# Variable speed drives

# **Altivar 71**

Catalogue
October

07




For 3-phase motors from 0.37 to 630 kW

a brand of Schneider Electric

Telemecanique

# Simply Smart !

## telemecanique.com



This international site allows you to access all the Telemecanique products in just 2 clicks via comprehensive range data-sheets, with direct links to:

- Complete library: technical documents, catalogs, certificates, FAQs, brochures...
- Selection guides from the e-catalog.
- Product discovery sites and their Flash animations.

You will also find illustrated overviews, news to which you can subscribe, a discussion forum, the list of country contacts...
To live automation solutions every day!



### *Flexibility*

- Interchangeable modular functions, to better meet the requirements for extensions
- Software and accessories common to multiple product families



### *Ingenuity*

- Auto-adapts to its environment, “plug & play”
- Application functions, control, communication and diagnostics embedded in the products
- User-friendly operation either directly on the product or remotely



### *Simplicity*

- Cost effective “optimum” offers that make selection easy for most typical applications
- Products that are easy to understand for users, electricians and automation specialists
- User-friendly intuitive programming



### *Compactness*

- High functionality in a minimum of space
- Freedom inimplementation



### *Openness*

- Compliance with field bus, connection, and software standards
- Enabling decentralised or remote surveillance via the web with Transparent Ready products

# Contents

# Variable speed drives
# Altivar 71


*Selection guide* . . . . . *page 2*

■ **Presentation** . . . . . *page 4*

■ **Variable speed drives**

□ characteristics . . . . . *page 10*
□ operation . . . . . *page 18*
□ UL type 1/IP 20 and UL type 12/IP 54 variable speed drives . . . . . *page 22*
□ accessories for UL type 1/IP 20 and UL type 12/IP 54 variable speed drives . . . . . *page 26*
□ pre-equipped IP 54 floor-standing enclosure kit . . . . . *page 39*
□ IP 23 or IP 54 floor-standing enclosure compact version . . . . . *page 52*
□ UL Type 12/IP 54 drives with Vario . . . . . *page 78*
□ IP 54 floor-standing enclosure with separate air flows . . . . . *page 86*

■ **Options**

□ dialogue . . . . . *page 108*
□ encoder interface cards . . . . . *page 110*
□ I/O extension cards . . . . . *page 114*
□ “Controller Inside” programmable card . . . . . *page 116*
□ communication buses and networks . . . . . *page 124*
□ resistance braking units . . . . . *page 134*
□ braking resistors . . . . . *page 136*
□ hoist resistors . . . . . *page 138*
□ network braking units . . . . . *page 148*
□ reduction of current harmonics:
- DC chokes . . . . . *page 155*
- line chokes . . . . . *page 160*
- passive filters . . . . . *page 162*
- additional EMC input filters . . . . . *page 168*
□ output filters:
- motor chokes . . . . . *page 172*
- sinus filters . . . . . *page 175*

■ **Combinations of variable speed drives and options** . . . . . *page 176*

■ **Dimensions** . . . . . *page 188*

■ **Schemes** . . . . . *page 218*

■ **Motor starters** . . . . . *page 242*

■ **Mounting recommendations** . . . . . *page 250*

■ **Combinations of functions and applications** . . . . . *page 266*

■ **Functions** . . . . . *page 268*

■ **Compatibility table for functions** . . . . . *page 300*

■ **PowerSuite software workshop** . . . . . *page 302*

■ **Communication via ModBus TCP Network** . . . . . *page 306*

■ **Communication via Fipio bus** . . . . . *page 312*

■ **Communication via Modbus serial link** . . . . . *page 316*

■ **Communication via Modbus Plus network** . . . . . *page 320*

■ **Communication via Uni-Telway serial link** . . . . . *page 324*

■ **Communication gateways LUF P** . . . . . *page 326*

■ **Communication gateway LA9 P307** . . . . . *page 330*

# Variable speed drives for asynchronous and synchronous motors

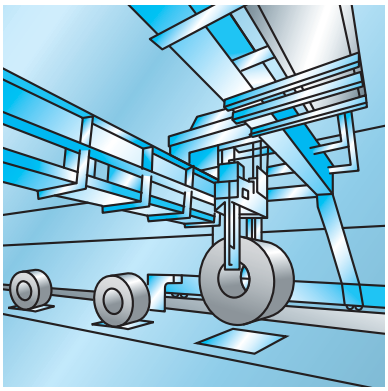
| Type of machine | | Simple machines | | Pumps and fans (building (HVAC) *(1)* |
|---|---|---|---|---|
| | |  |  |  |
| **Power range for 50…60 Hz (kW) line supply** | | **0.18…2.2** | **0.18…15** | **0.75…75** |
| | Single-phase 100…120 V (kW) | 0.18…0.75 | – | – |
| | Single-phase 200…240 V (kW) | 0.18…2.2 | 0.18…2.2 | – |
| | Three-phase 200…230 V (kW) | 0.18…2.2 | – | – |
| | Three-phase 200…240 V (kW) | – | 0.18…15 | 0.75…30 |
| | Three-phase 380…480 V (kW) | – | – | 0.75…75 |
| | Three-phase 380…500 V (kW) | – | 0.37…15 | – |
| | Three-phase 525…600 V (kW) | – | 0.75…15 | – |
| | Three-phase 500…690 V (kW) | – | – | – |
| **Drive** | Output frequency | 0.5…200 Hz | 0.5…500 Hz | 0.5…200 Hz |
| | Type of control – Asynchronous motor | Sensorless flux vector control | | Sensorless flux vector control, voltage/frequency ratio (2 points), energy saving ratio |
| | Type of control – Synchronous motor | – | | – |
| | Transient overtorque | 150…170% of the nominal motor torque | 180% of the nominal motor torque for 2 seconds | 110% of the nominal motor torque |
| **Functions** | | | | |
| Number of functions | | 26 | 50 | 50 |
| Number of preset speeds | | 4 | 16 | 7 |
| Number of I/O | Analog inputs | 1 | 3 | 2 |
| | Logic inputs | 4 | 6 | 3 |
| | Analog outputs | – | 1 | 1 |
| | Logic outputs | 1 | – | – |
| | Relay outputs | 1 | 2 | 2 |
| **Communication** | Integrated | – | Modbus and CANopen | Modbus |
| | Available as an option | – | Modbus TCP, DeviceNet, Fipio, PROFIBUS DP | LonWorks, METASYS N2, APOGEE FLN, BACnet |
| **Cards** (available as an option) | | – | – | – |
| **Standards and certifications** | | IEC/EN 61800-5-1, IEC/EN 61800-3 (environments 1 and 2) | | |
| | | EN 55011: Group 1, class A and class B. CE, UL, CSA, C-Tick, N998 | EN 55011: Group 1, class A and class B with option card, CE, UL, CSA, C-Tick, N998 | EN 55011: Group 1, class A and class B with option card, CE, UL, CSA, C-Tick, NOM 117 |
| **References** | | **ATV 11** | **ATV 31** | **ATV 21** |
| **Pages** | | Please consult our “Soft starters and variable speed drives” catalogue | | |

*(1) Heating, Ventilation and Air Conditioning*

| Pumps and fans (industrial) | Complex machines |
|---|---|
|  |    |
| **0.37…800** | **0.37…630** |
| – | – |
| 0.37…5.5 | 0.37…5.5 |
| – | – |
| 0.75…90 | 0.37…75 |
| 0.75…630 | 0.75…500 |
| – | – |
| – | – |
| 2.2…800 | 1.5…630 |
| 0.5…500 Hz for the entire range<br>0.5…1000 Hz up to 37 kW at 200…240 V ∿ and 380…480 V ∿ | 1…500 Hz across the entire range<br>1…1600 Hz up to 37 kW at 200…240 V ∿ and 380…480 V ∿ |
| Sensorless flux vector control,<br>voltage/frequency ratio (2 or 5 points), energy saving ratio | Sensor/sensorless flux vector control, voltage/frequency ratio (2 or 5 points),<br>ENA System |
| – | Vector control with or without speed feedback |
| 120...130% of the nominal motor torque for 60 seconds | 220% of the nominal motor torque for 2 seconds<br>170% for 60 seconds |
| > 100 | > 150 |
| 8 | 16 |
| 2…4 | 2…4 |
| 6…20 | 6…20 |
| 1…3 | 1…3 |
| 0…8 | 0…8 |
| 2…4 | 2…4 |
| Modbus and CANopen | |
| Modbus TCP, Fipio, Modbus/Uni-Telway, Modbus Plus, EtherNet/IP, DeviceNet, PROFIBUS DP, InterBus, CC-Link, LonWorks, METASYS N2, APOGEE FLN, BACnet | Modbus TCP, Fipio, Modbus/Uni-Telway, Modbus Plus, EtherNet/IP, DeviceNet, PROFIBUS DP, InterBus, CC-Link |
| I/O extension cards,<br>"Controller Inside" programmable card,<br>multi-pump cards | Interface cards for incremental, resolver or absolute encoders,<br>I/O extension cards,<br>"Controller Inside" programmable card |
| IEC/EN 61800-5-1, IEC/EN 61800-3 (environments 1 and 2, C1 to C3), EN 55011, IEC/EN 61000-4-2/4-3/4-4/4-5/4-6/4-11<br>CE, UL, CSA, DNV, C-Tick, NOM 117, GOST | |
| **ATV 61** | **ATV 71** |
| Please consult our "Altivar 61 speed drives" catalogue and our "Soft starters and variable speed drives" catalogue | 22 to 25 |

# Variable speed drives
Altivar 71

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*Hoisting application*

## Applications

With its different types of motor control and numerous integrated functions, the Altivar 71 range of variable speed drives meets the most stringent requirements. It is suitable for the most demanding drive systems:

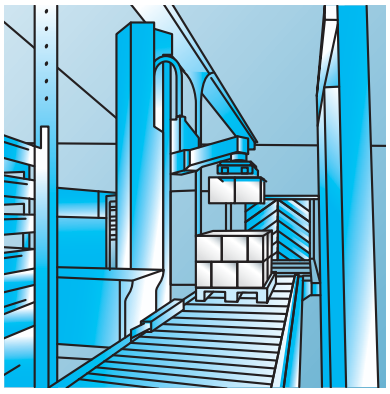
- Torque and speed accuracy at very low speed, high dynamic performance with sensor/sensorless flux vector control
- Extended frequency range for high-speed motors
- Parallel connection of motors and special drives using the voltage/frequency ratio
- Static speed accuracy and energy saving for open-loop synchronous motors
- Smooth flexibility for unbalanced machines with the ENA (ENergy Adaptation) System

In conjunction with the wide voltage range for a 690 V ∿ line supply,the functions provided by the Altivar 71 drive boost performance levels and make machines more flexible to use for a large number of applications.

### Hoisting

- Brake control tailored for translational, hoisting and slewing movements
- Load measurement using weight sensor
- High-speed hoisting
- Brake feedback management
- Limit switch management
- Slack sling

536800



*Packing application*

### Handling

- Very quick response times on transmission of a command: 2 ms (± 0.5 ms)
- Reference via pulse train or differential analog input
- Control via the principal communication networks
- Position control via limit switches with time optimization at low speed
- Multiple parameter settings via parameter set switching

### Packing

- Up to 50 Hz of the bandwidth
- Very quick response times on change of reference: 2 ms (± 0.5 ms)
- Control via integrated CANopen machine bus
- Position control via limit switches

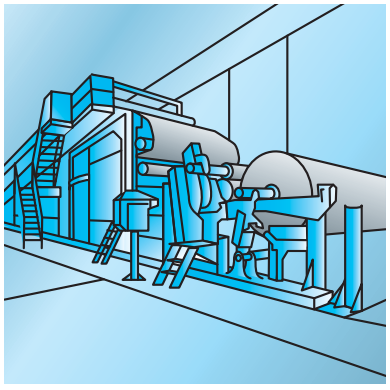
### Textile machines

- High-resolution digital speed reference (1/32000)
- Speed accuracy ensured on the basis of a synchronous motor, irrespective of load
- High bandwidth
- Spooling function
- Connection to common DC bus
- Control of both asynchronous and synchronous motors supported
- High-performance speed loop

### Wood-working machines

- Operation up to 1600 Hz
- Fastest possible controlled stop on loss of line supply
- Control via integrated CANopen machine bus
- Protection of motor against overvoltages

536801



*Process machinery application*

### Process machines

- PID regulator
- High-resolution references
- Speed or torque control
- Connection to the principal communication networks
- Separate control section power supply
- Braking unit via re-injection to the line supply
- Connection to common DC bus

### Lifts

- Brake control tailored for passenger comfort
- Processing of load measurement by weight sensor
- Conformity of relays to lift safety standard EN 81-13-2-2-3
- Connection to CANopen machine bus
- Control and integrity check of output contactor
- Lift car clearance function
- Control of both asynchronous and synchronous motors supported
- Lift macro-configuration

Characteristics: pages 10 to 17
References: pages 22 to 25
Dimensions: pages 188 to 217
Schemes: pages 218 to 241
Functions: pages 268 to 299

537093



*ATV 71HC28N4,*
*ATV 71HD37M3X, ATV 71HU22N4*

## Comprehensive offer

The Altivar 71 range of variable speed drives covers various motor power ratings from 0.37 kW to 630 kW with three types of power supply:
- 200…240 V single-phase, 0.37 kW to 5.5 kW, UL Type 1/IP 20, (**ATV 71H●●●M3**)
- 200…240 V three-phase, 0.37 kW to 75 kW, UL Type 1/IP 20, (**ATV 71H●●●M3** and **ATV 71H●●●M3X**)
- 380…480 V three-phase, 0.75 kW to 500 kW, UL Type 1/IP 20, (**ATV 71H●●●N4**)
- 500…690 V three-phase, 1.5 kW to 630 kW, UL Type 1/IP 20, (**ATV 71H●●●Y**)

This range can be used for controlling asynchronous motors in sensor/sensorless flux vector control mode as well as synchronous motors with sinusoidal electromotive force when there is no speed feedback.
At 200…240 V ∿ and 380…480 V ∿, there is a special version available that can be used for controlling synchronous motors with sinusoidal electromotive force when there is speed feedback.
Control of the motors referred to above is still supported (see pages 22, 23 and 110).
All the options supported by the Altivar 71 range of variable speed drives are also available with this version when an identical rating is used.

The Altivar 71 drive integrates the Modbus and CANopen protocols as standard, as well as numerous functions. These functions can be extended using communication option cards, I/O extension cards, a "Controller Inside" programmable card or an encoder interface option card, see page 9.

External options such as braking resistors, resistance braking units and filters complete the offer, see page 9.

The entire range conforms to international standards IEC/EN 61800-5-1, IEC/EN 61800-2, IEC/EN 61800-3, is UL, CSA, DNV, C-Tick, NOM 117 and GOST certified and has been developed to meet the requirements of directives regarding the protection of the environment (RoHS, WEEE, etc.) as well as those of European Directives (CE marking).

### Functional safety and ATEX applications *(1)*

The Altivar 71 variable speed drive features a safety function that is designed to ensure a motor stop and prevent accidental restarts.
This Power Removal safety function means that the drive can be installed as part of the safety system for an electrical/electronic/programmable electronic control system in order to ensure the safety of a machine or industrial process.
This function meets the requirements of category 3 of the EN 954-1 machine safety standard, SIL 2 of IEC/EN 61508 and the standard dealing with the functional safety requirements of power drive products: IEC/EN 61800-5-2.

The Power Removal function also enables the Altivar 71 variable speed drive to offer protection for motors that are installed in explosive atmospheres (ATEX), see pages 220 and 221.

### Electromagnetic compatibility

Reducing harmonics and observing requirements in respect of electromagnetic compatibility were considered right from the design stage.
The incorporation of EMC filters in **ATV 71H●●●M3**, **ATV 71●●●●N4, ATV 71H●●●Y, ATV 71P●●●N4Z** drives and the recognition of EMC requirements facilitates installation and provides an economical means of ensuring machines meet CE marking requirements.

The **ATV 71H●●●M3X** drives have been designed without an EMC filter. Filters are available as an option and can be installed by the user to reduce emission levels, see pages 166 to 169.

*(1) Please refer to the ATEX guide available on our website at "www.telemecanique.com".*

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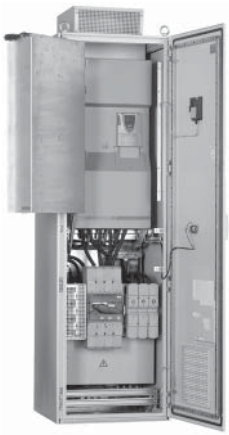
*ATV 71W075N4*

PF524498



*Kit VW3 A9 544*

PF536936



*ATV 71EXC2●●●N4*

107481



*ATV 71PU40N4Z*

## Standard versions

The Altivar 71 UL Type1/IP 20 range of variable speed drives offers various standard versions.

### Versions with IP 54 degree of protection for difficult environments

To meet the requirements of applications in difficult environments (dusty, humid, etc.), drives can be supplied individually or inside a floor-standing enclosure:

■ A drive version with UL Type 12/IP 54 degree of protection (see page 24):
□ 380…480 V ∿, 0.75 kW to 75 kW (**ATV 71W●●●N4**)

■ A drive version with UL Type 12/IP 54 degree of protection and featuring a Vario switch disconnector (see pages 76 to 79):
□ 380…480 V ∿ , 0.75 to 75 kW (**ATV 71E5●●●N4**)

■ A drive version ready-assembled in an IP 54 floor-standing enclosure (see pages 80 to 93):
□ 380…415 V ∿ , 90 kW to 500 kW (**ATV 71EXS5●●●N4**)
□ 500 V and 600…690 V ∿ , 90 kW to 630 kW (**ATV 71EXS5●●●N** and **ATV 71EXS5●●●Y**)
The **ATV 71EXS5●●●N4**, **ATV 71EXS5●●●N** and **ATV 71EXS5●●●Y** products have been designed for easy set-up in highly polluted environments and, in particular, to ensure optimum enclosure ventilation by keeping the control and power air circuits separate.

■ A preassembled kit for creating an IP 54-certified floor-standing enclosure (see pages 36 to 45):
This straightforward and cost-effective solution, which is available by quoting a single reference, provides you with all the mechanical components you need to create an IP 54 floor-standing enclosure (**VW3 A9 541**…**VW3 A9 551**).
This product has been designed for compatibility with Altivar 71 UL Type 1/IP 20 drives, 90 kW to 500 kW at 380…480 V ∿ (ATV 71HD90N4…HC50N4).

### Compact floor-standing enclosure versions for industrial environments and infrastructure contexts

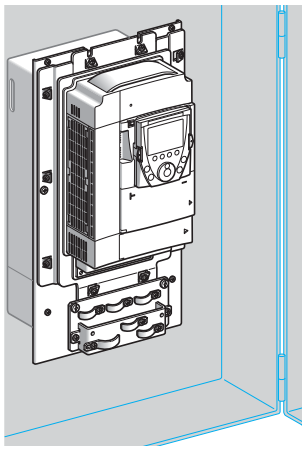
The following product is available to facilitate set-up in industrial environments and infrastructure contexts (tunnels, treatment plants, etc.):
■ A drive version ready-assembled in an IP 23 or IP 54 compact floor-standing enclosure (see pages 46 to 59):
□ 380…415 V ∿ , 90 kW to 500 kW (**ATV 71EXC●●●●N4**)
□ 500 V ∿ , 90 kW to 630 kW (**ATV 71EXC●●●●N**)
□ 600…690 V ∿ , 90 kW to 630 kW (**ATV 71EXC●●●●Y**)

### Version for environments where no ventilation is permitted

Thefollowing product is available to meet the requirements of applications where the necessary degree of protection rules out the possibility of ventilation:
■ **A drive on base plate version:**
□ 380…480 V ∿ , 0.75 to 11 kW (**ATV 71P●●●N4Z**), see page 24

As the drive is not equipped with a fan as standard, a DC choke (see page 155) must be added in order to prevent overheating during operation.
In environments supporting the use of ventilation, the DC choke (see page 155) must be replaced by a fan (see page 31).

DF536808



*ATV 71HU75N4 flush-mounted*

## Mounting options

The Altivar 71 drive can be mounted in a variety of ways for integration into machines.

### Mounting outside enclosure

The standard version of the Altivar 71 (on heatsink) or the base plate version can be mounted directly on a wall without having to be installed inside an enclosure.
UL Type 1 conformity can be achieved using kit **VW3 A9 2●●**, and IP 21 or IP 31 using kit **VW3 A9 1●●** (see pages 32 and 33).

### Flush-mounting in a dust-proof and damp-proof enclosure

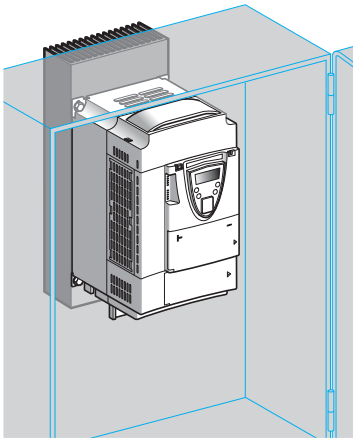
The Altivar 71 drive has been designed to optimize the size of enclosures (floor-standing, wall-mounted, etc).
This type of flush-mounting can be used to reduce the size of enclosure required and to limit the temperature rise inside the enclosure:

- The power section, with IP 54 degree of protection, can be easily mounted outside the enclosure using kit **VW3 A9 5●●** for flush-mounting in a dust-proof and damp-proof enclosure, see page 30.
- This type of mounting can lead to ambient temperatures of up to 60°C inside the enclosure without derating.

It may be necessary to use a control card fan kit **VW3 A9 4●●** appropriate for the drive rating in order to avoid hot spots, see page 27

- This option permits mounting side-by-side, see pages 250 and 253.

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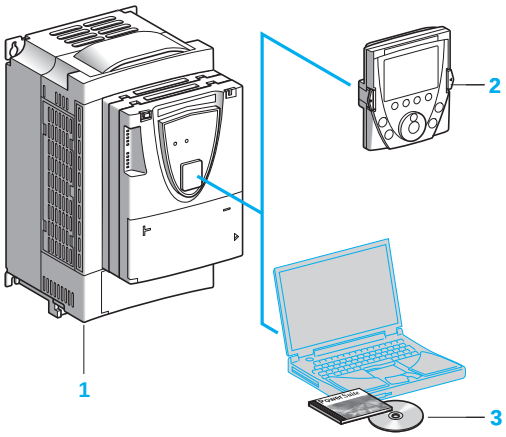


*ATV 71PU75N4Z in dust and damp proof enclosure*

### Mounting in a dust-proof and damp-proof enclosure or on machine frame

The Altivar 71 drive on base plate supports two mounting options:

- In a dust-proof and damp-proof enclosure, using kit **VW3 A9 80●** for dust-proof and damp-proof mounting (see page 31), which has been designed to dissipate heat via a heatsink mounted outside the enclosure
- On a machine frame, where this frame's earth allows the heat to be dissipated




## Dialogue tools

The Altivar 71 **1** is supplied with a remote graphic display terminal **2**:
- The navigation button can be used to access the drop-down menus quickly and easily.
- The graphic screen displays 8 lines of 24 characters of plain text.
- The advanced functions on the display unit can be used to access the more complex drive functions with ease.
- The display screens, menus and parameters can all be customized for the user or the machine.
- Online help screens are available.
- Configurations can be stored and downloaded (four configuration files can be stored).
- The drive can be connected to several other drives via a multidrop link.
- It can be located remotely on a floor-standing enclosure door with IP 54 or IP 65 degree of protection (UL Type 1/IP 20 drives) or built in (UL Type12/IP 54 drives).
- It is supplied with six languages installed as standard (Chinese, English, French, German, Italian and Spanish). Other languages can be loaded to the flash memory.

Up to 15 kW at 200…240 V ∿ and 75 kW at 380…480 V ∿, the Altivar 71 can be controlled using an integrated 7-segment display terminal, see pages 22 and 23.
At all ratings from 500…690 V ∿, the drive is supplied with an integrated 7-segment display terminal and a remote graphic display terminal.

The PowerSuite software workshop **3** can be used to configure, adjust, test and maintain the Altivar 71 in the same way as for all other Telemecanique variable speed drives and starters. It can be used via a direct connection, Ethernet, modem or a Bluetooth® wireless connection.

536803

| RUN | Term | +50.00Hz | 5.4A |
|---|---|---|---|
| 1.1 SIMPLY START | | | |
| **Cde 2 fils/3 fils** | : | **Cde 2 fils** | |
| Macro-configuration | : | Manutention | |
| Standard fréq. mot | : | 50Hz IEC | |
| Puissance nom. mot | : | 2.2kW | |
| Tension nom. mot | : | 400V | |
| Code | << | >> | Quick |

*Quick programming:*
*"Simply Start" menu*

536804

| SCF1 | Term | +50.00Hz | 0.0A |
|---|---|---|---|
| HISTORIQUE DEFAUTS | | | |
| Court-circuit mot. | | | |
| Surintensité | | | |
| Déf. Externe LI | | | |
| Surtension réseau | | | |
| Soustension | | | |
| Help | | | Quick |

*Services:*
*Fault log*

536805

| SCF1 | Term | +50.00Hz | 0.0A |
|---|---|---|---|
| COURT-CIRCUIT MOTEUR | | | |
| Vérifier les câbles de liaison et l'isolement du moteur. | | | |
| Effectuer un test de diagnostic | | | |
| | | | Quick |

*Services:*
*Troubleshooting screen*

## Quick programming

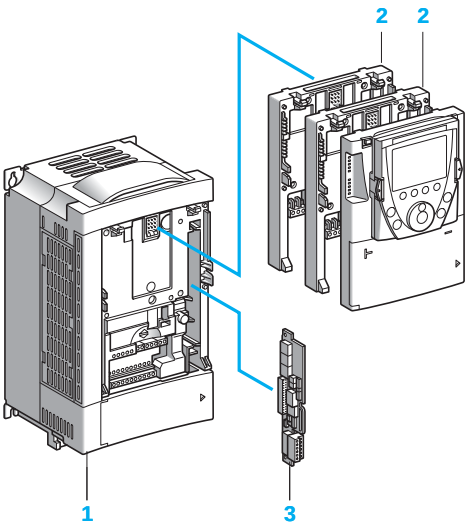
**Macro-configuration**
The Altivar 71 offers quick and easy programming using macro-configurations corresponding to different applications or uses: start-stop, handling, hoisting, general use, connection to communication networks, PID regulator, master/slave and lift applications (for synchronous motors with speed feedback).
Each of these configurations is still fully modifiable.

**Simply Start menu**
The Simply start menu can be used to ensure that the application is working correctly, maximize motor performance and ensure motor protection.

The architecture, the hierarchical parameter structure and the direct access functions all serve to make programming quick and easy, even for the more complex functions.

## Services

The Altivar 71 has numerous built-in maintenance, monitoring and diagnostic functions:
- Built-in drive test functions with diagnostic screen on the remote graphic display terminal
- I/O maps
- Communication maps for the different ports
- Oscilloscope function that can be viewed using the PowerSuite software workshop
- Management of the drive installed base via microprocessors with flash memory
- Remote use of these functions by connecting the drive to a modem via the Modbus port
- Identification of all the drive's component parts as well as the software versions
- Fault logs that can display the values for up to 16 variables in the event of a fault
- Display terminal languages loaded in the flash memory
- A message of up to 5 lines of 24 characters can be stored in the drive.

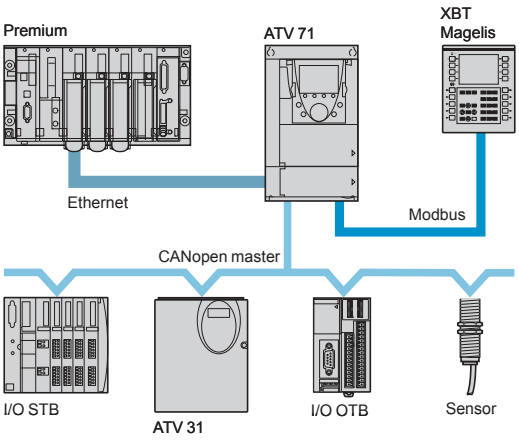



## Options

The Altivar 71 drive **1** can accommodate a maximum of three option cards simultaneously, comprising:
■ 2 from the following list *(1)*:
□ I/O extension cards **2**, see pages 114 and 115
□ Communication cards **2** (Modbus TCP, Fipio, Modbus/Uni-Telway, Modbus Plus, EtherNet/IP, DeviceNet, PROFIBUS DP, etc.), see pages 124 to 133
□ "Controller Inside" programmable card **2** This is used to adapt the drive to specific applications quickly and progressively, by decentralizing the control system functions (programming in IEC/EN 61131-3 languages), see pages 116 to 123
■ 1 encoder interface card **3** (with RS 422-compatible differential outputs; with open collector outputs (NPN); with push-pull outputs; resolver; with SinCos, SinCos Hiperface®, EnDat®, or SSI universal outputs; with RS 422-compatible differential outputs plus encoder emulation (RS 422 ESIM)), see pages 110 to 113

Various external options can be combined with the Altivar 71:
■ Braking units and resistors (standard or hoist-specific), see pages 134 to 147
■ Network braking units, see pages 148 to 151
■ DC chokes, line chokes and passive filters (to reduce harmonic currents), see pages 152 to 165
■ Additional EMC input filters, see pages 166 to 169
■ Motor chokes and sinus filters for long cable runs or to remove the need for shielding, see pages 170 to 175

***Note:** Please refer to the compatibility summary tables to determine which options are available for individual drives, see pages 176 to 187.*




*Example of a drive equipped with a communication card and a "Controller Inside" programmable card*

## Integration into control systems

The Altivar 71 features a combined Modbus or CANopen port for quick, accurate motion control, adjustment, monitoring and configuration. A second port is available for connecting a Magelis terminal for machine dialogue.

The Altivar 71 can also be connected to other communication networks using the communication option cards. The following communication protocols are supported: Modbus TCP, Fipio, Modbus, Uni-Telway, Modbus Plus, EtherNet/IP, DeviceNet, PROFIBUS DP, InterBus and CC-Link (see pages 124 to 133).

The fact that the control section can be powered separately means that communication (monitoring, diagnostics) can be maintained even if there is no power supply to the control section.

The "Controller Inside" programmable card transforms the drive into an automation island:
■ The card features its own I/O; it can also manage those of the drive and an I/O extension card.
■ It contains onboard application programs developed in IEC/EN 61131-3 languages, which reduce the control system response time.
■ Its CANopen master port enables control of other drives and dialogue with I/O modules and sensors.

*(1) The Altivar 71 cannot support more than one option card with the same reference.*

# Variable speed drives
Altivar 71

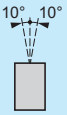
## Environmental characteristics

| | | | |
|---|---|---|---|
| **Conformity to standards** | | | Altivar 71 drives have been developed to conform to the strictest international standards and the recommendations relating to electrical industrial control devices (IEC, EN), in particular: low voltage, IEC/EN 61800-5-1, IEC/EN 61800-3 (conducted and radiated EMC immunity and emissions). |
| | EMC immunity | | IEC/EN 61800-3, environments 1 and 2<br>IEC/EN 61000-4-2 level 3; IEC/EN 61000-4-3 level 3<br>IEC/EN 61000-4-4 level 4; IEC/EN 61000-4-5 level 3<br>IEC/EN 61000-4-6 level 3; IEC/EN 61000-4-11 *(1)* |
| | Conducted and radiated EMC emissions for drives | | IEC/EN 61800-3, environments 1 and 2, categories C1, C2, C3 |
| | | ATV 71H037M3…HU22M3<br>ATV 71H075N4…HU40N4<br>ATV 71P075N4Z…PU40N4Z | EN 55011 class A group 1, IEC/EN 61800-3 category C2<br>With additional EMC filter *(2)*:<br>■ EN 55011 class B group 1, IEC/EN 61800-3 category C1 |
| | | ATV 71HU30M3…HU75M3<br>ATV 71HU55N4…HC50N4<br>ATV 71PU55N4Z…PU75N4Z | EN 55011 class A group 2, IEC/EN 61800-3 category C3<br>With additional EMC filter *(2)*:<br>■ EN 55011 class A group 1, IEC/EN 61800-3 category C2<br>■ EN 55011 class B group 1, IEC/EN 61800-3 category C1 |
| | | ATV 71H●●●M3X | With additional EMC filter *(2)*:<br>■ EN 55011 class A group 1, IEC/EN 61800-3 category C2<br>■ EN 55011 class B group 1, IEC/EN 61800-3 category C1 |
| | | ATV 71H●●●Y | EN 55011 class A group 2, IEC/EN 61800-3 category C3 |
| | | ATV 71W075N4…WU40N4 | EN 55011 class A group 1, IEC/EN 61800-3 category C2 |
| | | ATV 71WU55N4…WD75N4 | EN 55011 class A group 2, IEC/EN 61800-3 category C3<br>With additional EMC filter *(2)*:<br>EN 55011 class A group 1, IEC/EN 61800-3 category C2 |
| CE | | | The drives have CE marking in accordance with the European low voltage directives (2006/95/EC) and EMC (89/336/EEC). |
| **Product certification** | | ATV 71H●●●M3<br>ATV 71HD11M3X...HD45M3X<br>ATV 71HD55M3XD, HD75M3XD<br>ATV 71H075N4…HD75N4<br>ATV 71HD90N4D…HC50N4D<br>ATV 71H●●●Y | UL, CSA, C-Tick, NOM 117 and GOST<br>DNV with the dedicated kit, see pages 28 and 29 |
| | | ATV 71W●●●N4 | UL, CSA, C-Tick, NOM 117 and GOST |
| | | ATV 71P●●●N4Z | UL, CSA, C-Tick, NOM 117 |
| **Maximum ambient pollution**<br>Definition of insulation | | ATV 71H●●●M3<br>ATV 71HD11M3X, HD15M3X<br>ATV 71H075N4…HD18N4<br>ATV 71P●●●N4Z | Degree 2 conforming to IEC/EN 61800-5-1 |
| | | ATV 71HD18M3X…HD75M3X<br>ATV 71HD22N4…HC50N4<br>ATV 71H●●●Y<br>ATV 71W●●●N4 | Degree 2 conforming to IEC/EN 61800-5-1<br>Degree 3 in accordance with UL marking conforming to UL840 |
| **Degree of protection** | | | IEC/EN 61800-5-1, IEC/EN 60529 |
| | | ATV 71H●●●M3<br>ATV 71HD11M3X…HD45M3X<br>ATV 71H075N4…HD75N4<br>ATV 71HU22Y…HD90Y | IP 21 and IP 41 on upper part<br>IP 20 without blanking plate on upper part of cover<br>IP 54 on lower part (heatsink)<br>IP 21 with accessory VW3 A9 1●●, UL Type 1 with accessory VW3 A9 2●●, see pages 32 and 33 |
| | | ATV 71HD55M3X, HD75M3X<br>ATV 71HD90N4…HC50N4<br>ATV 71HC11Y…HC63Y | IP 00, IP 41 on upper part and IP 30 on front panel and side parts.<br>IP 54 on lower part (heatsink)<br>IP 31 with accessory VW3 A9 1●●, UL Type 1 with accessory VW3 A9 2●●, see pages 32 and 33 |
| | | ATV 71W●●●N4 | UL Type 12/IP 54 |
| **Vibration resistance** | | ATV 71H●●●M3<br>ATV 71HD11M3X…HD45M3X<br>ATV 71HU22Y…HD90Y<br>ATV 71H075N4…HD75N4<br>ATV 71W●●●N4<br>ATV 71P●●●N4Z | 1.5 mm peak to peak from 3…13 Hz, 1 gn from 13…200 Hz, conforming to IEC/EN 60068-2-6 |
| | | ATV 71HD55M3X, HD75M3X<br>ATV 71HD90N4…HC50N4<br>ATV 71HC11Y…HC63Y | 1.5 mm peak to peak from 3…10 Hz, 0.6 gn from 10…200 Hz, conforming to IEC/EN 60068-2-6 |

***Note** : Unless specifically indicated on pages 10 to 17, the characteristics of drives with a "S337","337", "383" or "A24" variant are identical, at equivalent ratings, to the standard drive.*

*(1) Drive behaviour according to the drive configurations, see pages 285, 288, 289, 297 and 298.*
*(2) See table on page 166 to check permitted cable lengths.*

## Environmental characteristics (continued)

| | | | |
|---|---|---|---|
| **Shock resistance** | ATV 71H●●●M3<br>ATV 71HD11M3X…HD45M3X<br>ATV 71H075N4…HD75N4<br>ATV 71HU22Y…HD90Y<br>ATV 71W●●●N4<br>ATV 71P●●●N4Z | | 15 gn for 11 ms conforming to IEC/EN 60068-2-27 |
| | ATV 71HD55M3X, HD75M3X<br>ATV 71HD90N4…HC13N4<br>ATV 71HC11Y…HC16Y | | 7 gn for 11 ms conforming to IEC/EN 60068-2-27 |
| | ATV 71HC16N4…HC50N4<br>ATV 71HC20Y…HC63Y | | 4 gn for 11 ms conforming to IEC/EN 60068-2-27 |
| **Environmental conditions**<br>Use | ATV 71H●●●M3,<br>ATV 71HD11M3X...HD45M3X<br>ATV 71H075N4…HD75N4<br>ATV 71P●●●N4Z | | IEC 60721-3-3 classes 3C1 and 3S2 |
| | ATV 71H●●●M3S337<br>ATV 71HD11M3X337...<br>HD45M3X337<br>ATV 71HD55M3X, HD75M3X<br>ATV 71H075N4S337…<br>HD75N4S337<br>ATV 71HD90N4…HC50N4<br>ATV 71H●●●Y<br>ATV 71W●●●N4<br>ATV 71W●●●N4A24 | | IEC 60721-3-3 class 3C2 |
| **Relative humidity** | | | 5…95% without condensation or dripping water conforming to IEC 60068-2-3 |
| **Ambient air temperature**<br>around the unit | Operation | **°C** | For ATV 71H●●●●● and ATV 71P●●●N4Z drives: - 10…+ 50 without derating<br>Up to + 60°C with derating and with the control card fan kit VW3 A9 4●● corresponding to the drive rating.<br>For ATV 71W●●●●● drives: - 10…+ 50 without derating.<br>See the derating curves on pages 251, 252, 254 to 258 and 265. |
| | Storage | **°C** | - 25…+ 70 |
| **Maximum operating altitude** | ATV 71H●●●M3<br>ATV 71H●●●M3X<br>ATV 71H●●●N4<br>ATV 71P●●●N4Z | **m** | 1000 without derating<br>1000…3000 derating the current by 1% per additional 100 m. Limited to 2000 m for the “Corner Grounded” distribution network |
| | ATV 71H●●●Y | **m** | 1000 without derating<br>1000…2260 derating the current by 1% per additional 100 m. |
| **Operating position**<br>Maximum permanent angle in relation to the normal vertical mounting position | | |  |

## Drive characteristics

| | | | |
|---|---|---|---|
| **Output frequency range** | ATV 71H●●●M3<br>ATV 71HD11M3X…HD37M3X<br>ATV 71H075N4…HD37N4<br>ATV 71W075N4…WD37N4<br>ATV 71P●●●N4Z | **Hz** | 0…1600 |
| | ATV 71HD45M3X…HD75M3X<br>ATV 71HD45N4…HC50N4<br>ATV 71H●●●Y<br>ATV 71WD45N4…WD75N4 | **Hz** | 0…500 |
| **Configurable switching frequency** | ATV 71H●●●M3<br>ATV 71HD11M3X, HD15M3X<br>ATV 71H075N4…HD30N4<br>ATV 71W075N4…WD30N4<br>ATV 71P075N4Z…PD11N4Z | **kHz** | Nominal switching frequency: 4 kHz without derating in continuous operation.<br>Adjustable during operation from 1…16 kHz<br>Above 4 kHz, see the derating curves on pages 251 and 265. |
| | ATV 71HD18M3X, HD45M3X<br>ATV 71HD37N4…HD75N4<br>ATV 71WD37N4…WD75N4 | **kHz** | Nominal switching frequency: 2.5 kHz without derating in continuous operation.<br>Adjustable during operation from 1…16 kHz<br>Above 2.5 kHz, see the derating curves on pages 251 and 265 |
| | ATV 71HD55M3X, HD75M3X<br>ATV 71HD90N4…HC50N4 | **kHz** | Nominal switching frequency: 2.5 kHz without derating in continuous operation.<br>Adjustable during operation from 2.5…8 kHz<br>Above 2.5 kHz, see the derating curves on pages 254 to 256 |
| | ATV 71HU22Y…HD30Y | **kHz** | Nominal switching frequency: 4 kHz without derating in continuous operation.<br>Adjustable during operation from 2.5…6 kHz<br>Above 4 kHz, see the derating curves on page 252 |
| | ATV 71HD37Y…HC63Y | **kHz** | Nominal switching frequency: 2.5 kHz without derating in continuous operation.<br>Adjustable during operation from 2.5…4.9 kHz<br>Above 2.5 kHz, see the derating curves on pages 252 and 258 |
| **Speed range** | ATV 71H●●●M3<br>ATV 71H●●●M3X<br>ATV 71●●●●N4<br>ATV 71H●●●Y<br>ATV 71P●●●N4Z | | Asynchronous motor:<br>■ 1…1000 in closed-loop mode with encoder feedback<br>■ 1…100 in open-loop mode without speed feedback<br>Synchronous motor:<br>■ 1…50 in open-loop mode without speed feedback |
| | ATV 71H●●●M3383<br>ATV 71H●●●M3X383<br>ATV 71H●●●N4383 | | Asynchronous motor:<br>■ 1…1000 in closed-loop mode with encoder feedback<br>■ 1…100 in open-loop mode without speed feedback<br>Synchronous motor:<br>■ 1…1000 in closed-loop mode with encoder feedback<br>■ 1…50 in open-loop mode without speed feedback |
| **Speed accuracy** | For a torque variation of 0.2 Tn to Tn | | ± 0.01% of nominal speed, in closed-loop mode with encoder feedback<br>± 10% of nominal slip, without speed feedback |
| **Torque accuracy** | | | ± 5% in closed-loop mode with encoder feedback<br>± 15% in open-loop mode without speed feedback |
| **Transient overtorque** | | | 170% of the nominal motor torque (typical value at ± 10%) for 60 s<br>220% of the nominal motor torque (typical value at ± 10%) for 2 s |
| **Braking torque** | | | 30% of nominal motor torque without braking resistor (typical value)<br>Up to 150% with braking or hoist resistor installed as an option, see pages 137 and 139 |
| **Maximum transient current** | | | 150% of the nominal drive current for 60 s (typical value)<br>165% of the nominal drive current for 2 s (typical value) |
| **Permanent torque at 0 Hz** | ATV 71H037M3…HD45M3X<br>ATV 71H075N4…HD75N4<br>ATV 71HU22Y…HD90Y<br>ATV 71W●●●N4<br>ATV 71P●●●N4Z | | The Altivar 71 drive can continuously supply the peak value of the nominal drive current |
| | ATV 71HD55M3X, HD75M3X<br>ATV 71HD90N4…HC50N4<br>ATV 71HC11Y…HC63Y | | The Altivar 71 drive can continuously supply 80% of the peak value of the nominal drive current |
| **Motor control profile** | ATV 71H●●●M3<br>ATV 71H●●●M3X<br>ATV 71●●●●N4<br>ATV 71H●●●Y<br>ATV 71P●●●N4Z | | Asynchronous motor:<br>■ Flux Vector Control (FVC) with sensor (current vector)<br>■ Sensorless Flux Vector Control (SFVC) (voltage or current vector)<br>■ Voltage/frequency ratio (2 or 5 points)<br>■ ENA (Energy Adaptation) System for unbalanced loads<br>Synchronous motor:<br>■ Vector control without speed feedback |
| | ATV 71H●●●M3383<br>ATV 71H●●●M3X383<br>ATV 71H●●●N4383 | | Asynchronous motor:<br>■ Flux Vector Control (FVC) with sensor (current vector)<br>■ Sensorless Flux Vector Control (SFVC) (voltage or current vector)<br>■ Voltage/frequency ratio (2 or 5 points)<br>■ ENA (Energy Adaptation) System for unbalanced loads<br>Synchronous motor:<br>■ Vector control with speed feedback<br>■ Vector control without speed feedback |
| **Frequency loop** | | | PI regulator with adjustable structure for a speed response adapted to the machine (accuracy, speed) |
| **Slip compensation** | | | Automatic whatever the load. Can be suppressed or adjusted<br>Not available in voltage/frequency ratio |

Presentation: pages 4 to 9
References: pages 22 to 25
Dimensions: pages 188 to 217
Schemes: pages 218 to 241
Functions: pages 268 to 299

## Electrical power characteristics

| | | | |
|---|---|---|---|
| **Power Supply** | Voltage | **V** | 200 - 15%...240 + 10% single phase for ATV 71H075M3...HU75M3<br>200 - 15%...240 + 10% three-phase for ATV 71H●●●M3 and ATV 71H●●●M3X<br>380 - 15%...480 + 10% three-phase for ATV 71●●●●N4 and ATV 71P●●●N4Z<br>500 - 15%…690 + 10% three-phase for ATV 71H●●●Y |
| | Frequency | **Hz** | 50 - 5%...60 + 5% |
| **Signalling** | | | 1 red LED: LED lit indicates the presence of drive voltage |
| **Output voltage** | | | Maximum three-phase voltage equal to line supply voltage |
| **Drive noise level** | | | Conforming to directive 86-188/EEC |
| | ATV 71H037M3…HU15M3<br>ATV 71H075N4…HU22N4<br>ATV 71W075N4…WU22N4 | **dBA** | 43 |
| | ATV 71HU22M3…HU40M3<br>ATV 71HU30N4, HU40N4<br>ATV 71WU30N4, WU40N4 | **dBA** | 54.5 |
| | ATV 71HU55M3<br>ATV 71HU55N4, HU75N4<br>ATV 71WU55N4, WU75N4 | **dBA** | 55.6 |
| | ATV 71HU75M3<br>ATV 71HD11N4<br>ATV 71WD11N4 | **dBA** | 57.4 |
| | ATV 71HD11M3X, HD15M3X<br>ATV 71HD15N4, HD18N4<br>ATV 71WD15N4, WD18N4 | **dBA** | 60.2 |
| | ATV 71HD18M3X, HD22M3X<br>ATV 71HD22N4<br>ATV 71HU22Y…HD30Y<br>ATV 71WD22N4 | **dBA** | 59.9 |
| | ATV 71HD30M3X…HD45M3X,<br>ATV 71HD30N4, HD37N4<br>ATV 71WD30N4, WD37N4 | **dBA** | 64 |
| | ATV 71HD45N4…HD75N4<br>ATV 71HD37Y…HD90Y<br>ATV 71WD45N4…WD75N4 | **dBA** | 63.7 |
| | ATV 71HD55M3X<br>ATV 71HD90N4 | **dBA** | 60.5 |
| | ATV 71HD75M3X<br>ATV 71HC11N4 | **dBA** | 69.5 |
| | ATV 71HC13N4, HC16N4 | **dBA** | 66 |
| | ATV 71HC20N4…HC50N4<br>ATV 71HC11Y…HC63Y | **dBA** | 77 |
| | ATV 71P075N4Z…PU22N4Z | **dBA** | 0<br>With fan kit: 43 |
| | ATV 71PU30N4Z, PU40N4Z | **dBA** | 0<br>With fan kit: 54.5 |
| | ATV 71PU55N4Z, PU75N4 | **dBA** | 0<br>With fan kit: 55.6 |
| | ATV 71PD11N4Z | **dBA** | 0<br>With fan kit: 57.4 |
| **Electrical isolation** | | | Between power and control (inputs, outputs, power supplies) |

## Connection cable characteristics

| | | | |
|---|---|---|---|
| **Type of cable for** | Mounting in an enclosure | | Single-strand IEC cable, ambient temperature 45°C, copper 90°C XLPE/EPR or copper 70°C PVC |
| | Mounting in an enclosure with an IP 21 or IP 31 kit | | 3-strand IEC cable, ambient temperature 40°C, copper 70°C PVC |
| | Mounting in an enclosure with a NEMA Type 1 kit | | 3-strand UL 508 cable except for choke (2-strand UL 508 cable), ambient temperature 40°C, copper 75°C PVC |

## Connection characteristics (terminals for the power supply, the motor, the DC bus and the braking resistor)

| **Drive terminals** | | **L1/R, L2/S, L3/T, U/T1, V/T2, W/T3** | **PC/-, PO *(1)*, PA/+** | **PA, PB** |
|---|---|---|---|---|
| **Maximum wire size and tightening torque** | ATV 71H037M3…HU40M3<br>ATV 71H075N4…HU40N4<br>ATV 71W075N4…WU40N4<br>ATV 71P075N4Z…PU40N4Z | 4 mm², AWG 10<br>1.4 Nm, 12.3 lb.in | | |
| | ATV 71HU55M3<br>ATV 71HU55N4, HU75N4<br>ATV 71WU55N4, WU75N4<br>ATV 71PU55N4Z, PU75N4Z | 6 mm², AWG 8<br>3 Nm, 26.5 lb.in | | |
| | ATV 71HU75M3<br>ATV 71HD11N4<br>ATV 71WD11N4<br>ATV 71PD11N4Z | 16 mm², AWG 4<br>3 Nm, 26.5 lb.in | | |
| | ATV 71HD11M3X, HD15M3X<br>ATV 71HD15N4, HD18N4<br>ATV 71WD15N4, WD18N4 | 35 mm², AWG 2<br>5.4 Nm, 47.7 lb.in | | |
| | ATV 71HD18M3X, HD22M3X<br>ATV 71HD22N4…HD37N4<br>ATV 71HU22Y…HD30Y<br>ATV 71WD22N4…WD37N4 | 50 mm², AWG 1/0<br>12 Nm, 102.2 lb.in | | |
| | ATV 71HD30M3X…HD45M3X<br>ATV 71HD45N4…HD75N4<br>ATV 71HD37Y…HD90Y<br>ATV 71WD45N4…WD75N4 | 150 mm², 300 MCM<br>41 Nm, 360 lb.in | | |
| | ATV 71HD55M3X<br>ATV 71HD90N4 | 2 x 100 mm², 2 x 250 MCM<br>M10, 24 Nm, 212 lb.in | 2 x 100 mm², 2 x 250 MCM<br>M12, 41 Nm, 360 lb.in | 60 mm², 250 MCM<br>M8, 12 Nm, 106 lb.in |
| | ATV 71HD75M3X, HC11N4 | 2 x 100 mm², 2 x 250 MCM<br>M10, 24 Nm, 212 lb.in | 2 x 150 mm², 2 x 250 MCM<br>M12, 41 Nm, 360 lb.in | 60 mm², 250 MCM<br>M8, 12 Nm, 106 lb.in |
| | ATV 71HC13N4<br>ATV 71HC11Y…HC16Y | 2 x 120 mm², 2 x 250 MCM<br>M10, 24 Nm, 212 lb.in | 2 x 120 mm², 2 x 250 MCM<br>M10, 24 Nm, 212 lb.in | 120 mm², 250 MCM<br>M10, 24 Nm, 212 lb.in |
| | ATV 71HC16N4 | 2 x 150 mm², 2 x 350 MCM<br>M12, 41 Nm, 360 lb.in | 2 x 150 mm², 2 x 350 MCM<br>M12, 41 Nm, 360 lb.in | 120 mm², 250 MCM<br>M10, 24 Nm, 212 lb.in |
| | ATV 71HC20N4… HC28N4<br>ATV 71HC20Y…HC31Y | 4 x 185 mm², 3 x 350 MCM<br>M12, 41 Nm, 360 lb.in | 4 x 185 mm², 3 x 350 MCM<br>M12, 41 Nm, 360 lb.in | – |
| | ATV 71HC31N4 | 4 x 185 mm², 4 x 500 MCM<br>M12, 41 Nm, 360 lb.in | 8 x 185 mm², 4 x 500 MCM<br>M12, 41 Nm, 360 lb.in | – |
| | ATV 71HC40N4 | **R/L1.1, S/L2.1, T/L3.1, R/L1.2, S/L2.2, T/L3.2**<br>2 x 2 x 185 mm², 2 x 2 x 500 MCM<br>M12, 41 Nm, 360 lb.in<br>**U/T1, V/T2, W/T3**<br>4 x 185 mm², 4 x 500 MCM<br>M12, 41 Nm, 360 lb.in | 8 x 185 mm², 4 x 500 MCM<br>M12, 41 Nm, 360 lb.in | – |
| | ATV 71HC50N4<br>ATV 71HC40Y…HC63Y | **R/L1.1, S/L2.1, T/L3.1, R/L1.2, S/L2.2, T/L3.2**<br>2 x 4 x 185 mm², 2 x 3 x 500 MCM<br>M12, 41 Nm, 360 lb.in<br>**U/T1, V/T2, W/T3**<br>6 x 185 mm², 5 x 500 MCM<br>M12, 41 Nm, 360 lb.in | 8 x 185 mm², 5 x 500 MCM<br>M12, 41 Nm, 360 lb.in | – |

*(1) There is no PO terminal on ATV 71HC11Y…HC63Y drives.*

## Electrical control characteristics

| | | | |
|---|---|---|---|
| **Internal supplies available** | | | Short-circuit and overload protection:<br>■ 1 x 10.5 V ⎓ ± 5% supply for the reference potentiometer (1 to 10 kΩ), maximum current 10 mA<br>■ 1 x 24 V ⎓ supply (min. 21 V, max. 27 V), maximum current 200 mA |
| **External + 24 V power supply** *(1)* (not supplied) | | | 24 V ⎓ (min. 19 V, max. 30 V)<br>Power 30 W |
| **Analog inputs** | AI1-/AI1+ | | 1 bipolar differential analog input ± 10 V ⎓ (maximum safe voltage 24 V)<br>Max. sampling time: 2 ms ± 0.5 ms<br>Resolution: 11 bits + 1 sign bit<br>Accuracy: ± 0.6% for a temperature variation of 60°C<br>Linearity: ± 0.15% of maximum value |
| | AI2 | | 1 software-configurable voltage or current analog input:<br>■ Voltage analog input 0...10 V ⎓, impedance 30 kΩ (max. safe voltage 24 V)<br>■ Current analog input X-Y mA by programming X and Y from 0 to 20 mA, with impedance 242 Ω<br>Max. sampling time: 2 ms ± 0.5 ms<br>Resolution: 11 bits<br>Accuracy: ± 0.6% for a temperature variation of 60°C<br>Linearity: ± 0.15% of maximum value |
| | Other inputs | | See option cards |
| **Analog outputs** | AO1 | | 1 analog output software-configurable for voltage or current or as a logic output:<br>■ Voltage analog output 0...10 V ⎓, min. load impedance 470 Ω,<br>■ Current analog output X-Y mA by programming X and Y from 0 to 20 mA, max. load impedance 500 Ω<br>Max. sampling time: 2 ms ± 0.5 ms<br>Resolution: 10 bits<br>Accuracy: ± 1% for a temperature variation of 60°C<br>Linearity: ± 0.2%<br>■ Logic output: 10 V, 20 mA maximum |
| | Other outputs | | See option cards |
| **Configurable relay outputs** | R1A, R1B, R1C | | 1 relay logic output, one "N/C" contact and one "N/O" contact with common point<br>Minimum switching capacity: 3 mA for 24 V ⎓<br>Maximum switching capacity:<br>■ On resistive load (cos φ = 1): 5 A for 250 V ∿ or 30 V ⎓<br>■ On inductive load (cos φ = 0.4 and L/R = 7 ms): 2 A for 250 V ∿ or 30 V ⎓<br>Max. response time: 7 ms ± 0.5 ms<br>Electrical service life: 100,000 operations |
| | R2A, R2B | | 1 relay logic output, one "N/O" contact<br>Minimum switching capacity: 3 mA for 24 V ⎓<br>Maximum switching capacity:<br>■ On resistive load (cos φ = 1): 5 A for 250 V ∿ or 30 V ⎓<br>■ On inductive load (cos φ = 0.4 and L/R = 7 ms): 2 A for 250 V ∿ or 30 V ⎓<br>Max. response time: 7 ms ± 0.5 ms<br>Electrical service life: 100,000 operations |
| | Other outputs | | See option cards |
| **Logic inputs LI** | LI1...LI5 | | 5 programmable logic inputs 24 V ⎓, compatible with level 1 PLC, IEC/EN 61131-2 standard<br>Impedance: 3.5 kΩ<br>Maximum voltage: 30 V<br>Max. sampling time: 2 ms ± 0.5 ms<br>Multiple assignment makes it possible to configure several functions on one input (example: LI1 assigned to forward and preset speed 2, LI3 assigned to reverse and preset speed 3) |
| | LI6 | | 1 logic input, switch-configurable as a logic input or as an input for PTC probes<br>Logic input, characteristics identical to inputs LI1...LI5<br>Input for a maximum of 6 PTC probes mounted in series:<br>■ Nominal value < 1.5 kΩ<br>■ Trip resistance 3 kΩ, reset value 1.8 kΩ<br>■ Short-circuit protection < 50 Ω<br>This logic input must never be used to protect an ATEX motor in applications in explosive atmospheres *(2)*. |
| | Positive logic (Source) | | State 0 if ⩽ 5 V or logic input not wired, state 1 if ⩾ 11 V |
| | Negative logic (Sink) | | State 0 if ⩾ 16 V or logic input not wired, state 1 if ⩽ 10 V |
| | Other inputs | | See option cards |
| **Safety input** | PWR | | 1 input for the Power Removal safety function and/or for thermal protection of the ATEX motor in applications in explosive atmospheres *(2)*:<br>■ Power supply: 24 V ⎓ (max. 30 V)<br>■ Impedance: 1.5 kΩ<br>■ State 0 if < 2 V, state 1 if > 17 V |
| **Maximum wire size and tightening torque for inputs/outputs** | | | 2.5 mm² (AWG 14)<br>0.6 Nm |

*(1) Please consult our specialist catalogue "Phaseo power supplies and transformers"*
*(2) Please consult the ATEX guide, available on our website "www.telemecanique.com"*

Presentation: pages 4 to 9 | References: pages 22 to 25 | Dimensions: pages 188 to 217 | Schemes: pages 218 to 241 | Functions: pages 268 to 299

## Electrical control characteristics (continued)

| | | | |
|---|---|---|---|
| **Acceleration and deceleration ramps** | | | Ramp profiles:<br>■ Linear, can be adjusted separately from 0.01 to 9999 s<br>■ S, U or customized<br>Automatic adaptation of deceleration ramp time if braking capacities exceeded, possible inhibition of this adaptation (use of braking resistor) |
| **Braking to a standstill** | | | By DC injection:<br>■ By a command on a programmable logic input<br>■ Automatically as soon as the estimated output frequency drops to < 0.1 Hz, period adjustable from 0 to 60 s or continuous, current adjustable from 0 to 1.2 In (in open-loop mode only). |
| **Main drive protection and safety features** | | | Thermal protection:<br>■ Against overheating<br>■ Of the power stage<br>Protection against:<br>■ Short-circuits between motor phases<br>■ Input phase breaks<br>■ Overcurrents between output phases and earth<br>■ Overvoltages on the DC bus<br>■ A break on the control circuit<br>■ Exceeding the limit speed<br>Safety function for:<br>■ Line supply overvoltage and undervoltage<br>■ Input phase loss, in three-phase |
| **Motor protection** (see page 296) | | | Thermal protection integrated in drive via continuous calculation of $I^2t$ taking speed into account:<br>■ The motor thermal state is saved when the drive is powered down.<br>■ Function can be modified via operator dialogue terminals, depending on the type of motor (force-cooled or self-cooled).<br>Protection against motor phase breaks<br>Protection with PTC probes |
| **Dielectric strength** | ATV 71H●●●M3<br>ATV 71H●●●M3X | | Between earth and power terminals: 2830 V ⎓<br>Between control and power terminals: 4230 V ⎓ |
| | ATV 71●●●●N4<br>ATV 71P●●●N4Z | | Between earth and power terminals: 3535 V ⎓<br>Between control and power terminals: 5092 V ⎓ |
| | ATV 71H●●●Y | | Between earth and power terminals: 3110 V ⎓<br>Between control and power terminals: 5345 V ⎓ |
| **Insulation resistance to earth** | | | > 1 MΩ (electrical isolation) 500 V ⎓ for 1 minute |
| **Frequency resolution** | Display units | **Hz** | 0.1 |
| | Analog inputs | **Hz** | 0.024/50 Hz (11 bits) |

## Operational safety characteristics and ATEX applications *(1)*

| | | | |
|---|---|---|---|
| **Protection** | Of the machine | | Power Removal (PWR) safety function which forces stopping and/or prevents the motor from restarting unintentionally, conforming to EN 954-1 category 3 and draft standard IEC/EN 61800-5-2. |
| | Of the system process | | Power Removal (PWR) safety function which forces stopping and/or prevents the motor from restarting unintentionally, conforming to IEC/EN 61508 level SIL2 and draft standard IEC/EN 61800-5-2. |
| | Of the ATEX motor *(1)* | | The PWR safety input of the Power Removal safety function is connected to the switching device integrated in the thermal sensor of the ATEX motor (or connected to the switching device of the control device when using PTC ATEX probes). |
| **Response time** | | **ms** | ≤ 100 in STO (Safe Torque Off) |

*(1) Please consult the ATEX guide, available on our website "www.telemecanique.com"*

## Communication port characteristics

### Modbus protocol

| Type of connection | | Modbus RJ45 connector port | Modbus RJ45 network port |
|---|---|---|---|
| **Structure** | Physical interface | 2-wire RS 485 | |
| | Transmission mode | RTU | |
| | Transmission speed | Configurable via the display terminal or the PowerSuite software workshop:<br>9600 bps or 19200 bps | Configurable via the display terminal or the PowerSuite software workshop:<br>4800 bps, 9600 bps, 19200 bps or 38.4 kbps |
| | Format | Fixed = 8 bits, even parity, 1 stop | Configurable via the display terminal or the PowerSuite software workshop:<br>- 8 bits, odd parity, 1 stop<br>- 8 bits, even parity, 1 stop<br>- 8 bits, no parity, 1 stop<br>- 8 bits, no parity, 2 stop |
| | Polarization | No polarization impedances<br>These should be provided by the wiring system (for example, in the master) | |
| | Address | 1 to 247, configurable via the terminal or the PowerSuite software workshop.<br>3 addresses can be configured in order to access the drive data, the “Controller Inside” programmable card and the communication card respectively.<br>These 3 addresses are identical for the connector and network ports. | |
| **Services** | Device profiles | 2 profiles: CiA 402 (“Device Profile Drives and Motion Control”) and I/O profile | |
| | Messaging | Read Holding Registers (03) 63 words maximum<br>Write Single Register (06)<br>Write Multiple Registers (16) 61 words maximum<br>Read/Write Multiple Registers (23) 63/59 words maximum<br>Read Device Identification (43)<br>Diagnostics (08) | |
| | Communication monitoring | Can be inhibited.<br>“Time out”, which can be set between 0.1 s and 30 s | |
| **Diagnostics** | With LEDs on ATV 71H●●●M3Z, ATV 71HD11M3XZ, HD15M3XZ, ATV 71H075N4Z…HD75N4Z ATV 71P●●●N4Z | One activity LED on integrated 7-segment display terminal. One LED for each port. | |
| | With graphic display terminal | One activity LED<br>Command word received<br>Reference received<br>For each port:<br>■ Number of frames received<br>■ Number of incorrect frames | |

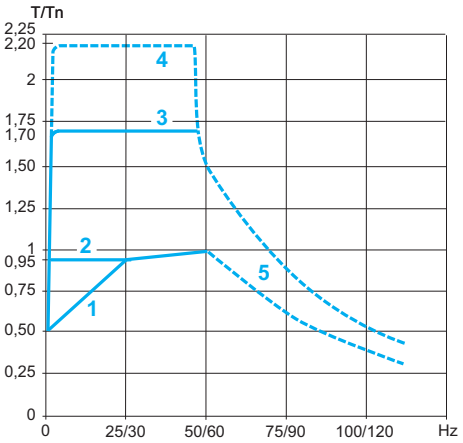
### CANopen protocol

| | | |
|---|---|---|
| **Structure** | Connector | 9-way male SUB-D connector on CANopen adapter. This connects to the Modbus RJ45 Modbus network port. |
| | Network management | Slave |
| | Transmission speed | 20 kbps, 50 kbps, 125 kbps, 250 kbps, 500 kbps or 1 Mbps |
| | Address (Node ID) | 1 to 127, configurable via the terminal or the PowerSuite software workshop. |
| **Services** | Number of PDOs | 3 receive and 3 transmit (PDO1, PDO2 and PDO3) |
| | PDO modes | Event-triggered, Time-triggered, Remotely-requested, Sync (cyclic), Sync (acyclic) |
| | PDO linking | Yes |
| | PDO mapping | Configurable (PDO1 and PDO2) |
| | Number of SDOs | 1 server |
| | Emergency | Yes |
| | CANopen application layer | CiA DS 301, V 4.02 |
| | Functional profiles | 2 profiles: CiA 402 (“Device Profile Drives and Motion Control”) and I/O profile |
| | Communication monitoring | Node Guarding, Heartbeat |
| **Diagnostics** | With LEDs on ATV 71H●●●M3Z, ATV 71HD11M3XZ, HD15M3XZ, ATV 71H075N4Z…HD75N4Z ATV 71P●●●N4Z | 2 LEDs: “RUN” and “ERROR” on integrated 7-segment display terminal |
| | With graphic display terminal and PowerSuite software workshop | 2 LEDs: “RUN” and “ERROR”<br>Command word received<br>Reference received<br>Display of received PDOs<br>Display of transmitted PDOs<br>State of NMT chart<br>Received PDOs counter<br>Transmitted PDOs counter<br>Reception error counter<br>Transmission error counter |
| **Description file** | | A single eds file is supplied for the whole range on the CD-ROM containing the documentation or can be downloaded from the Internet at www.telemecanique.com. It contains the description of the drive parameters. |

# Variable speed drives
Altivar 71

## Torque characteristics (typical curves)

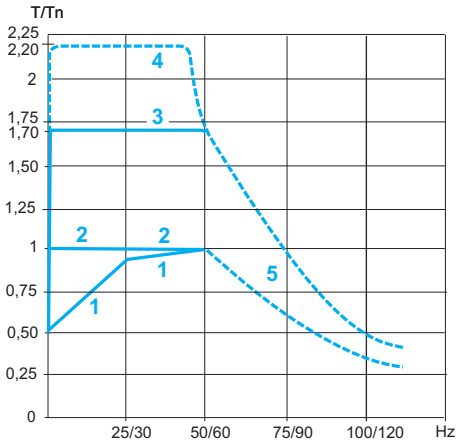
The curves opposite define the available continuous torque and transient overtorque for both force-cooled and self-cooled motors. The only difference is in the ability of the motor to provide a high continuous torque at less than half the nominal speed.




*Open loop applications*

### Open loop applications

1 Self-cooled motor: continuous useful torque *(1)*
2 Force-cooled motor: continuous useful torque
3 Overtorque for 60 s maximum
4 Transient overtorque for 2 s maximum
5 Torque in overspeed at constant power *(2)*




*Closed loop applications*

### Closed loop applications

1 Self-cooled motor: continuous useful torque *(1)*
2 Force-cooled motor: continuous useful torque
3 Overtorque for 60 s maximum
4 Transient overtorque for 2 s maximum
5 Torque in overspeed at constant power *(2)*

Altivar 71 drives are capable of supplying nominal torque continuously at zero speed.

## Motor thermal protection

Altivar 71 drives feature thermal protection designed specifically for self-cooled or force-cooled variable speed motors. The drive calculates the thermal state of the motor even when it is switched off.

This motor thermal protection is designed for a maximum ambient temperature of 40°C around the motor. If the temperature around the motor exceeds 40°C, thermal protection should be provided directly by thermistor probes (PTC) integrated in the motor. The probes are managed directly by the drive.

*(1) For power ratings ≤ 250 W, derating is 20% instead of 50% at very low frequencies.*
*(2) The motor nominal frequency and the maximum output frequency can be adjusted from 10 to 500 Hz or 1600 Hz depending on the supply voltage and the rating. The mechanical overspeed characteristics of the selected motor must be checked with the manufacturer.*

## Special uses

### Using Altivar 71 drives with synchronous motors

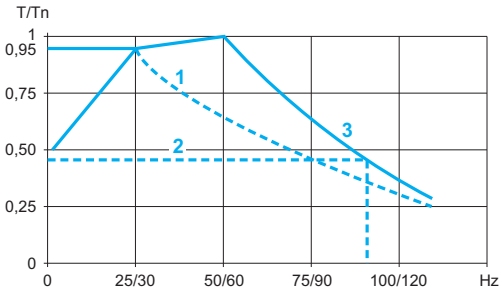
Altivar 71 drives are also suitable for powering synchronous motors with sinusoidal electromotive force. This drive/motor combination makes it possible to obtain remarkable accuracy and maximum torque even at zero speed.
The design and construction of synchronous motors are such that they offer enhanced power density and high-speed performance in a compact unit.
Drive control for synchronous motors does not cause stalling.

**Driving a synchronous motor with sinusoidal electromotive force without speed feedback.**
The entire range of Altivar 71 variable speed drives can drive a synchronous motor with sinusoidal electromotive force without speed feedback. The performance level achieved is then comparable to that obtained with an asynchronous motor in sensorless flux vector control.

**Driving a synchronous motor with sinusoidal electromotive force with or without speed feedback.**
Using 200…240 V ∿ and 380…480 V ∿, a functional variant is available for Altivar 71 drives for driving a synchronous motor with sinusoidal electromotive force with or without speed feedback. The performance level achieved is then comparable to that obtained with an asynchronous motor in flux vector control with or without sensor.

### Using special motors at high-speed

These motors are designed for constant torque applications with high frequency ranges. The Altivar 71 drive supports operating frequencies of up to 1600 Hz, depending on the supply voltage and the rating. Through their design, this type of motor is more sensitive to overvoltages than a standard motor.
Various solutions are available:
■ Overvoltage limitation function
■ Output filters
The drive's 5-point voltage/frequency control ratio is particularly well-suited as it avoids resonance.



*Using a motor at overspeed*

### Using a motor at overspeed

The maximum output frequency of the drive can be adjusted from:
■ 10 to 1600 Hz for drives rated less than or equal to 37 kW in 200… 240 V ∿ and 380…480 V ∿
■ 10 to 500 Hz for all other Altivar 71 drives whatever the type of power supply
When using a standardized asynchronous motor at overspeed, check the mechanical overspeed characteristics of the selected motor with the manufacturer. Above its nominal speed corresponding to a frequency of 50/60 Hz, the motor operates with a decreasing flux, and its torque decreases significantly (see curve opposite). The application must be able to permit this type of low-torque, high-speed operation.

**1** Machine torque (degressive torque)
**2** Machine torque (low motor torque)
**3** Continuous motor torque
**Typical applications:** wood-working machinery, broaching machines, high-speed hoisting, etc.

## Special uses (continued)

### Motor power less than drive power

The Altivar 71 can power any motor which has a rating lower than that for which the drive was designed. This motor/drive combination makes it suitable for applications requiring high, intermittent overtorque.
**Typical applications:** machines with very high starting torque, grinders, kneaders, etc.

***Note:*** *In this case, it is advisable to over-rate the drive to the next standard power rating immediately above that of the motor.*

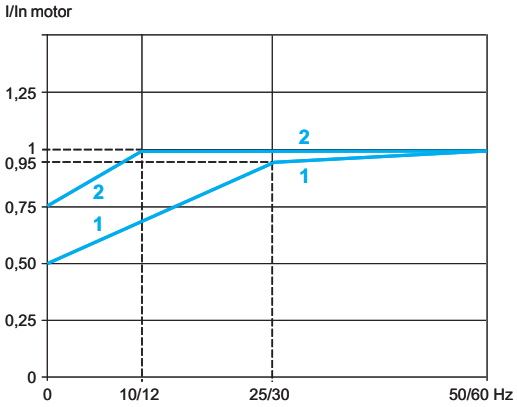
Example: Use an 11 kW motor with a 15 kW drive.

### Power of self-cooled motor greater than the drive power

This motor-drive combination makes it possible to use a self-cooled motor for a greater speed range in continuous operation. The use of a motor with a higher power rating than that of the drive is only possible if the current drawn by this motor is less than or equal to the nominal drive current.

***Note:*** *Limit the motor power to the standard rating immediately above that of the drive.*

Example: On a single machine, the use of a 2.2 kW drive combined with a 3 kW motor means that the machine can operate at its nominal power (2.2 kW) at low speed.
1 Motor power = drive power = 2.2 kW
2 2.2 kW drive combined with a 3 kW motor: greater speed range at 2.2 kW

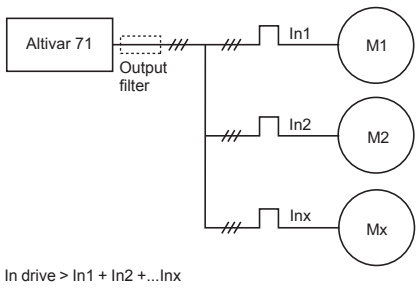



*Power of a self-cooled motor greater than the drive power*

### Connecting motors in parallel

The nominal current of the drive must be greater than or equal to the sum of the currents of the motors to be controlled.
In this case, provide external thermal protection for each motor using probes or thermal overload relays. For cable runs over a certain length, taking account of all the tap links, it is advisable either to install an output filter between the drive and the motors or to use the overvoltage limitation function.

If several motors are used in parallel, there are two possible scenarios:
■ The motors have equal power ratings, in which case the torque characteristics will remain optimized after the drive has been configured
■ The motors have different power ratings, in which case the torque characteristics will not be optimized for all the motors



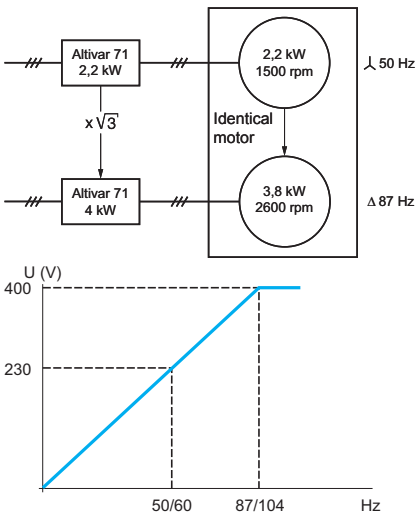

In drive > In1 + In2 +...Inx

*Connecting motors in parallel*

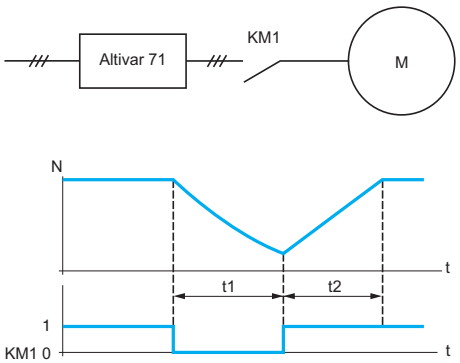
### Using a motor at constant torque up to 87/104 Hz

A 400 V, 50 Hz motor in ⅄ connection can be used at constant torque up to 87 Hz if it is in Δ connection.
In this particular case, the initial motor power and the power of the first associated drive are multiplied by $\sqrt{3}$ (it is therefore important to select a drive with a suitable rating).
Example: A 2.2 kW 50 Hz motor in ⅄ connection supplies 3.8 kW at 87 Hz with a Δ connection.

***Note:*** *Check the overspeed operating characteristics of the motor.*




*Using a motor at constant torque up to 87/104 Hz*




t1: deceleration without ramp (freewheel)
t2: acceleration with ramp
N: motor speed

*Example of loss of output contactor*

## Special uses (continued)

### Using special motors

**Special brake motors: tapered rotor or flux bypass**

The magnetic field releases the brake. This type of operation with the Altivar 71 drive requires application of the voltage/frequency ratio.

***Note:*** *The no-load current may be high, and operation at low speed can only be intermittent.*

### ATEX motors in an explosive atmosphere explosive *(1)*

Use of the “Power Removal” safety function enables the variable speed drive to provide thermal protection in the event of excessive temperature rise of the ATEX motor, but it does not enable it to safely control and regulate the temperature of the ATEX motor.
All motor types ATEX certified for use in zones 1, 21, 2 or 22, which are equipped with ATEX thermal sensors, can be protected by the Altivar 71 variable speed drive.

### Resistive rotor asynchronous motors

Different motor control ratios available on the Altivar 71 drive make it possible to apply specific settings when using high-slip motors.

### Switching the motor at the drive output

The drive can be switched when locked or unlocked. If the drive is switched on-the-fly (drive unlocked), the motor is controlled and accelerates until it reaches the reference speed smoothly following the acceleration ramp. This use requires configuration of the automatic catching a spinning load ("catch on the fly") and the motor phase loss on output cut functions.

**Typical applications:** loss of safety circuit at drive output, bypass function, switching of motors connected in parallel.On new installations, it is recommended that the Power Removal safety function is used.

### Test on a low power motor or without a motor

In a test or maintenance environment, the drive can be tested without having to use a motor with the same rating as the drive (particularly useful in the case of high power drives). This use requires deactivation of the output phase loss function.

*(1) Please consult the ATEX guide, available on our website “www.telemecanique.com”*

# Variable speed drives
## Altivar 71
### Supply voltage 200...240 V 50/60 Hz

107478



*ATV 71HU22M3Z*

107474



*ATV 71H037M3*

107475



*ATV 71HD37M3X*

## UL Type 1/IP20 drives

| Motor | | Line supply | | | | Altivar 71 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Power indicated on plate *(1)* | | Line current *(2)* | | Apparent power | Maximum prospective line Isc | Maximum continuous current *(1)* | Max. transient current for | | Reference *(3)* | Weight |
| | | 200 V | 240 V | 240 V | | 230 V | 60 s | 2 s | | |
| kW | *HP* | A | A | kVA | kA | A | A | A | | kg |
| **Single phase supply voltage: 200…240 V 50/60 Hz** | | | | | | | | | | |
| 0.37 | *0.5* | 6.9 | 5.8 | 1.4 | 5 | 3 | 4.5 | 4.9 | **ATV 71H075M3** *(4) (5)* | 3.000 |
| 0.75 | *1* | 12 | 9.9 | 2.4 | 5 | 4.8 | 7.2 | 7.9 | **ATV 71HU15M3** *(4) (5)* | 3.000 |
| 1.5 | *2* | 18.2 | 15.7 | 3.7 | 5 | 8 | 12 | 13.2 | **ATV 71HU22M3** *(4) (5)* | 4.000 |
| 2.2 | *3* | 25.9 | 22.1 | 5.3 | 5 | 11 | 16.5 | 18.1 | **ATV 71HU30M3** *(4) (5)* | 4.000 |
| 3 | – | 25.9 | 22 | 5.3 | 5 | 13.7 | 20.6 | 22.6 | **ATV 71HU40M3** *(4) (5) (6)* | 4.000 |
| 4 | *5* | 34.9 | 29.9 | 7 | 5 | 17.5 | 26.3 | 28.8 | **ATV 71HU55M3** *(4) (5) (6)* | 5.500 |
| 5.5 | *7.5* | 47.3 | 40.1 | 9.5 | 22 | 27.5 | 41.3 | 45.3 | **ATV 71HU75M3** *(4) (5) (6)* | 7.000 |
| **Three-phase supply voltage: 200…240 V 50/60 Hz** | | | | | | | | | | |
| 0.37 | *0.5* | 3.5 | 3.1 | 1.3 | 5 | 3 | 4.5 | 4.9 | **ATV 71H037M3** *(4) (5)* | 3.000 |
| 0.75 | *1* | 6.1 | 5.3 | 2.2 | 5 | 4.8 | 7.2 | 7.9 | **ATV 71H075M3** *(4) (5)* | 3.000 |
| 1.5 | *2* | 11.3 | 9.6 | 4 | 5 | 8 | 12 | 13.2 | **ATV 71HU15M3** *(4) (5)* | 3.000 |
| 2.2 | *3* | 15 | 12.8 | 5.3 | 5 | 11 | 16.5 | 18.1 | **ATV 71HU22M3** *(4) (5)* | 4.000 |
| 3 | – | 19.3 | 16.4 | 6.8 | 5 | 13.7 | 20.6 | 22.6 | **ATV 71HU30M3** *(4) (5)* | 4.000 |
| 4 | *5* | 25.8 | 22.9 | 9.5 | 5 | 17.5 | 26.3 | 28.8 | **ATV 71HU40M3** *(4) (5)* | 4.000 |
| 5.5 | *7.5* | 35 | 30.8 | 12.8 | 22 | 27.5 | 41.3 | 45.3 | **ATV 71HU55M3** *(4) (5)* | 5.500 |
| 7.5 | *10* | 45 | 39.4 | 16.4 | 22 | 33 | 49.5 | 54.5 | **ATV 71HU75M3** *(4) (5)* | 7.000 |
| 11 | *15* | 53.3 | 45.8 | 19 | 22 | 54 | 81 | 89.1 | **ATV 71HD11M3X** *(4) (5) (7)* | 22.000 |
| 15 | *20* | 71.7 | 61.6 | 25.6 | 22 | 66 | 99 | 109 | **ATV 71HD15M3X** *(4) (5) (7)* | 22.000 |
| 18.5 | *25* | 77 | 69 | 28.7 | 22 | 75 | 112 | 124 | **ATV 71HD18M3X** *(4) (7)* | 30.000 |
| 22 | *30* | 88 | 80 | 33.3 | 22 | 88 | 132 | 145 | **ATV 71HD22M3X** *(4) (7)* | 30.000 |
| 30 | *40* | 124 | 110 | 45.7 | 22 | 120 | 180 | 198 | **ATV 71HD30M3X** *(4) (7)* | 37.000 |
| 37 | *50* | 141 | 127 | 52.8 | 22 | 144 | 216 | 238 | **ATV 71HD37M3X** *(4) (7)* | 37.000 |
| 45 | *60* | 167 | 147 | 61.1 | 22 | 176 | 264 | 290 | **ATV 71HD45M3X** *(4) (7)* | 37.000 |
| 55 | *75* | 200 | 173 | 71.9 | 35 | 221 | 332 | 365 | **ATV 71HD55M3X** *(7) (8) (9)* | 84.000 |
| 75 | *100* | 271 | 232 | 96.4 | 35 | 285 | 428 | 470 | **ATV 71HD75M3X** *(7) (8) (9)* | 106.000 |

*(1) These values are given for a nominal switching frequency of 4 kHz up to ATV 71HD15M3X or 2.5 kHz for ATV 71HD18M3X…HD75M3X drives for use in continuous operation.*
*The switching frequency is adjustable from 1…16 kHz up to ATV 71HD45M3X and from 1…8 kHz for ATV 71HD55M3X and ATV 71HD75M3X drives. Above 2.5 or 4 kHz, depending on the rating, the drive will reduce the switching frequency automatically in the event of an excessive temperature rise. For continuous operation above the nominal switching frequency, derate the nominal drive current (see derating curves on pages 251 and 254).*

*(2) Typical value for the indicated motor power and for the maximum prospective line Isc.*

*(3) Drives supplied as standard with or without sensor feedback for asynchronous motors, and without speed feedback for synchronous motors with sinusoidal electromotive force. It is possible to order a drive that can control not only those motors included in the standard offer, but also synchronous motors with sinusoidal electromotive force with speed feedback, by adding 383 at the end of the reference. For example: ATV 71H037M3 becomes **ATV 71H037M3383**.*
*See pages 110 to 113 for the available encoder interface cards. This offer is not available for ATV 71H●●●M3S337, ATV 71HD11M3X337...HD45M3X337 (4) and ATV 71HD55M3XD, HD75M3XD drives (8).*

*(4) ATV 71HD55M3X, HD75M3X drives are supplied as standard in a reinforced version for operation in specific environmental conditions (see the environmental conditions on page 11).*
*To order ATV 71H●●●M3 and ATV 71HD11M3X…HD45M3X drives in a reinforced version for specific environmental conditions, add the following at the end of the reference:*
*- S337 for ATV 71H●●●M3. For example: ATV 71H037M3 becomes **ATV 71H037M3S337***
*- 337 for ATV 71H●●●M3X. For example: ATV 71HD11M3X becomes **ATV 71HD11M3X337***
*In the reinforced version, the drive is supplied with a remote graphic display terminal.*

*(5) All the drives are supplied with a remote graphic display terminal.*
*To order an ATV 71H●●●M3, ATV 71HD11M3X, HD15M3X drive without a graphic display terminal, add a Z at the end of the reference. The drive will then come equipped with an integrated 7-segment display terminal. For example: ATV 71H037M3 becomes **ATV 71H037M3Z**. To order ATV 71H●●●M3383 and ATV 71HD11M3X383, HD15M3X383 drives without a graphic display terminal, please contact your Regional Sales Office.*

*(6) A line choke must be used, see page 160.*

*(7) Drive supplied without EMC filter. EMC filters are available as an option, see page 168.*

*(8) Drive supplied as standard with a DC choke, which must be used when connecting the drive to the three-phase supply. For connections to the DC bus, the drive can be ordered without a DC choke by adding a **D** at the end of the reference. For example: ATV 71HD55M3X becomes **ATV 71HD55M3XD.***

*(9) Drive supplied without plate for EMC mounting. It is included in the kit for UL Type 1 or IP 31 conformity, which must be ordered separately, see pages 32 and 33.*

***Note:** Consult the summary tables of possible drive, option and accessory combinations, see pages 176 and 177.*

# Variable speed drives
## Altivar 71
### Supply voltage 380...480 V 50/60 Hz

107464



*ATV 71HU22N4*

107472



*ATV 71HU40N4Z*

107461



*ATV 71HC28N4*

## UL Type 1/IP20 drives

| Motor | | Line supply | | | | Altivar 71 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Power indicated on plate *(1)* | | Line current *(2)* | | Apparent power | Maximum prospective line Isc | Maximum continuous current *(1)* | | Max. transient current for | | Reference *(3)* | Weight |
| | | 380 V | 480 V | 380 V | | 380 V | 460 V | 60 s | 2 s | | |
| kW | HP | A | A | kVA | kA | A | A | A | A | | kg |
| **Three-phase supply voltage: 380…480 V 50/60 Hz** | | | | | | | | | | | |
| 0.75 | 1 | 3.7 | 3 | 2.4 | 5 | 2.3 | 2.1 | 3.5 | 3.8 | **ATV 71H075N4** *(4) (5)* | 3.000 |
| 1.5 | 2 | 5.8 | 5.3 | 3.8 | 5 | 4.1 | 3.4 | 6.2 | 6.8 | **ATV 71HU15N4** *(4) (5)* | 3.000 |
| 2.2 | 3 | 8.2 | 7.1 | 5.4 | 5 | 5.8 | 4.8 | 8.7 | 9.6 | **ATV 71HU22N4** *(4) (5)* | 3.000 |
| 3 | – | 10.7 | 9 | 7 | 5 | 7.8 | 6.2 | 11.7 | 12.9 | **ATV 71HU30N4** *(4) (5)* | 4.000 |
| 4 | 5 | 14.1 | 11.5 | 9.3 | 5 | 10.5 | 7.6 | 15.8 | 17.3 | **ATV 71HU40N4** *(4) (5)* | 4.000 |
| 5.5 | 7.5 | 20.3 | 17 | 13.4 | 22 | 14.3 | 11 | 21.5 | 23.6 | **ATV 71HU55N4** *(4) (5)* | 5.500 |
| 7.5 | 10 | 27 | 22.2 | 17.8 | 22 | 17.6 | 14 | 26.4 | 29 | **ATV 71HU75N4** *(4) (5)* | 5.500 |
| 11 | 15 | 36.6 | 30 | 24.1 | 22 | 27.7 | 21 | 41.6 | 45.7 | **ATV 71HD11N4** *(4) (5)* | 7.000 |
| 15 | 20 | 48 | 39 | 31.6 | 22 | 33 | 27 | 49.5 | 54.5 | **ATV 71HD15N4** *(4) (5)* | 22.000 |
| 18.5 | 25 | 45.5 | 37.5 | 29.9 | 22 | 41 | 34 | 61.5 | 67.7 | **ATV 71HD18N4** *(4) (5)* | 22.000 |
| 22 | 30 | 50 | 42 | 32.9 | 22 | 48 | 40 | 72 | 79.2 | **ATV 71HD22N4** *(4) (5)* | 30.000 |
| 30 | 40 | 66 | 56 | 43.4 | 22 | 66 | 52 | 99 | 109 | **ATV 71HD30N4** *(4) (5)* | 37.000 |
| 37 | 50 | 84 | 69 | 55.3 | 22 | 79 | 65 | 118.5 | 130 | **ATV 71HD37N4** *(4) (5)* | 37.000 |
| 45 | 60 | 104 | 85 | 68.5 | 22 | 94 | 77 | 141 | 155 | **ATV 71HD45N4** *(4) (5)* | 44.000 |
| 55 | 75 | 120 | 101 | 79 | 22 | 116 | 96 | 174 | 191 | **ATV 71HD55N4** *(4) (5)* | 44.000 |
| 75 | 100 | 167 | 137 | 109.9 | 22 | 160 | 124 | 240 | 264 | **ATV 71HD75N4** *(4) (5)* | 44.000 |
| 90 | 125 | 166 | 134 | 109.3 | 35 | 179 | 179 | 269 | 295 | **ATV 71HD90N4** *(6) (7)* | 60.000 |
| 110 | 150 | 202 | 163 | 133 | 35 | 215 | 215 | 323 | 355 | **ATV 71HC11N4** *(6) (7)* | 74.000 |
| 132 | 200 | 239 | 192 | 157.3 | 35 | 259 | 259 | 388 | 427 | **ATV 71HC13N4** *(6) (7)* | 80.000 |
| 160 | 250 | 289 | 233 | 190.2 | 50 | 314 | 314 | 471 | 518 | **ATV 71HC16N4** *(6) (7)* | 110.000 |
| 200 | 300 | 357 | 286 | 235 | 50 | 387 | 387 | 580 | 638 | **ATV 71HC20N4** *(6) (7)* | 140.000 |
| 220 | 350 | 396 | 320 | 260.6 | 50 | 427 | 427 | 640 | 704 | **ATV 71HC25N4** *(6) (7)* | 140.000 |
| 250 | 400 | 444 | 357 | 292.2 | 50 | 481 | 481 | 721 | 793 | | |
| 280 | 450 | 494 | 396 | 325.1 | 50 | 550 | 550 | 825 | 907 | **ATV 71HC28N4** *(6) (7)* | 140.000 |
| 315 | 500 | 555 | 444 | 365.3 | 50 | 616 | 616 | 924 | 1016 | **ATV 71HC31N4** *(6) (7)* | 215.000 |
| 355 | – | 637 | 512 | 419.3 | 50 | 671 | 671 | 1006 | 1107 | **ATV 71HC40N4** *(6) (7)* | 225.000 |
| 400 | 600 | 709 | 568 | 466.6 | 50 | 759 | 759 | 1138 | 1252 | | |
| 500 | 700 | 876 | 699 | 576.6 | 50 | 941 | 941 | 1411 | 1552 | **ATV 71HC50N4** *(6) (7)* | 300.000 |

*(1) These values are given for a nominal switching frequency of 4 kHz up to ATV 71HD30N4 or 2.5 kHz for ATV 71HD37N4…HC50N4 drives for use in continuous operation.*
*The switching frequency is adjustable from 1…16 kHz up to ATV 71HD75N4 and from 2.5…8 kHz for ATV 71HD90N4…ATV 71HC50N4 drives.*
*Above 2.5 or 4 kHz, depending on the rating, the drive will reduce the switching frequency automatically in the event of an excessive temperature rise. For continuous operation above the nominal switching frequency, derate the nominal drive current (see derating curves on pages 251 and 254 to 256).*

*(2) Typical value for the indicated motor power and for the maximum prospective line Isc.*

*(3) Drives supplied as standard with or without sensor feedback for asynchronous motors, and without speed feedback for synchronous motors with sinusoidal electromotive force. It is possible to order a drive that can control not only those motors included in the standard offer, but also synchronous motors with sinusoidal electromotive force with speed feedback, by adding 383 at the end of the reference. For example: ATV 71H075N4 becomes* ***ATV 71H075N4383.***
*See pages 110 to 113 for the available encoder interface cards.*
*This offer is not available for ATV 71H075N4S337...HD75N4S337 (4) and ATV 71HD90N4D...HC50N4D (6) drives.*

*(4) ATV 71HD90N4…HC50N4 drives are supplied as standard in a reinforced version for operation in specific environmental conditions (see the environmental conditions on page 11).*
*To order ATV 71H075N4...HD75N4 drives in a reinforced version, add* ***S337*** *at the end of the reference. For example: ATV 71H075N4 becomes* ***ATV 71H075N4S337.***
*In the reinforced version, the drive is supplied with a remote graphic display terminal.*

*(5) All the drives are supplied with a remote graphic display terminal. To order an ATV 71H075N4...ATV 71HD75N4 drive without a graphic display terminal, add a* ***Z*** *at the end of the reference. The drive will then come equipped with an integrated 7-segment display terminal.*
*For example: ATV 71H075N4 without a graphic display terminal becomes* ***ATV 71H075N4Z.***
*To order ATV 71H075N4383...HD75N4383 drives without a graphic display terminal, please contact your Regional Sales Office.*

*(6) Drive supplied as standard with a DC choke, which must be used when connecting the drive to the three-phase supply.*
*For connections to the DC bus, the drive can be ordered without a DC choke by adding a* ***D*** *at the end of the reference.*
*For example: ATV 71HD90N4 becomes* ***ATV 71HD90N4D.***

*(7) Drive supplied without plate for EMC mounting. It is included in the UL Type 1 or IP 31 kit, which must be ordered separately, see pages 32 and 33.*

***Note:*** *Consult the summary tables of possible drive, option and accessory combinations, see pages 178 and 179.*

# Variable speed drives
## Altivar 71
Supply voltage 380...480 V 50/60 Hz

107473



*ATV 71W075N4*

## UL Type 12/IP54 drives with an integrated class A EMC filter

| Motor | | Line supply | | | | Altivar 71 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Power indicated on plate *(1)* | | Line current *(2)* | | Apparent power | Maximum prospective line Isc | Maximum continuous current *(1)* | | Max. transient current for | | Reference *(3) (4)* | Weight |
| | | 380 V | 480 V | 380 V | | 380 V | 460 V | 60 s | 2 s | | |
| kW | *HP* | A | A | kVA | kA | A | | A | | | kg |
| **Three-phase supply voltage: 380…480 V 50/60 Hz** | | | | | | | | | | | |
| 0.75 | *1* | 3.7 | 3 | 2.4 | 5 | 2.3 | 2.1 | 3.5 | 3.8 | **ATV 71W075N4** | 12.000 |
| 1.5 | *2* | 5.8 | 5.3 | 3.8 | 5 | 4.1 | 3.4 | 6.2 | 6.8 | **ATV 71WU15N4** | 12.000 |
| 2.2 | *3* | 8.2 | 7.1 | 5.4 | 5 | 5.8 | 4.8 | 8.7 | 9.6 | **ATV 71WU22N4** | 12.000 |
| 3 | – | 10.7 | 9 | 7 | 5 | 7.8 | 6.2 | 11.7 | 12.9 | **ATV 71WU30N4** | 13.000 |
| 4 | *5* | 14.1 | 11.5 | 9.3 | 5 | 10.5 | 7.6 | 15.8 | 17.3 | **ATV 71WU40N4** | 13.000 |
| 5.5 | *7.5* | 20.3 | 17 | 13.4 | 22 | 14.3 | 11 | 21.5 | 23.6 | **ATV 71WU55N4** | 16.000 |
| 7.5 | *10* | 27 | 22.2 | 17.8 | 22 | 17.6 | 14 | 26.4 | 29 | **ATV 71WU75N4** | 16.000 |
| 11 | *15* | 36.6 | 30 | 24.1 | 22 | 27.7 | 21 | 41.6 | 45.7 | **ATV 71WD11N4** | 21.000 |
| 15 | *20* | 48 | 39 | 31.6 | 22 | 33 | 27 | 49.5 | 54.5 | **ATV 71WD15N4** | 31.000 |
| 18.5 | *25* | 45.5 | 37.5 | 29.9 | 22 | 41 | 34 | 61.5 | 67.7 | **ATV 71WD18N4** | 31.000 |
| 22 | *30* | 50 | 42 | 32.9 | 22 | 48 | 40 | 72 | 79.2 | **ATV 71WD22N4** | 30.500 |
| 30 | *40* | 66 | 56 | 43.4 | 22 | 66 | 52 | 99 | 109 | **ATV 71WD30N4** | 38.500 |
| 37 | *50* | 84 | 69 | 55.3 | 22 | 79 | 65 | 118.5 | 130 | **ATV 71WD37N4** | 38.500 |
| 45 | *60* | 104 | 85 | 68.5 | 22 | 94 | 77 | 141 | 155 | **ATV 71WD45N4** | 61.500 |
| 55 | *75* | 120 | 101 | 79 | 22 | 116 | 96 | 174 | 191 | **ATV 71WD55N4** | 61.500 |
| 75 | *100* | 167 | 137 | 109.9 | 22 | 160 | 124 | 240 | 264 | **ATV 71WD75N4** | 61.500 |

107481



*ATV 71PU40N4Z*

## UL Type 1/IP20 drives on base plate with an integrated class A EMC filter

| Motor | | Line supply | | | | Altivar 71 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Power indicated on plate *(1)* | | Line current *(2)* | | Apparent power | Maximum prospective line Isc | Maximum continuous current *(1)* | | Max. transient current for | | Reference *(5) (6) (7)* | Weight |
| | | 380 V | 480 V | 380 V | | 380 V | 460 V | 60 s | 2 s | | |
| kW | *HP* | A | A | kVA | kA | A | A | A | A | | kg |
| **Three-phase supply voltage: 380…480 V 50/60 Hz** | | | | | | | | | | | |
| 0.75 | *1* | 3.7 | 3 | 2.4 | 5 | 2.3 | 2.1 | 3.5 | 3.8 | **ATV 71P075N4Z** | 2.700 |
| 1.5 | *2* | 5.8 | 5.3 | 3.8 | 5 | 4.1 | 3.4 | 6.2 | 6.8 | **ATV 71PU15N4Z** | 2.700 |
| 2.2 | *3* | 8.2 | 7.1 | 5.4 | 5 | 5.8 | 4.8 | 8.7 | 9.6 | **ATV 71PU22N4Z** | 2.700 |
| 3 | – | 10.7 | 9 | 7 | 5 | 7.8 | 6.2 | 11.7 | 12.9 | **ATV 71PU30N4Z** | 3.600 |
| 4 | *5* | 14.1 | 11.5 | 9.3 | 5 | 10.5 | 7.6 | 15.8 | 17.3 | **ATV 71PU40N4Z** | 3.600 |
| 5.5 | *7.5* | 20.3 | 17 | 13.4 | 22 | 14.3 | 11 | 21.5 | 23.6 | **ATV 71PU55N4Z** | 5.000 |
| 7.5 | *10* | 27 | 22.2 | 17.8 | 22 | 17.6 | 14 | 26.4 | 29 | **ATV 71PU75N4Z** | 5.000 |
| 11 | *15* | 36.6 | 30 | 24.1 | 22 | 27.7 | 21 | 41.6 | 45.7 | **ATV 71PD11N4Z** | 7.000 |

*(1) These values are given for a nominal switching frequency in continuous operation of:*
*- 4 kHz for ATV 71W075N4...WD30N4 and ATV 71P●●●N4Z drives*
*- 2.5 kHz for ATV 71WD37N4…WD75N4 drives.*
*The switching frequency is adjustable from 1 to 16 kHz for all ratings.*
*Above 2.5 (ATV 71WD37N4…WD75N4) or 4 kHz (ATV 71W075N4...WD30N4 and ATV 71P●●●N4Z), the drive will reduce the switching frequency automatically in the event of an excessive temperature rise. For continuous operation above the nominal switching frequency, derate the nominal drive current, see derating curves on pages 265 (ATV 71W●●●N4) and 251 (ATV 71P●●●N4Z).*

*(2) Typical value for the indicated motor power and for the maximum prospective line Isc.*

*(3) ATV 71W●●●N4 drives can be ordered with a 24 V ⎓ power supply, thus allowing an additional consumption of 250 mA. In this case, add **A24** at the end of the reference.*
*For example: ATV 71W075N4 becomes **ATV 71W075N4A24**.*
*These ATV 71W●●●N4A24 drives:*
*- Also have the reinforced version treatment for operation in specific environmental conditions (see the environmental conditions on page 11).*
*- Incorporate a DC choke to reduce the current harmonics.*

*(4) All ATV 71W●●●N4 drives are supplied with a plate for EMC mounting.*

*(5) All ATV 71P●●●N4Z drives are equipped with an integrated 7-segment display terminal.*

*(6) A DC choke must be used, see page 155.*

*(7) All ATV 71P●●●N4Z drives are supplied with a plate for EMC mounting and a thermal liner for mounting on the machine frame, see page 31.*

***Note:***
*- Consult the summary tables of possible combinations of ATV 71W●●●N4 drives, options and accessories, pages 180 and 181*
*- Consult the summary tables of possible combinations of ATV 71P●●●N4Z drives, options and accessories, pages 182 and 183.*

# Variable speed drives
## Altivar 71
### Supply voltage 500...690 V 50/60 Hz

107536



*ATV 71HU22Y*

107538



*ATV 71HD37Y*

107540



107532



*ATV 71HC25Y*
+
*VW3 A4 572 (Line choke compulsory) (5)*

## UL Type 1/IP20 drives

| Motor | | | Line supply | | | | Altivar 71 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Power indicated on plate *(1)* | | | Line current *(2)* | | | Maximum prospective line Isc | Maximum continuous current *(1) (3)* | | | Reference *(4)* | Weight |
| 500 V | 575 V | 690 V | 500 V | 600 V | 690 V | | 500 V | 575 V | 690 V | | |
| kW | *HP* | kW | A | A | A | kA | A | A | A | | kg |
| **Three-phase supply voltage: 500…690 V 50/60 Hz** | | | | | | | | | | | |
| 1.5 | *2* | 2.2 | 3.8 | 3.2 | 4 | 22 | 3.2 | 2.7 | 4 | **ATV 71HU22Y** | 30.000 |
| 2.2 | *3* | 3 | 5.2 | 4.4 | 5.2 | 22 | 4.5 | 3.9 | 4.5 | **ATV 71HU30Y** | 30.000 |
| 3 | – | 4 | 6.8 | – | 6.6 | 22 | 5.8 | – | 5.5 | **ATV 71HU40Y** | 30.000 |
| 4 | *5* | 5.5 | 8.6 | 7.2 | 8.6 | 22 | 7.5 | 6.1 | 7.5 | **ATV 71HU55Y** | 30.000 |
| 5.5 | *7.5* | 7.5 | 11.2 | 9.5 | 11.2 | 22 | 10 | 9 | 10 | **ATV 71HU75Y** | 30.000 |
| 7.5 | *10* | 11 | 14.6 | 12.3 | 15.5 | 22 | 13.5 | 11 | 13.5 | **ATV 71HD11Y** | 30.000 |
| 11 | *15* | 15 | 19.8 | 16.7 | 20.2 | 22 | 18.5 | 17 | 18.5 | **ATV 71HD15Y** | 30.000 |
| 15 | *20* | 18.5 | 24 | 21 | 24 | 22 | 24 | 22 | 24 | **ATV 71HD18Y** | 30.000 |
| 18.5 | *25* | 22 | 29 | 24 | 27 | 22 | 29 | 27 | 27 | **ATV 71HD22Y** | 30.000 |
| 22 | *30* | 30 | 33 | 28 | 34 | 22 | 35 | 32 | 35 | **ATV 71HD30Y** | 30.000 |
| 30 | *40* | 37 | 48 | 41 | 47 | 22 | 47 | 41 | 43 | **ATV 71HD37Y** | 68.000 |
| 37 | *50* | 45 | 62 | 51 | 55 | 22 | 59 | 52 | 54 | **ATV 71HD45Y** | 68.000 |
| 45 | *60* | 55 | 68 | 57 | 63 | 22 | 68 | 62 | 62 | **ATV 71HD55Y** | 68.000 |
| 55 | *75* | 75 | 84 | 70.5 | 88 | 22 | 85 | 77 | 84 | **ATV 71HD75Y** | 68.000 |
| 75 | *100* | 90 | 109 | 92 | 101 | 22 | 110 | 99 | 104 | **ATV 71HD90Y** | 68.000 |
| 90 | *125* | 110 | 128 | 113 | 117 | 28 | 136 | 125 | 125 | **ATV 71HC11Y** *(5) (6)* | 116.000 |
| 110 | *150* | 132 | 153 | 133 | 137 | 28 | 165 | 144 | 150 | **ATV 71HC13Y** *(5) (6)* | 116.000 |
| 132 | – | 160 | 182 | – | 163 | 35 | 200 | – | 180 | **ATV 71HC16Y** *(5) (6)* | 116.000 |
| 160 | *200* | 200 | 227 | 204 | 212 | 35 | 240 | 192 | 220 | **ATV 71HC20Y** *(5) (6)* | 207.000 |
| 200 | *250* | 250 | 277 | 249 | 256 | 35 | 312 | 242 | 290 | **ATV 71HC25Y** *(5) (6)* | 207.000 |
| 250 | *350* | 315 | 342 | 311 | 317 | 35 | 390 | 336 | 355 | **ATV 71HC31Y** *(5) (6)* | 207.000 |
| 315 | *450* | 400 | 439 | 401 | 409 | 35 | 462 | 412 | 420 | **ATV 71HC40Y** *(5) (6)* | 435.000 |
| 400 | *550* | 500 | 544 | 491 | 498 | 35 | 590 | 528 | 543 | **ATV 71HC50Y** *(5) (6)* | 435.000 |
| 500 | *700* | 630 | 673 | 613 | 616 | 42 | 740 | 672 | 675 | **ATV 71HC63Y** *(5) (6)* | 435.000 |

*(1) These values are given for a nominal switching frequency of 4 kHz up to ATV 71HD30Y or 2.5 kHz for ATV 71HD37Y…HC63Y drives for use in continuous operation.*
*The switching frequency is adjustable from 2.5…6 kHz up to ATV 71HD30Y and from 2.5…4.9 kHz for ATV 71HD37Y… ATV 71HC63Y drives.*
*Above 2.5 kHz or 4 kHz, depending on the rating, the drive will reduce the switching frequency automatically in the event of an excessive temperature rise. For continuous operation above the nominal switching frequency, derate the nominal drive current (see derating curves on pages 252, 257 and 258).*

*(2) Typical value for the indicated motor power and for the maximum prospective line Isc.*

*(3) The maximum transient current for:*
*- 60 seconds is equal to 150% of the maximum continuous current*
*- 2 seconds is equal to 165% of the maximum continuous current*

*(4) Drives supplied as standard:*
*- With or without sensor feedback for asynchronous motors, and without speed feedback for synchronous motors with sinusoidal electromotive force.*
*- In a reinforced version for operation in specific environmental conditions (see the environmental conditions on page 11).*
*- With a remote graphic display terminal and an integrated 7-segment display terminal*

*(5) Line choke mandatory for ATV 71HC11Y…HC63Y drives, unless a special transformer is used (12-pulse). The line choke must be ordered separately, see page 160.*

*(6) Drive supplied without plate for EMC mounting. It is included in the UL Type 1 or IP 31 kit, which must be ordered separately, see pages 32 and 33.*

***Note:*** *Consult the summary tables of possible drive, option and accessory combinations, see pages 184 and 185.*

# Variable speed drives
Altivar 71
Options: accessories

## Adapter for 115 V ∼ logic inputs

This adapter is used to connect 115 V ∼ logic signals to the logic inputs on the drive or an I/O extension card.

7 logic inputs with capacitive impedance at 60 Hz of 0.22 µF are available for connecting the logic signals:
- Maximum current: 200 mA
- Response time: 5 ms to change from state 0 to state 1, 20 ms to change from state 1 to state 0
- Logic state 0 for a voltage below 20 V, logic state 1 for a voltage between 70 V and 132 V.

The power supply must be provided by a 115 V a external power supply (min. 70 V, max. 132 V).

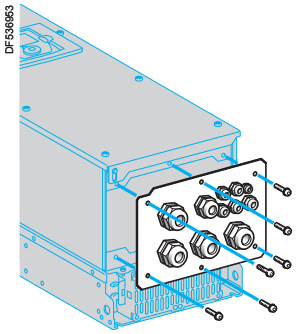
**Reference**

| Description | Reference | Weight kg |
|---|---|---|
| **Adapter for 115 V ∼ logic inputs** | **VW3 A3 101** | – |

## Ready-assembled IP 54 base plate (for ATV 71W●●●N4 drives)

This plate can be used to increase the number of cable connections supported by the drive as standard from 3 to 11.

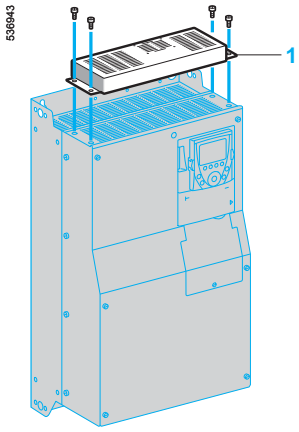
It is supplied with:
- A metal cable gland for the motor cable
- A special plastic cable gland for the network cable
- Plastic cable glands for the connection of the control cable or options such as communication cards, etc.



*Ready-assembled IP 54 base plate*

**References**

| For drive | Type of cable gland | | | Reference | Weight kg |
|---|---|---|---|---|---|
| | Metal | Plastic | Plastic for network cable | | |
| ATV 71W075N4 …WU40N4 | 1 (ISO 25) | 1 (ISO 12), 4 (ISO 16), 3 (ISO 20), 1 (ISO 25) | 1 (ISO 32) | **VW3 A9 901** | – |
| ATV 71WU55N4, WU75N4 | 1 (ISO 25) | 1 (ISO 12), 4 (ISO 16), 3 (ISO 20), 1 (ISO 25) | 1 (ISO 32) | **VW3 A9 902** | – |
| ATV 71WD11N4 | 1 (ISO 32) | 1 (ISO 12), 4 (ISO 16), 1 (ISO 20), 3 (ISO 32) | 1 (ISO 32) | **VW3 A9 903** | – |
| ATV 71WD15N4, WD18N4 | 1 (ISO 32) | 1 (ISO 12), 4 (ISO 16), 1 (ISO 20), 3 (ISO 32) | 1 (ISO 32) | **VW3 A9 904** | – |
| ATV 71WD22N4 | 1 (ISO 40) | 1 (ISO 12), 4 (ISO 16), 1 (ISO 20), 3 (ISO 40) | 1 (ISO 32) | **VW3 A9 905** | – |
| ATV 71WD30N4, WD37N4 | 1 (ISO 40) | 1 (ISO 12), 4 (ISO 16), 1 (ISO 20), 3 (ISO 50) | 1 (ISO 32) | **VW3 A9 906** | – |
| ATV 71WD45N4 …WD75N4 | 1 (ISO 50) | 1 (ISO 12), 4 (ISO 16), 1 (ISO 20), 1 (ISO 50), 1 (ISO 63) | 1 (ISO 32) | **VW3 A9 907** | – |




*Control card fan kit*

## Control card fan kit
**(for ATV 71H●●●●● drives on heatsink)**

This kit is required for ATV 71HD18M3X…HD45M3X, ATV 71HD22N4…HD75N4 and ATV 71HU22Y…HD90Y drives in order that they can operate at ambient temperatures between 50°C and 60°C, for example if they are mounted in an IP54 enclosure. The circulation of the air around the electronic cards prevents the formation of hot spots.

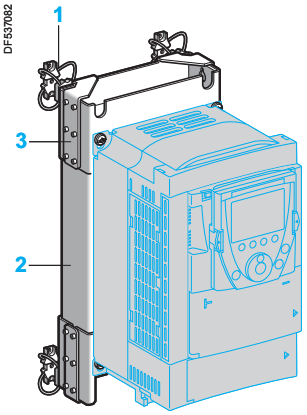
Check the derating to be applied to the drive nominal current (see the derating curves on pages 251 and 252).

The kit **1** is mounted on the upper part of the drive. It is powered by the drive.
It consists of:
- A fan subassembly
- Fixing accessories
- A manual

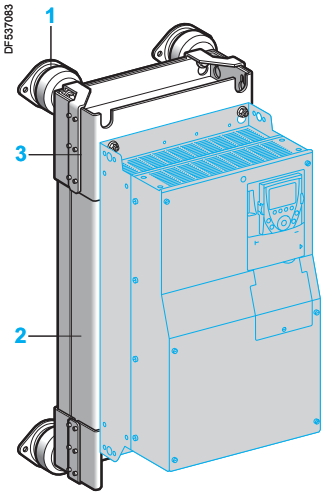
### References

| For drives | Reference | Weight kg |
|---|---|---|
| ATV 71HD18M3X, HD22M3X<br>ATV 71HD22N4<br>ATV 71HU22Y…HD30Y | **VW3 A9 404** | – |
| ATV 71HD30N4, HD37N4 | **VW3 A9 405** | – |
| ATV 71HD30M3X…HD45M3X | **VW3 A9 406** | – |
| ATV 71HD45N4…HD75N4<br>ATV 71HD37Y…HD90Y | **VW3 A9 407** | – |

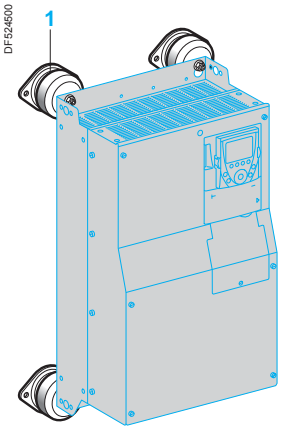
Dimensions:
page 197




*ATV 71HD11M3X drive mounted on kit DNV VW3 A9 625*




*ATV 71HD45N4 drive mounted on kit DNV VW3 A9 628*




*ATV 71H●●●Y drive mounted on kit DNV VW3 A9 64●*

## DNV kit

This kit enables Altivar 71 variable speed drives to satisfy the requirements of the DNV certification body.

For the following variable speed drives:
- ATV 71H●●●M3
- ATV 71HD11M3X…HD45M3X
- ATV 71H075N4…HD75N4.

The kit consists of:
- Shock-absorbing mounts 1
- An additional EMC input filter 2
- EMC filter supports 3
- Fixing accessories.

It is mounted on the back of the variable speed drive on the additional EMC filter supplied with the DNV kit as standard.

### References

| For drives | Reference | Weight kg |
|---|---|---|
| ATV 71H037M3…HU15M3<br>ATV 71H075N4…HU22N4 | **VW3 A9 621** | 5.400 |
| ATV 71HU22M3…HU40M3<br>ATV 71HU30N4, HU40N4 | **VW3 A9 622** | 7.400 |
| ATV 71HU55M3<br>ATV 71HU55N4, HU75N4 | **VW3 A9 623** | 9.800 |
| ATV 71HU75M3<br>ATV 71HD11N4 | **VW3 A9 624** | 11.200 |
| ATV 71HD11M3X, HD15M3X<br>ATV 71HD15N4, HD18N4 | **VW3 A9 625** | 16.500 |
| ATV 71HD18M3X, HD22M3X<br>ATV 71HD22N4 | **VW3 A9 626** | 20.000 |
| ATV 71HD30N4, HD37N4 | **VW3 A9 627** | 22.500 |
| ATV 71HD30M3X…HD45M3X<br>ATV 71HD45N4…HD75N4 | **VW3 A9 628** | 53.500 |

For ATV 71HU22Y…HD30Y variable speed drives, the kit consists of:
- Shock-absorbing mounts 1
- An EMC input filter
- Fixing accessories.

The shock-absorbing mounts are mounted on the back of the variable speed drive. The EMC filter is positioned beside the unit.

### Reference

| For drives | Reference | Weight kg |
|---|---|---|
| ATV 71HU22Y…HD30Y | **VW3 A9 642** | 7.500 |

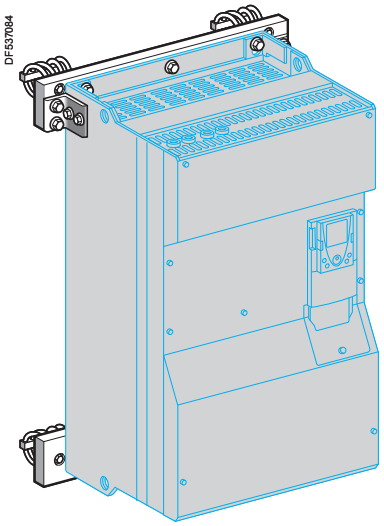
For ATV 71HD37Y…HD90Y variable speed drives, the kit consists of:
- Shock-absorbing mounts 1
- An EMC input filter
- A line choke
- Fixing accessories.

The shock-absorbing mounts are mounted on the back of the variable speed drive. The EMC filter is positioned beside the unit. The line choke must be installed upstream of the drive.

### Reference

| For drives | Reference | Weight kg |
|---|---|---|
| ATV 71HD37Y…HD90Y | **VW3 A9 643** | 32.000 |

Dimensions
page 194




*ATV 71HC11N4D drive mounted on kit DNV VW3 A9 631*

## DNV kit (continued)

For the following variable speed drives:

- ATV 71HD55M3XD, HD75M3XD
- ATV 71HD90N4D…HC50N4D
- ATV 71HC11Y…HC63Y

The kit consists of:

- Shock-absorbing mounts **1**
- The mechanical fittings (profiles and brackets) required for fixing **2**
- Fixing accessories.

It is mounted on the back of the variable speed drive using the mechanical fittings.

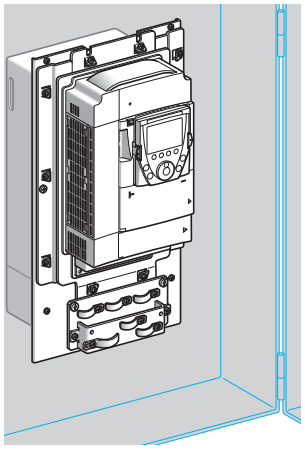
### References

| For drives | Line choke *(1)* | EMC filter *(2)* | Reference | Weight kg |
|---|---|---|---|---|
| ATV 71HD55M3XD | VW3 A4 562 | VW3 A4 410 | **VW3 A9 629** | – |
| ATV 71HD90N4D | VW3 A4 559 | VW3 A4 410 | **VW3 A9 629** | – |
| ATV 71HD75M3XD | VW3 A4 563 | VW3 A4 410 | **VW3 A9 631** | – |
| ATV 71HC11N4D | VW3 A4 559 | VW3 A4 410 | **VW3 A9 631** | – |
| ATV 71HC13N4D | VW3 A4 560 | VW3 A4 410 | **VW3 A9 633** | – |
| ATV 71HC16N4D | VW3 A4 561 | VW3 A4 411 | **VW3 A9 635** | – |
| ATV 71HC20N4D | VW3 A4 569 | VW3 A4 411 | **VW3 A9 637** | – |
| ATV 71HC25N4D, HC28N4D | VW3 A4 564 | VW3 A4 411 | **VW3 A9 638** | – |
| ATV 71HC31N4D | VW3 A4 565 | VW3 A4 412 | **VW3 A9 639** | – |
| ATV 71HC40N4D | 2 x VW3 A4 569 | 2 x VW3 A4 411 | **VW3 A9 640** | – |
| ATV 71HC50N4D | 2 x VW3 A4 564 | 2 x VW3 A4 411 | **VW3 A9 641** | – |
| ATV 71HC11Y *(3)* | VW3 A4 570 | VW3 A4 414 | **VW3 A9 644** | – |
| ATV 71HC13Y, HC16Y *(3)* | VW3 A4 571 | VW3 A4 414 | **VW3 A9 645** | – |
| ATV 71HC20Y *(3)* | VW3 A4 560 | VW3 A4 415 | **VW3 A9 646** | – |
| ATV 71HC25Y, HC31Y *(3)* | VW3 A4 572 | VW3 A4 415 | **VW3 A9 647** | – |
| ATV 71HC40Y *(3)* | 2 x VW3 A4 568 | 2 x VW3 A4 415 | **VW3 A9 648** | – |
| ATV 71HC50Y, HC63Y *(3)* | 2 x VW3 A4 572 | 2 x VW3 A4 415 | **VW3 A9 649** | – |

*(1) A line choke must be used. It must be ordered separately (dimensions, see page 209).*
*(2) An EMC filter must be used. It must be ordered separately (dimensions, see page 213 or consult your Regional Sales Office).*
*(3) When using a DNV kit, the variable speed drive and the transformer for the fan are mounted separately (dimensions, see page 189).*

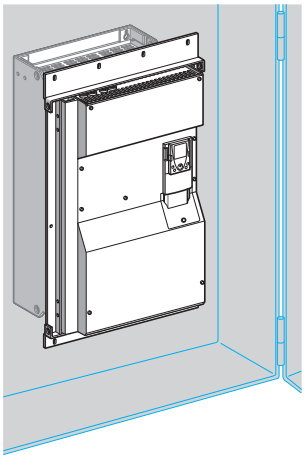
Dimensions
pages 195 to 197

536946



*ATV 71HU75N4 flush-mounted drive*

536947



*ATV 71HC28N4D flush-mounted drive*

## Kit for flush-mounting in a dust and damp proof enclosure
**(for ATV 71H●●●●● drives on heatsink)**

This kit can be used to mount the power section of the drive outside the enclosure (IP 54 degree of protection), which reduces the power dissipated into the enclosure, see page 259.

It is available for ATV 71H●●●M3, ATV 71H●●●M3X, ATV 71HD55M3XD, HD75M3XD, ATV 71H075N4…HC28N4, ATV 71HD90N4D…HC28N4D and ATV 71HU22Y…HC31Y drives.

With this type of mounting, the maximum internal temperature in the enclosure can then reach 60°C without it being necessary to derate the drive current.
Between 50°C and 60°C, a control card fan kit must be used for ATV 71HD18M3X…HD45M3X, ATV 71HD22N4…HD75N4 and ATV 71HU22Y…HD90Y drives to prevent hot spots, see page 27.

The back of the enclosure must be drilled and cut out for this type of mounting.

The kit consists of:
- A metal frame of the right size for the drive rating
- Corner pieces
- Seals
- A fan support. (this can be used to move the fans so that they can be accessed from the front of the enclosure).
- Fixing accessories
- A cutting and drilling template
- A manual.

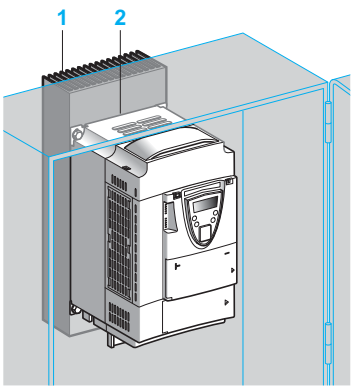
### References

| For drives | | Reference | Weight kg |
|---|---|---|---|
| ATV 71H037M3…HU15M3<br>ATV 71H075N4…HU22N4 | | **VW3 A9 501** | 2.700 |
| ATV 71HU22M3…HU40M3<br>ATV 71HU30N4, HU40N4 | | **VW3 A9 502** | 3.100 |
| ATV 71HU55M3<br>ATV 71HU55N4, HU75N4 | | **VW3 A9 503** | 3.700 |
| ATV 71HU75M3<br>ATV 71HD11N4 | | **VW3 A9 504** | 4.600 |
| ATV 71HD11M3X, HD15M3X<br>ATV 71HD15N4, HD18N4 | | **VW3 A9 505** | 4.900 |
| ATV 71HD18M3X, HD22M3X<br>ATV 71HD22N4<br>ATV 71HU22Y…HD30Y | | **VW3 A9 506** | 3.900 |
| ATV 71HD30N4, HD37N4 | | **VW3 A9 507** | 4.200 |
| ATV 71HD30M3X…HD45M3X | | **VW3 A9 508** | 4.900 |
| ATV 71HD45N4…HD75N4<br>ATV 71HD37Y…HD90Y | | **VW3 A9 509** | 5.200 |
| ATV 71HD55M3X *(1)*<br>ATV 71HD55M3XD *(2)*<br>ATV 71HD90N4 *(1)*<br>ATV 71HD90N4D *(2)* | | **VW3 A9 510** | 5.100 |
| ATV 71HD75M3X *(1)*<br>ATV 71HD75M3XD *(2)*<br>ATV 71HC11N4 *(1)*<br>ATV 71HC11N4D *(2)* | | **VW3 A9 511** | 3.600 |
| ATV 71HC13N4 *(1)*<br>ATV 71HC13N4D *(2)*<br>ATV 71HC11Y…HC16Y *(3)* | | **VW3 A9 512** | 4.300 |
| ATV 71HC16N4 *(1)*<br>ATV 71HC16N4D *(2)* | | **VW3 A9 513** | 4.400 |
| ATV 71HC20N4…HC28N4 *(1)* | Without braking unit | **VW3 A9 514** | 4.700 |
| ATV 71HC20N4D…HC28N4D *(2)*<br>ATV 71HC20Y…HC31Y *(3)* | With braking unit | **VW3 A9 515** | 4.700 |

*(1) Drives supplied as standard with a DC choke. In this case, cut out and drill the enclosure for the choke. See pages 200 and 201.*
*(2) Drives supplied without DC choke.*
*(3) Drives supplied as standard with a transformer for the fan. In this case, cut out and drill the enclosure for the transformer. See page 201.*

Dimensions:
pages 199 to 201

DF536952




*ATV 71PU22N4Z drive in a dust and damp proof enclosure*

## Kits for mounting in a dust and damp proof enclosure
**(for ATV 71P●●●N4Z drives on base plate)**

This kit can be used to mount a drive “on base plate” inside a dust and damp proof enclosure (IP 54 degree of protection). Heat is dissipated via a heatsink mounted outside the enclosure.

This type of mounting simply requires that a hole be drilled in the enclosure at the same level as the drive fixing holes used to mount the heatsink.

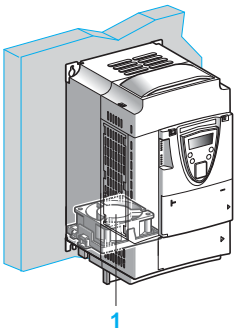
The kit consists of:
- A heatsink **1**
- A thermal liner **2**
- Hinged mechanical adapters
- A manual.

### Enclosure characteristics
The steel used for the floor-standing or wall-mounted enclosure which is to house the drive must meet the following requirements:
- Thickness 1.5 to 3 mm
- Steel: stainless or paint-finished smooth steel
- Heat-treated epoxy paintwork (lacquer finish not permitted), max. thickness 70 µm, fine or medium texture

### References

| For drives | Reference | Weight kg |
|---|---|---|
| ATV 71P075N4Z…PU22N4Z | **VW3 A9 801** | – |
| ATV 71PU30N4Z, PU40N4Z | **VW3 A9 802** | – |
| ATV 71PU55N4Z, PU75N4Z | **VW3 A9 803** | – |

DF536951




*ATV 71PU22N4Z drive with fan VZ3 V1 203*

## Fan for variable speed drives on base plate
This fan **1** is required for ATV 71P●●●N4Z drives if they are not equipped with a DC choke (see page 152).

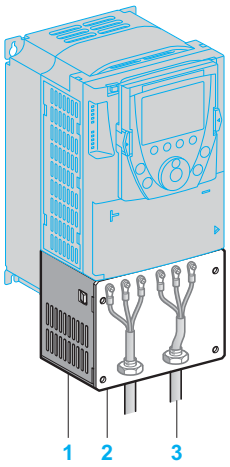
It is mounted on the lower part of the drive, thereby enabling installation dimensions to be optimized. It is powered by the drive.

### References

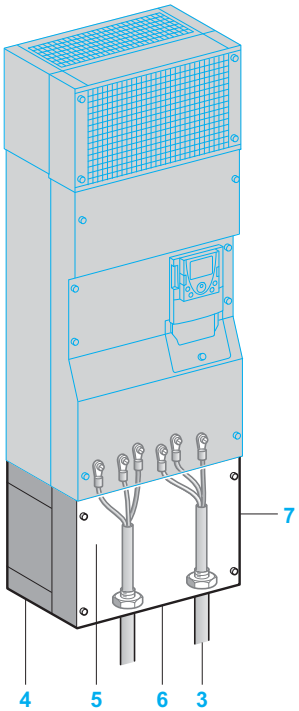
| For drives | Reference | Weight kg |
|---|---|---|
| ATV 71P075N4Z…PU22N4Z | **VZ3 V1 203** | – |
| ATV 71PU30N4Z, PU40N4Z | **VZ3 V1 209** | – |
| ATV 71PU55N4Z, PU75N4Z | **VZ3 V1 204** | – |
| ATV 71PD11N4Z | **VZ3 V1 210** | – |

Dimensions:
page 202

534544




536950




*UL Type 1 conformity kits*

## Kit for UL Type 1 conformity (mounting outside the enclosure)

When the drive is mounted directly on a wall outside the enclosure, this kit can be used to ensure UL Type 1 conformity when connecting the cables with a tube.
The shielding is connected inside the kit.

For ATV 71H●●●M3, ATV 71HD11M3X…HD45M3X, ATV 71H075N4…HD75N4, ATV 71P●●●N4Z and ATV 71HU22Y…HD90Y drives, the kit consists of:
- All the mechanical fittings **1** including a pre-cut plate **2** for connecting the tubes **3**
- Fixing accessories
- A manual.

For ATV 71HD55M3X, HD75M3X, ATV 71HD90N4…HC28N4, ATV 71HD90N4D… HC28N4D and ATV 71HC11Y…HC31Y drives, the kit consists of:
- An IP 54 casing **4** used to maintain the IP 54 degree of protection for the power section
- An EMC plate **5**
- A UL Type 1 cover **7**
- A pre-drilled plate **6** for connecting the tubes **3**
- Fixing accessories
- A manual.

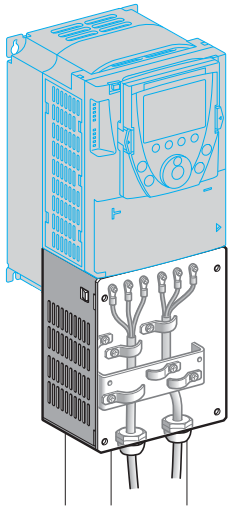
### References

| For drives | | Reference | Weight kg |
|---|---|---|---|
| ATV 71H037M3…HU15M3<br>ATV 71H075N4…HU22N4<br>ATV 71P075N4Z…PU22N4Z | | **VW3 A9 201** | 1.300 |
| ATV 71HU22M3…HU40M3<br>ATV 71HU30N4, HU40N4<br>ATV 71PU30N4Z, PU40N4Z | | **VW3 A9 202** | 1.500 |
| ATV 71HU55M3<br>ATV 71HU55N4, HU75N4<br>ATV 71PU55N4Z, PU75N4Z | | **VW3 A9 203** | 1.800 |
| ATV 71HU75M3<br>ATV 71HD11N4 | | **VW3 A9 204** | 2.000 |
| ATV 71HD11M3X, HD15M3X<br>ATV 71HD15N4, HD18N4 | | **VW3 A9 205** | 2.800 |
| ATV 71HD18M3X, HD22M3X<br>ATV 71HD22N4<br>ATV 71HU22Y…HD30Y | | **VW3 A9 206** | 4.000 |
| ATV 71HD30N4, HD37N4 | | **VW3 A9 207** | 5.000 |
| ATV 71HD30M3X…HD45M3X | | **VW3 A9 217** | 7.000 |
| ATV 71HD45N4…HD75N4<br>ATV 71HD37Y…HD90Y | | **VW3 A9 208** | 7.200 |
| ATV 71HD55M3X *(1)*<br>ATV 71HD55M3XD *(2)*<br>ATV 71HD90N4 *(1)*<br>ATV 71HD90N4D *(2)* | | **VW3 A9 209** | 9.400 |
| ATV 71HD75M3X *(1)*<br>ATV 71HD75M3XD *(2)*<br>ATV 71HC11N4 *(1)*<br>ATV 71HC11N4D *(2)* | | **VW3 A9 210** | 11.800 |
| ATV 71HC13N4 *(1)*<br>ATV 71HC13N4D *(2)*<br>ATV 71HC11Y…HC16Y *(3)* | | **VW3 A9 211** | 11.600 |
| ATV 71HC16N4 *(1)*<br>ATV 71HC16N4D *(2)* | | **VW3 A9 212** | 14.600 |
| ATV 71HC20N4…HC28N4 *(1)*<br>ATV 71HC20N4D…HC28N4D *(2)*<br>ATV 71HC20Y…HC31Y *(3)* | Without braking unit | **VW3 A9 213** | 19.500 |
| | With braking unit | **VW3 A9 214** | 19.500 |

*(1) Drives supplied as standard with a DC choke.*
*(2) Drives supplied without DC choke.*
*(3) Drives supplied as standard with a transformer for the fan.*

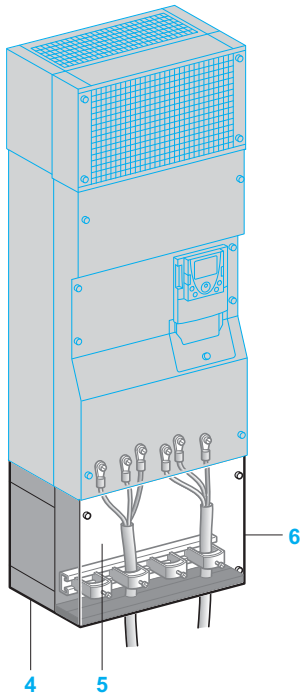
Dimensions
pages 202 and 203

536948




*Kit for IP 21 conformity*

536949




*Kit for IP 31 conformity*

## Kit for IP 21 or IP 31 conformity (mounting outside the enclosure)

When the drive is mounted directly on a wall outside the enclosure, this kit can be used to ensure IP 21 or IP 31 degree of protection when connecting the cables with a cable gland.
The shielding is connected inside the kit.

For ATV 71H●●●M3, ATV 71HD11M3X…HD45M3X, ATV 71H075N4…HD75N4, ATV 71P●●●N4Z and ATV 71HU22Y…HD90Y drives, the kit conforms to IP 21 degree of protection. It consists of:
- All the mechanical fittings **1** including a drilled plate **2** for fixing the cable glands **3**
- Fixing accessories
- A manual.

For ATV 71HD55M3X, HD75M3X, ATV 71HD90N4…HC50N4 and ATV 71HC11Y…HC63Y drives, the kit conforms to IP 31 degree of protection. It consists of:
- An IP 54 casing **4** used to maintain the IP 54 degree of protection for the power section
- An EMC plate with cable clamps **5**
- An IP 31 cover **6**
- Fixing accessories
- A manual.

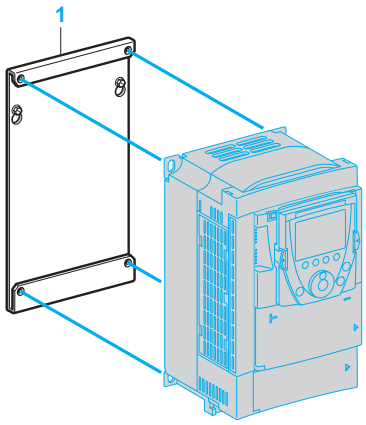
### References

| For drives | | Degree of protection | Reference | Weight kg |
|---|---|---|---|---|
| ATV 71H037M3…HU15M3<br>ATV 71H075N4…HU22N4<br>ATV 71P075N4Z…PU22N4Z | | IP 21 | **VW3 A9 101** | 1.300 |
| ATV 71HU22M3…HU40M3<br>ATV 71HU30N4, HU40N4<br>ATV 71PU30N4Z, PU40N4Z | | IP 21 | **VW3 A9 102** | 1.500 |
| ATV 71HU55M3<br>ATV 71HU55N4, HU75N4<br>ATV 71PU55N4Z, PU75N4Z | | IP 21 | **VW3 A9 103** | 1.800 |
| ATV 71HU75M3<br>ATV 71HD11N4 | | IP 21 | **VW3 A9 104** | 2.000 |
| ATV 71HD11M3X, HD15M3X<br>ATV 71HD15N4, HD18N4 | | IP 21 | **VW3 A9 105** | 2.800 |
| ATV 71HD18M3X, HD22M3X<br>ATV 71HD22N4<br>ATV 71HU22Y…HD30Y | | IP 21 | **VW3 A9 106** | 4.000 |
| ATV 71HD30N4, HD37N4 | | IP 21 | **VW3 A9 107** | 5.000 |
| ATV 71HD30M3X…HD45M3X | | IP 21 | **VW3 A9 117** | 7.000 |
| ATV 71HD45N4…HD75N4<br>ATV 71HD37Y…HD90Y | | IP 21 | **VW3 A9 108** | 7.000 |
| ATV 71HD55M3X *(1)*<br>ATV 71HD55M3XD *(2)*<br>ATV 71HD90N4 *(1)*<br>ATV 71HD90N4D *(2)* | | IP 31 | **VW3 A9 109** | 9.400 |
| ATV 71HD75M3X *(1)*<br>ATV 71HD75M3XD *(2)*<br>ATV 71HC11N4 *(1)*<br>ATV 71HC11N4D *(2)* | | IP 31 | **VW3 A9 110** | 11.800 |
| ATV 71HC13N4 *(1)*<br>ATV 71HC13N4D *(2)*<br>ATV 71HC11Y…HC16Y *(3)* | | IP 31 | **VW3 A9 111** | 11.600 |
| ATV 71HC16N4 *(1)*<br>ATV 71HC16N4D *(2)* | | IP 31 | **VW3 A9 112** | 14.600 |
| ATV 71HC20N4…HC28N4 *(1)*<br>ATV 71HC20N4D…HC28N4D *(2)*<br>ATV 71HC20Y…HC31Y *(3)* | Without braking unit | IP 31 | **VW3 A9 113** | 19.500 |
| | With braking unit | IP 31 | **VW3 A9 114** | 19.500 |
| ATV 71HC31N4, HC40N4 *(1)*<br>ATV 71HC31N4D, HC40N4D *(2)* | | IP 31 | **VW3 A9 115** | 25.000 |
| ATV 71HC50N4 *(1)*<br>ATV 71HC50N4D *(2)*<br>ATV 71HC40Y…HC63Y *(3)* | | IP 31 | **VW3 A9 116** | 35.000 |

*(1) Drives supplied as standard with a DC choke.*
*(2) Drives supplied without DC choke.*
*(3) Drives supplied as standard with a transformer for the fan.*

Dimensions:
pages 202 and 203

536945



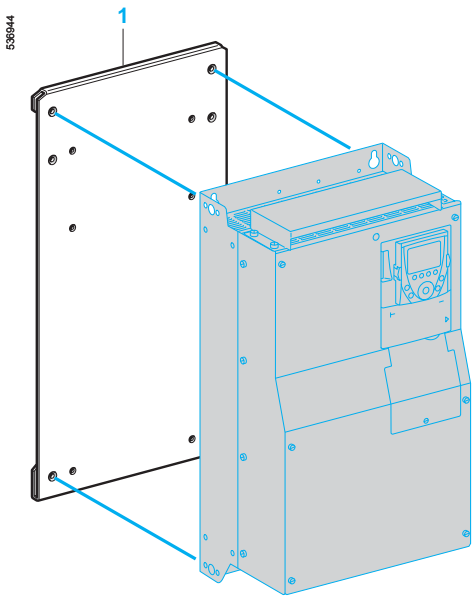

*Substitution kit VW3 A9 304*

## Substitution kit for Altivar 58 or Altivar 58F drives

This kit **1** is used to fit an Altivar 71 drive in the place of an Altivar 58 or Altivar 58F drive using the same fixing holes. It includes the mechanical adapters required for mounting.

### High torque application (170% Tn)

| Old drive | Motor Power | | Replaced by | Reference | Weight |
|---|---|---|---|---|---|
| | kW | *HP* | | | kg |
| **Supply voltage 200…240 V single phase** | | | | | |
| ATV 58HU09M2 | 0.37 | *0.5* | ATV 71H075M3 | **VW3 A9 301** | – |
| ATV 58HU18M2 | 0.75 | *1* | ATV 71HU15M3 | **VW3 A9 301** | – |
| ATV 58HU29M2 | 1.5 | *2* | ATV 71HU22M3 | **VW3 A9 303** | – |
| ATV 58HU41M2 | 2.2 | *3* | ATV 71HU30M3 | **VW3 A9 303** | – |
| ATV 58HU72M2 | 3 | – | ATV 71HU40M3 | **VW3 A9 304** | – |
| ATV 58HU90M2 | 4 | *5* | ATV 71HU55M3 | **VW3 A9 306** | – |
| ATV 58HD12M2 | 5.5 | *7.5* | ATV 71HU75M3 | **VW3 A9 307** | – |
| **Supply voltage 200…240 V three-phase** | | | | | |
| ATV 58HU29M2 | 1.5 | *2* | ATV 71HU15M3 | **VW3 A9 302** | – |
| ATV 58HU41M2 | 2.2 | *3* | ATV 71HU22M3 | **VW3 A9 303** | – |
| ATV 58HU54M2 | 3 | – | ATV 71HU30M3 | **VW3 A9 304** | – |
| ATV 58HU72M2 | 4 | *5* | ATV 71HU40M3 | **VW3 A9 304** | – |
| ATV 58HU90M2 | 5.5 | *7.5* | ATV 71HU55M3 | **VW3 A9 306** | – |
| ATV 58HD12M2 | 7.5 | *10* | ATV 71HU75M3 | **VW3 A9 307** | – |
| ATV 58HD16M2X | 11 | *15* | ATV 71HD11M3X | **VW3 A9 309** | – |
| ATV 58HD23M2X | 15 | *20* | ATV 71HD15M3X | **VW3 A9 309** | – |
| ATV 58HD28M2X | 18.5 | *25* | ATV 71HD18M3X | **VW3 A9 312** | – |
| ATV 58HD33M2X | 22 | *30* | ATV 71HD22M3X | **VW3 A9 312** | – |
| ATV 58HD46M2X | 30 | *40* | ATV 71HD30M3X | **VW3 A9 314** | – |
| **Supply voltage 380…480 V three-phase** | | | | | |
| ATV 58HU18N4 | 0.75 | *1* | ATV 71H075N4 | **VW3 A9 302** | – |
| ATV 58HU29N4 | 1.5 | *2* | ATV 71HU15N4 | **VW3 A9 302** | – |
| ATV 58HU41N4 | 2.2 | *3* | ATV 71HU22N4 | **VW3 A9 302** | – |
| ATV 58HU54N4 | 3 | – | ATV 71HU30N4 | **VW3 A9 304** | – |
| ATV 58HU72N4 | 4 | *5* | ATV 71HU40N4 | **VW3 A9 304** | – |
| ATV 58HU90N4 | 5.5 | *7.5* | ATV 71HU55N4 | **VW3 A9 305** | – |
| ATV 58HD12N4 | 7.5 | *10* | ATV 71HU75N4 | **VW3 A9 306** | – |
| ATV 58HD16N4 | 11 | *15* | ATV 71HD11N4 | **VW3 A9 307** | – |
| ATV 58HD23N4 | 15 | *20* | ATV 71HD15N4 | **VW3 A9 308** | – |
| ATV 58HD28N4 | 18.5 | *25* | ATV 71HD18N4 | **VW3 A9 309** | – |
| ATV 58HD33N4 | 22 | *30* | ATV 71HD22N4 | **VW3 A9 310** | – |
| ATV 58HD46N4 | 30 | *40* | ATV 71HD30N4 | **VW3 A9 310** | – |
| ATV 58HD54N4 | 37 | *50* | ATV 71HD37N4 | **VW3 A9 312** | – |
| ATV 58HD64N4 | 45 | *60* | ATV 71HD45N4 | **VW3 A9 312** | – |
| ATV 58HD79N4 | 55 | *75* | ATV 71HD55N4 | **VW3 A9 312** | – |
| **Supply voltage 500 V three-phase** | | | | | |
| ATV 58HU18N4 | 0.75 | *1* | ATV 71HU22Y | **VW3 A9 310** | – |
| ATV 58HU29N4 | 1.5 | *2* | ATV 71HU22Y | **VW3 A9 310** | – |
| ATV 58HU41N4 | 2.2 | *3* | ATV 71HU30Y | **VW3 A9 310** | – |
| ATV 58HU54N4 | 3 | – | ATV 71HU40Y | **VW3 A9 310** | – |
| ATV 58HU72N4 | 4 | *5* | ATV 71HU55Y | **VW3 A9 310** | – |
| ATV 58HU90N4 | 5.5 | *7.5* | ATV 71HU75Y | **VW3 A9 310** | – |
| ATV 58HD12N4 | 7.5 | *10* | ATV 71HD11Y | **VW3 A9 310** | – |
| ATV 58HD16N4 | 11 | *15* | ATV 71HD15Y | **VW3 A9 310** | – |
| ATV 58HD23N4 | 15 | *20* | ATV 71HD18Y | **VW3 A9 310** | – |
| ATV 58HD28N4 | 18.5 | *25* | ATV 71HD22Y | **VW3 A9 310** | – |
| ATV 58HD33N4 | 22 | *30* | ATV 71HD30Y | **VW3 A9 310** | – |
| ATV 58HD46N4 | 30 | *40* | ATV 71HD37Y | **VW3 A9 312** | – |
| ATV 58HD54N4 | 37 | *50* | ATV 71HD45Y | **VW3 A9 312** | – |
| ATV 58HD64N4 | 45 | *60* | ATV 71HD55Y | **VW3 A9 312** | – |
| ATV 58HD79N4 | 55 | *75* | ATV 71HD75Y | **VW3 A9 312** | – |



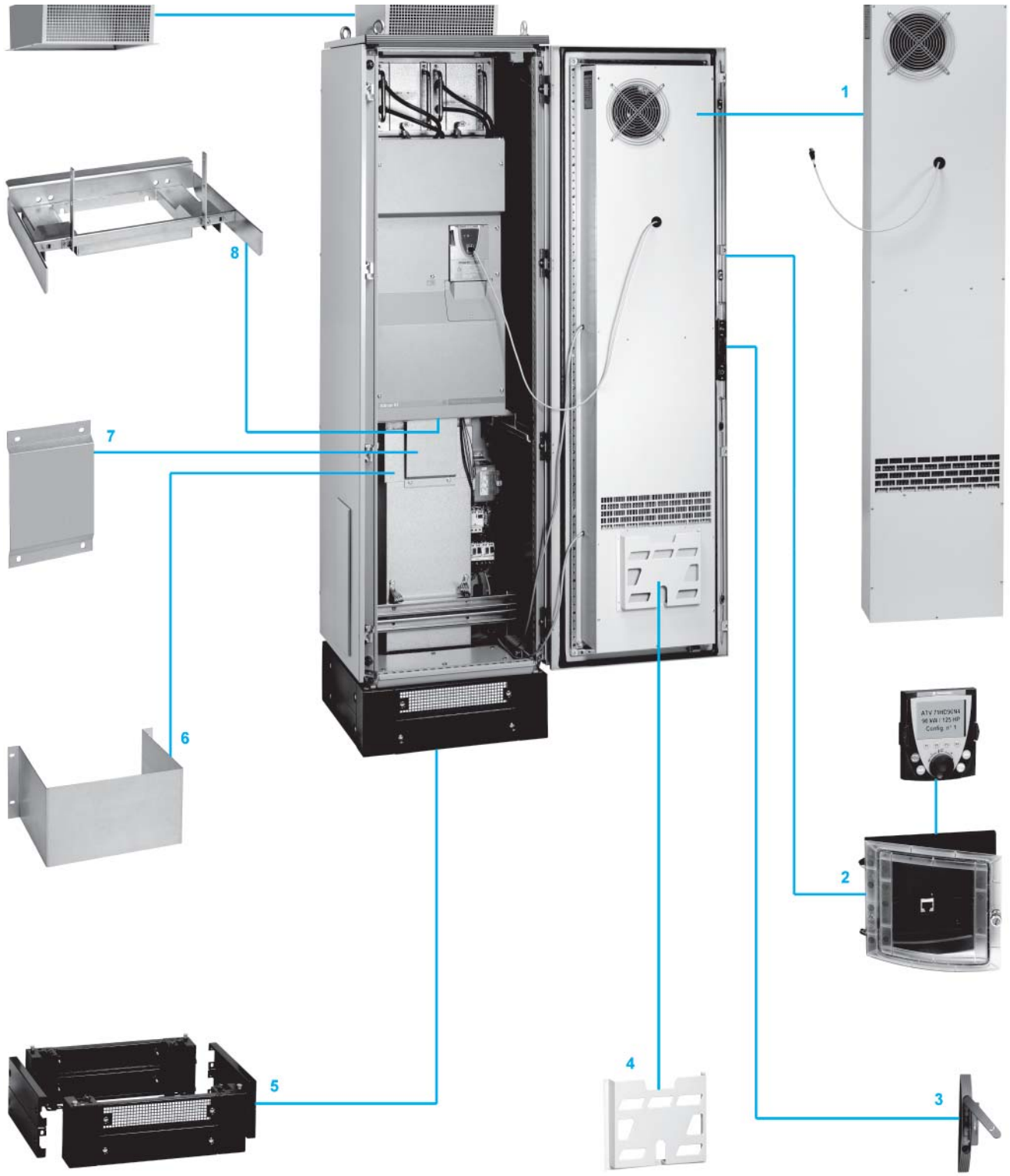

*Substitution kit VW3 A9 312*

## Substitution kit for Altivar 58 or Altivar 58F drives (continued)

**Standard torque application (120% Tn)**

| Old drive | Motor Power | | Replaced by | Reference | Weight |
|---|---|---|---|---|---|
| | kW | *HP* | | | kg |
| **Supply voltage 200…240 V three-phase** | | | | | |
| ATV 58HD16M2X | 15 | *20* | ATV 71HD15M3X | **VW3 A9 309** | – |
| ATV 58HD23M2X | 18.5 | *25* | ATV 71HD18M3X | **VW3 A9 310** | – |
| ATV 58HD28M2X | 22 | *30* | ATV 71HD22M3X | **VW3 A9 312** | – |
| ATV 58HD33M2X | 30 | *40* | ATV 71HD30M3X | **VW3 A9 312** | – |
| ATV 58HD46M2X | 37 | *50* | ATV 71HD37M3X | **VW3 A9 312** | – |
| **Supply voltage 380…480 V three-phase** | | | | | |
| ATV 58HD28N4 | 22 | *30* | ATV 71HD22N4 | **VW3 A9 310** | – |
| ATV 58HD33N4 | 30 | *40* | ATV 71HD30N4 | **VW3 A9 310** | – |
| ATV 58HD46N4 | 37 | *50* | ATV 71HD37N4 | **VW3 A9 310** | – |
| ATV 58HD54N4 | 45 | *60* | ATV 71HD45N4 | **VW3 A9 312** | – |
| ATV 58HD64N4 | 55 | *75* | ATV 71HD55N4 | **VW3 A9 312** | – |
| ATV 58HD79N4 | 75 | *100* | ATV 71HD75N4 | **VW3 A9 312** | – |
| **Supply voltage 500 V three-phase** | | | | | |
| ATV 58HD28N4 | 22 | *30* | ATV 71HD30Y | **VW3 A9 310** | – |
| ATV 58HD33N4 | 30 | *40* | ATV 71HD37Y | **VW3 A9 312** | – |
| ATV 58HD46N4 | 37 | *50* | ATV 71HD45Y | **VW3 A9 312** | – |
| ATV 58HD54N4 | 45 | *60* | ATV 71HD55Y | **VW3 A9 312** | – |
| ATV 58HD64N4 | 55 | *75* | ATV 71HD75Y | **VW3 A9 312** | – |
| ATV 58HD79N4 | 75 | *100* | ATV 71HD90Y | **VW3 A9 312** | – |

# Variable speed drive
## Altivar 71
### Pre-equipped IP 54 floor-standing enclosure kit



# Variable speed drive
## Altivar 71
## Pre-equipped IP 54 floor-standing enclosure kit

## Presentation

The pre-equipped kit solution is used to create an IP 54 certified floor-standing enclosure for 90 kW to 500 kW UL Type 1/IP 20 Altivar 71 variable speed drives for a 380…480 V three-phase power supply.

This kit has been designed to:
- Reduce the implementation time with:
  - Simplified assembly
  - Optimized thermal and mechanical dimensioning

The cooling systems used enable the equipment to be installed in difficult and dusty environments.
There are two types of cooling:
- Kits **VW3 A9 541** and **VW3 A9 542** with a single air circuit for the power section
- Kits **VW3 A9 543**…**548** with two separate air circuits:
  - One for the power section
  - One for the control section

So that the air circuit for the control section is not contaminated, an air/air heat exchanger is incorporated in the enclosure door (see page 38).

## Description

The kit consists of:
- Air/air heat exchanger (except for enclosure kits **VW3 A9 541** and **VW3 A9 542**) 1
- IP 65 graphic display terminal remote mounting kit 2
- Handle with a pushbutton-operated opening mechanism 3
- Document holder 4
- Plinth 5
- Lower air duct 6
- EMC plate 7
- Drive support 8
- Roof extension 9
- Upper air duct
- Altivar 71 and 61 identification labels
- 24 V ⎓, 600 mA supplementary power supply
- Fixing accessories
- Seals
- Technical documentation containing all the:
  - Parts lists
  - Electrical diagrams
  - Mechanical assembly drawings

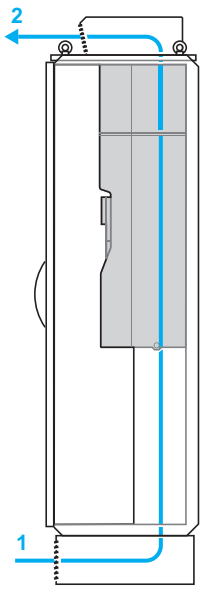
## Options

For adding accessories or options, there are two additional 600 and 800 mm empty enclosure kits supplied in kit form.
The additional empty enclosure kit must be installed on the left side of the pre-equipped IP 54 enclosure kit. In this case, the left-hand panel of the pre-equipped IP 54 enclosure kit is mounted on the left side of the additional empty enclosure kit which is supplied without side panels.

Characteristics: page 38
References: page 39
Dimensions: pages 40 to 45

# Variable speed drive
Altivar 71
Pre-equipped IP 54 floor-standing enclosure kit

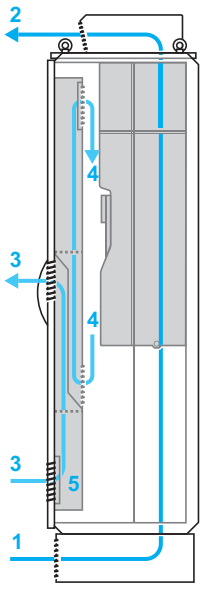
## Ventilation




### VW3 A9 541, VW3 A9 542

The enclosure ventilation is optimized using a single air circuit cooling the power section.

**Power section:**
1 Air inlet via the plinth
2 Air outlet located on the enclosure roof




### VW3 A9 543…A9 548

The enclosure ventilation is optimized using two separate air circuits cooling the power section and the control section.
The air circulating in the power section is isolated from the control section thereby ensuring better protection against the entry of contaminants (in hostile and dusty environments).

**Power section:**
1 Air inlet via the plinth
2 Air outlet located on the enclosure roof

**Control section:**
Cooling system using an air/air exchanger:
3 External air circuit for cooling the exchanger 5
4 Internal air circuit cooled by the exchanger 5

## Characteristics

| | |
|---|---|
| Maximum temperature | ■ + 45°C outside the enclosure<br>■ + 50°C inside the enclosure (internal temperature monitored by a thermostat which stops the equipment) |
| Colour of SAREL Spacial 6000 Cell Enclosure | RAL 7032 for case<br>RAL 7022 for plinth |
| Connections | Cable entries via the enclosure bottom or from the left |
| Available internal supplies | ■ 1 x 24 V ⎓ drive supply (min. 21 V, max. 27 V), maximum current 200 mA<br>■ 1 x 24 V ⎓ additional supply, maximum current 600 mA |
| Accessories *(1)* | SAREL Spacial 6000 Cell compatible |

*(1) Please refer to the website www.sarel.fr*

Presentation: pages 36 and 37
References: page 39
Dimensions: pages 40 to 45

# Variable speed drive
## Altivar 71
## Pre-equipped IP 54 floor-standing enclosure kit




*VW3 A9 543…A9 546*

## References

| Description | Used with | Reference | Weight kg |
|---|---|---|---|
| **Pre-equipped IP 54 floor-standing enclosure kit** | ATV 71HD90N4 *(1)* | **VW3 A9 541** | 220.000 |
| | ATV 71HC11N4 *(1)* | **VW3 A9 542** | 220.000 |
| | ATV 71HC13N4 *(1)* | **VW3 A9 543** | 252.000 |
| | ATV 71HC16N4 *(1)* | **VW3 A9 544** | 252.000 |
| | ATV 71HC20N4 *(1)*<br>without braking unit<br>ATV 71HC25N4 *(1)*<br>without braking unit<br>ATV 71HC28N4 *(1)*<br>without braking unit | **VW3 A9 545** | 300.000 |
| | ATV 71HC20N4 *(1)*<br>with braking unit VW3 A7 101 *(2)*<br>ATV 71HC25N4 *(1)*<br>with braking unit VW3 A7 101 *(2)*<br>ATV 71HC28N4 *(1)*<br>with braking unit VW3 A7 101 *(2)* | **VW3 A9 546** | 300.000 |
| | ATV 71HC31N4 *(1)*<br>without braking unit<br>ATV 71HC40N4 *(1)*<br>without braking unit | **VW3 A9 547** | 360.000 |
| | ATV 71HC50N4 *(1)*<br>without braking unit | **VW3 A9 548** | 470.000 |
| | VW3 A7 102 *(2)* | **VW3 A9 549** | 252.000 |
| **Empty enclosure kit additionnal 600 mm** | Options and accessories *(3)* | **VW3 A9 550** | 200.000 |
| **Empty enclosure kit additionnal 800 mm** | Options and accessories *(3)* | **VW3 A9 551** | 210.000 |

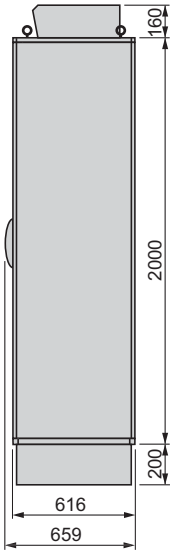
*(1) Drive to be ordered separately, see page 23.*
*(2) To be ordered separately, see page 135. Braking unit **VW3 A7 102** for ATV 71HC31N4…HC50N4 variable speed drives.*
*(3) For any additional information, please consult your Regional Sales Office.*

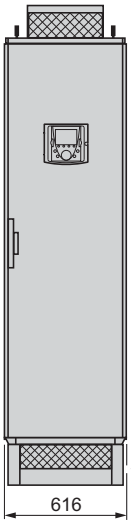
Presentation: pages 36 and 37
Characteristics: page 38
Dimensions: pages 40 to 45

# Variable speed drive
## Altivar 71
## Pre-equipped IP 54 floor-standing enclosure kit

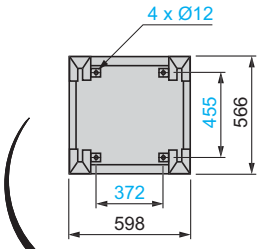
### VW3 A9 541, 542 *(1)*

**Assembled kit**



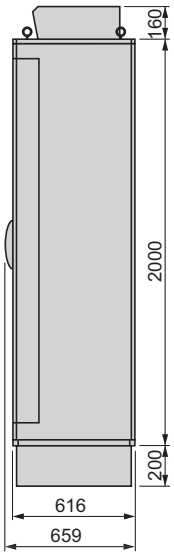



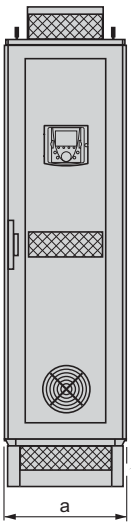

**Fixing the kit to the floor**



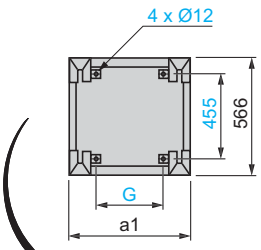

### VW3 A9 543…546 *(1)*

**Assembled kit**




**Fixing the kit to the floor**



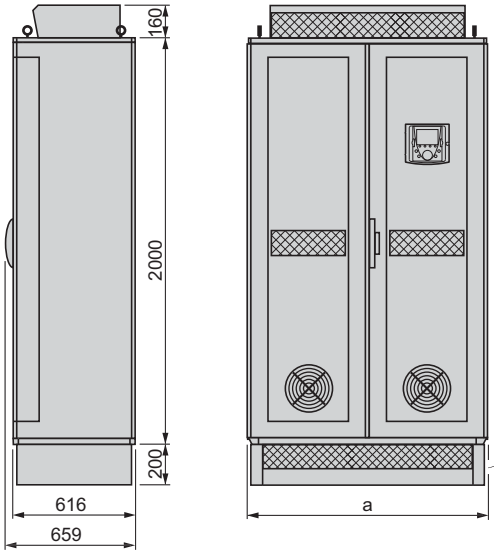

| VW3 | a | a1 | G |
|---|---|---|---|
| **A9 543** | 616 | 598 | 372 |
| **A9 544** | 616 | 598 | 372 |
| **A9 545** | 816 | 798 | 572 |
| **A9 546** | 816 | 798 | 572 |

*(1) For detail of location of terminals, see page 43.*

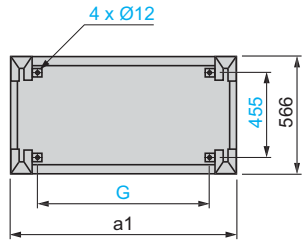
# Variable speed drive
## Altivar 71
## Pre-equipped IP 54 floor-standing enclosure kit

### VW3 A9 547, 548 *(1)*

**Assembled kit**



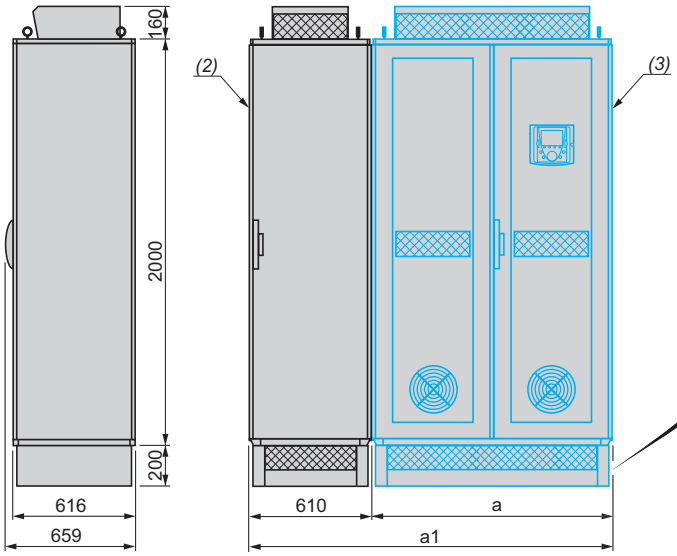

**Fixing the kit to the floor**



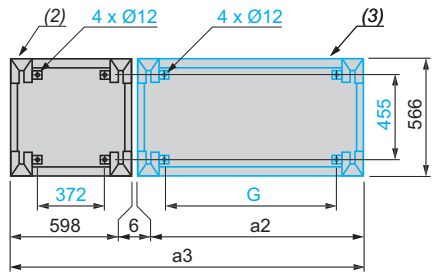

| VW3 | a | a1 | G |
|---|---|---|---|
| **A9 547** | 1016 | 998 | 772 |
| **A9 548** | 1216 | 1198 | 972 |

### VW3 A9 549 *(1)*

**Assembled kit**




**Fixing the kits to the floor**



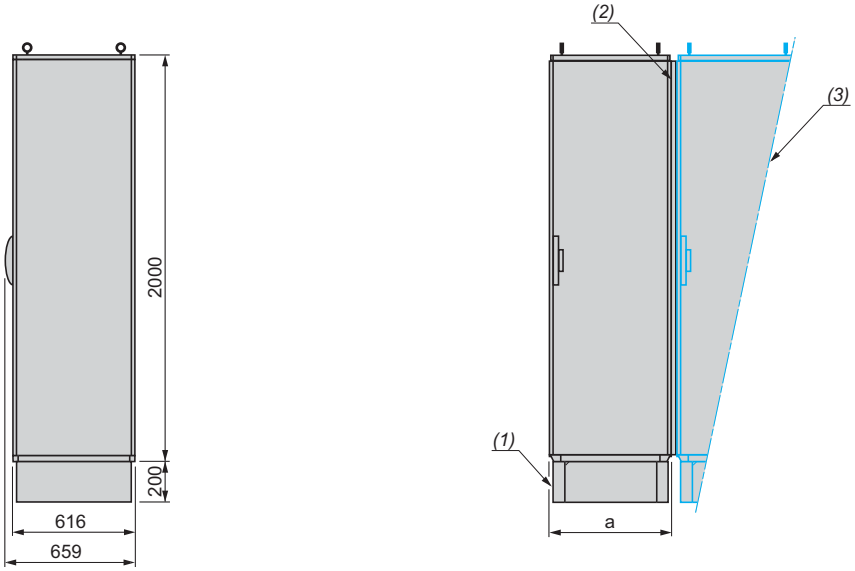

***Note**: The VW3 A9 549 enclosure must be mounted on the left of the VW3 A9 547 and VW3 A9 548 pre-equipped IP 54 enclosure kits*

| VW3 | a | a1 | a2 | a3 | G |
|---|---|---|---|---|---|
| **A9 549 + A9 547** | 1010 | 1620 | 998 | 1602 | 772 |
| **A9 549 + A9 548** | 1210 | 1820 | 1198 | 1802 | 972 |

*(1) For detail of location of terminals, see pages 44 and 45.*
*(2) IP 54 pre-equipped enclosure kit **VW3 A9 549***
*(3) IP 54 pre-equipped enclosure kits **VW3 A9 547** and **VW3 A9 548***

## VW3 A9 550, 551

### Assembled kit



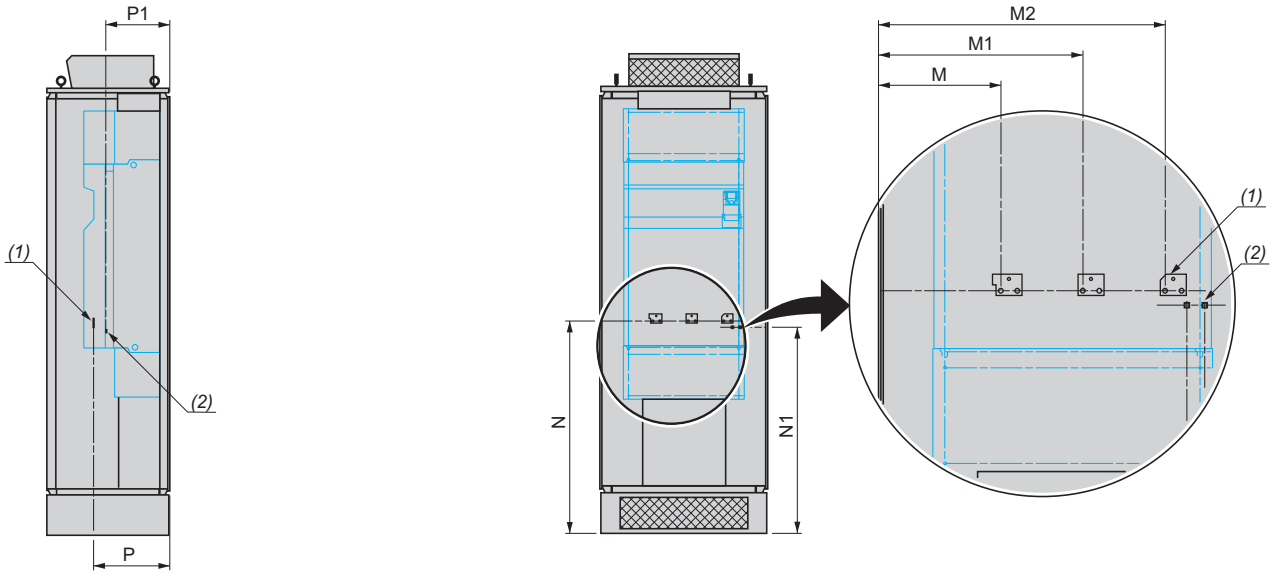

***Note**: The VW3 A9 550 and VW3 A9 551 empty enclosures must be mounted on the left of the VW3 A9 541…549 pre-equipped IP 54 enclosure kits*

| VW3 | a |
|---|---|
| **A9 550** | 610 |
| **A9 551** | 810 |

*(1) Plinth*
*(2) Seal. For each empty enclosure added, allow for a spacing of 4 mm due to the seal.*
*(3) IP 54 pre-equipped enclosure kit **VW3 A9 541…549***

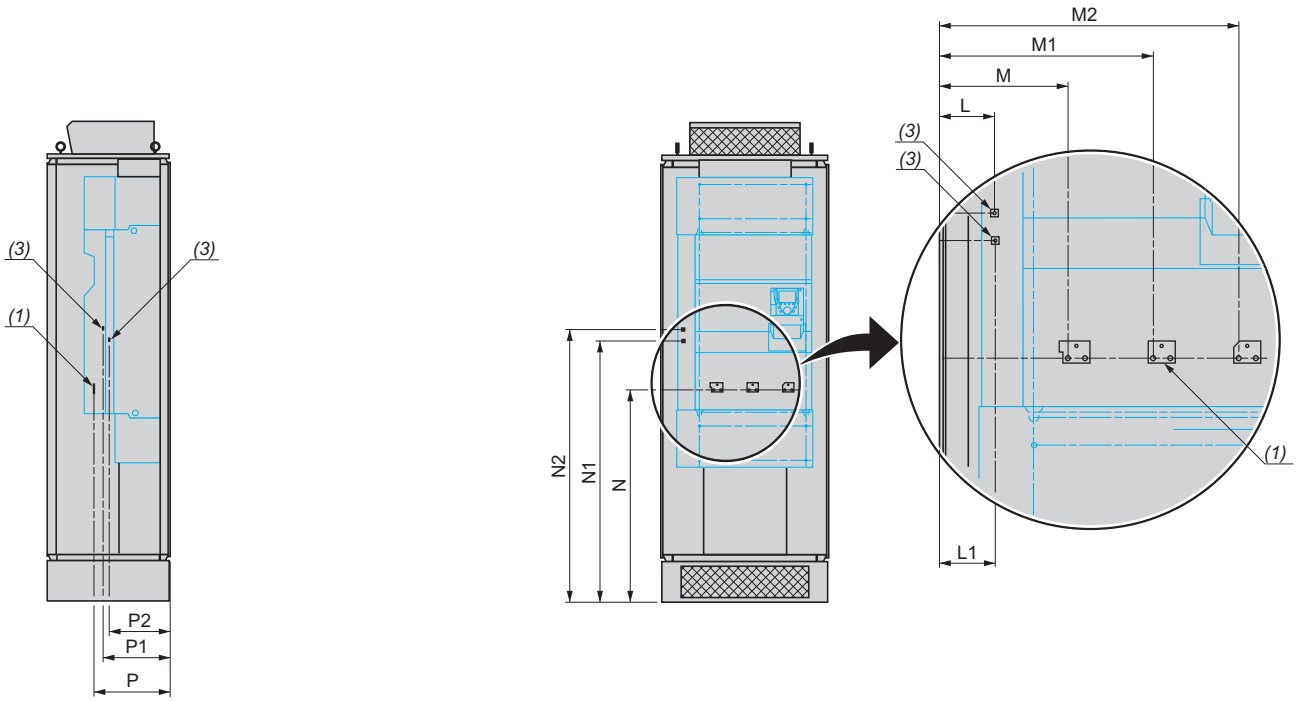
## Detail of location of terminals

### VW3 A9 541...VW3 A9 544




| VW3 | M | M1 | M2 | N | N1 | P | P1 |
|---|---|---|---|---|---|---|---|
| **A9 541** | 240 | 300 | 360 | 1235 | 1200 | 355 | 285 |
| **A9 542** | 215 | 275 | 335 | 1335 | 1270 | 385 | 320 |
| **A9 543** | 225 | 300 | 375 | 1060 | 1025 | 380 | 320 |
| **A9 544** | 205 | 310 | 415 | 1065 | 1030 | 380 | 320 |

### VW3 A9 545, VW3 A9 546



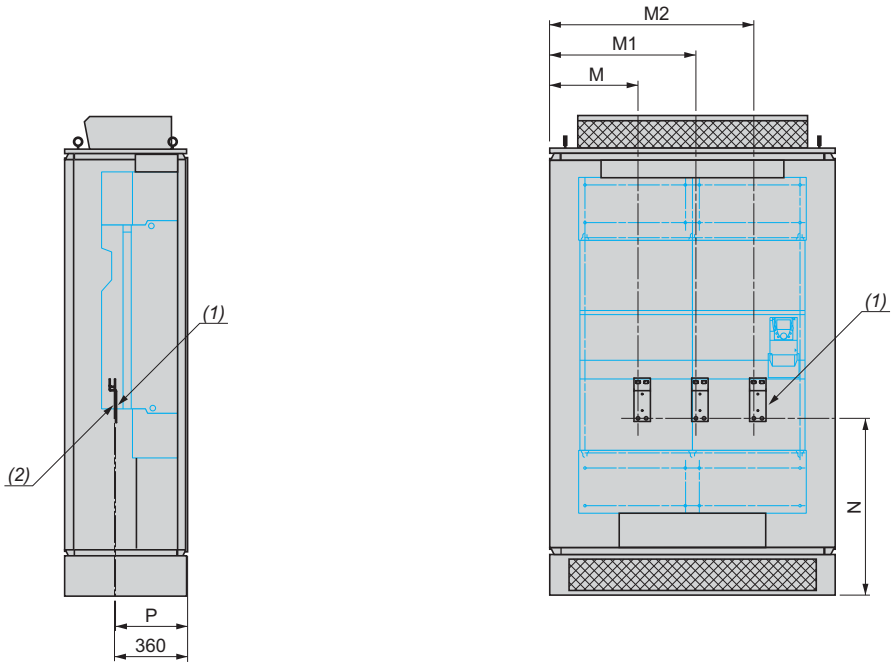

| VW3 | L | L1 | M | M1 | M2 | N | N1 | N2 | P | P1 | P2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **A9 545** | – | – | 275 | 450 | 625 | 1055 | – | – | 380 | – | – |
| **A9 546** | 125 | 127 | 275 | 450 | 625 | 1055 | 1295 | 1355 | 380 | 335 | 305 |

*(1) Terminals for connecting the motor.*
*(2) Terminals for connecting the braking transistor.*
*(3) Terminals for connecting the braking unit **VW3 A7 101**.*

Presentation: pages 36 and 37
Characteristics: page 38
References: page 39

## Detail of location of terminals (continued)

**VW3 A9 547, 548**

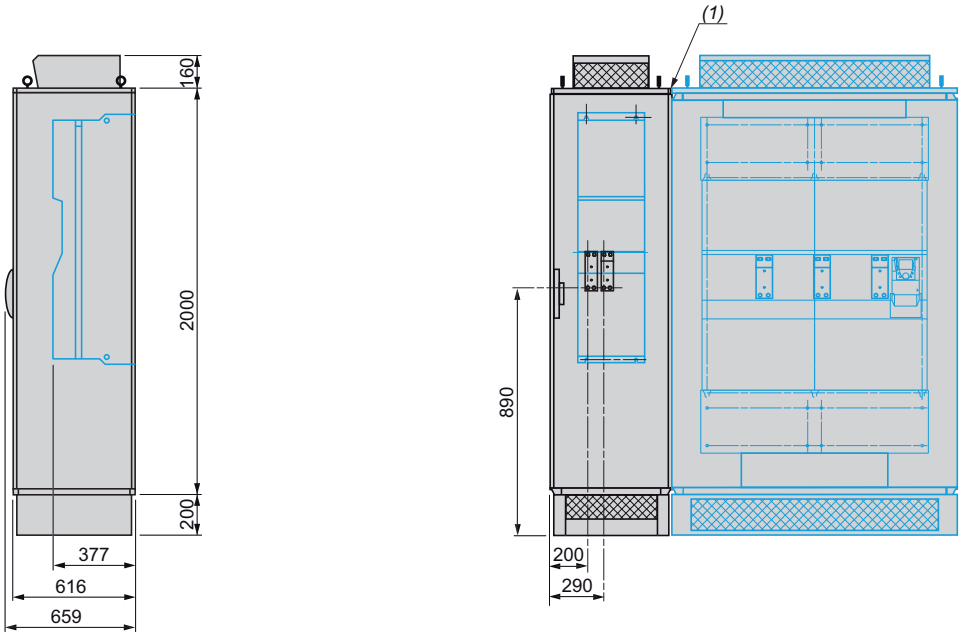



| VW3 | M1 | M2 | M3 | N | P |
|---|---|---|---|---|---|
| **A9 547** | 235 | 330 | 425 | 860 | 360 |
| **A9 548** | 255 | 350 | 445 | 870 | 360 |

*(1) Terminals for connecting the motor.*
*(2) Terminals for connecting the braking unit **VW3 A7 102**.*

## Detail of location of terminals (continued)

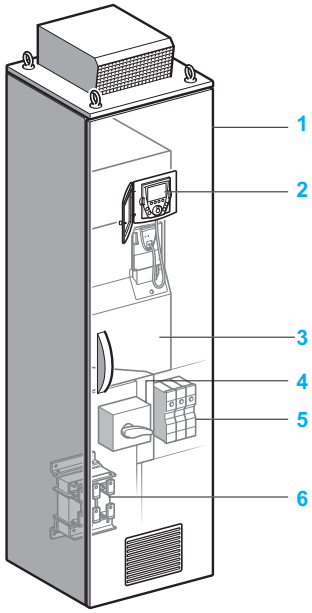
**VW3 A9 549**




***Note**: The VW3 A9 550 and VW3 A9 551 empty enclosures must be mounted on the left of the VW3 A9 547 and VW3 A9 548 pre-equipped IP 54 enclosure kits*

*(1) Seal. For each empty enclosure added, allow for a spacing of 4 mm due to the seal.*

# Variable speed drives
## Altivar 71
## IP 23 or IP 54 floor-standing enclosure compact version




## Presentation

Altivar 71 variable speed drives can be supplied ready-assembled in an IP 23 or IP 54 floor-standing enclosure to facilitate installation and setup and, in particular, to ensure optimum ventilation.
The ATV 71EXC●●●●●● offer consists of a compact floor-standing enclosure providing IP 23 or IP 54 protection with common cooling circuit for industrial environments and infrastructures.
The enclosure is supplied ready to connect.

The ATV 71EXC●●●●●● offer covers motor power ratings from 90 kW to 630 kW with three types of power supply:
- 380…415 V three-phase, 90 kW to 500 kW (**ATV 71EXC●●●●N4**)
- 500 V three-phase, 90 kW to 500 kW (**ATV 71EXC●●●●N**)
- 600…690 V three-phase, 110 kW to 630 kW (**ATV 71EXC●●●●Y**)

The ATV 71EXC●●●●●● offer includes the choice of:
- A standard compact offer
- A modular offer in which a wide selection of options can be incorporated according to the rating of the drive.

### The standard compact offer

It consists of:
- A wired, ready-assembled Sarel “Spacial 6000” enclosure 1
- A drive on heatsink, ATV 71HD90N4D…HC50N4D or ATV 71HC11Y…HC63Y 3
- An IP 65 remote mounting kit for graphic display terminal 2
- A switch and fast-acting semi-conductor fuses 4
- Motor terminals 5
- A line choke 6

See pages 52 and 53.

### Modular offer

It consists of:
- The standard compact offer
- One or more options (see pages 54 to 59)

As well as these specific options, all the options available for Altivar 71 drives can be used at the same rating with the enclosed drives offer (see pages 178, 179 and 184 to 187).
For any configuration other than those shown on pages 54 to 59, please consult your Regional Sales Office.

### **Common options** (modular offer only)

- Adapter for 115 V ∿ logic inputs
- Encoder interface cards
- I/O extension cards
- "Controller Inside" programmable card
- Modbus TCP, Fipio, Modbus/Uni-Telway, Modbus Plus, EtherNet/IP, DeviceNet, PROFIBUS DP, INTERBUS and CC-Link communication cards
- PT100 relays
- Motor heater
- Additional 24 V ⎓ power supply
- Emergency stop button
- Enclosure lighting
- Key switch (Local Remote)
- Power supply circuit for external fan

See pages 54 and 55.

### **Options dependent on the drive rating** (modular offer only)

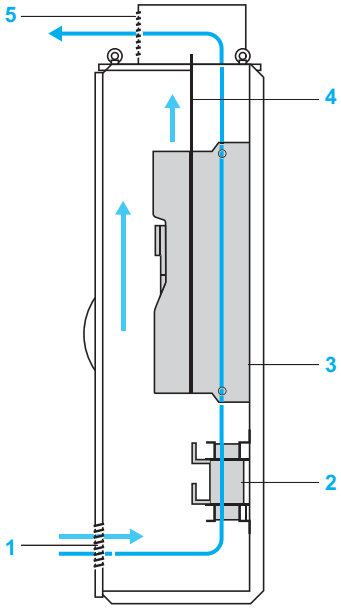
- Braking unit
- Isolating handle for switch
- Circuit-breaker
- Line contactor
- Control transformer
- Ammeter
- Enclosure heater
- Motor choke
- Sinus filter
- Cable entry via the top
- Plinth
- Etc.

See pages 56 to 59.

# Variable speed drives
Altivar 71
IP 23 or IP 54 floor-standing enclosure compact version

## Ventilation

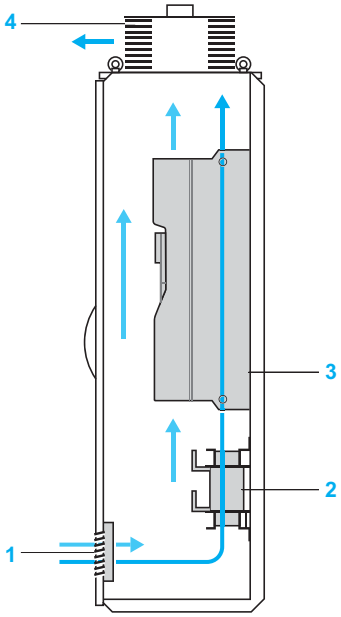
### IP 23 compact version




One common air circuit provides optimum enclosure ventilation, cooling the power section and the control section.

1 Air entry via an intake grille (without filter) located on the enclosure door
2 Line choke
3 Fan integrated in the drive for ventilating the power section
4 Separating plate to prevent internal turbulence.
5 Air outlet via a metal cover with protection against water splashes, on the enclosure roof

### IP 54 compact version




One common air circuit provides optimum enclosure ventilation, cooling the power section and the control section.

1 Air entry via an intake grille (with protective filter) located on the enclosure door
2 Line choke
3 Fan integrated in the drive for ventilating the power section
4 Air outlet via a fan with filter, on the enclosure roof

# Variable speed drives
Altivar 71
IP 23 or IP 54 floor-standing enclosure compact version

## Specific characteristics

| | | | | |
|---|---|---|---|---|
| **Enclosure degree of protection** | ATV 71EXC2●●●N4<br>ATV 71EXC2●●●N<br>ATV 71EXC2●●●Y | | | IP 23:<br>■ Air intake via a grille on the enclosure door<br>■ Air outlet on the enclosure roof |
| | ATV 71EXC5●●●N4<br>ATV 71EXC5●●●N<br>ATV 71EXC5●●●Y | | | IP 54:<br>■ Air intake via a grille (with filter) on the enclosure door<br>■ Air outlet via a fan (with filter) on the enclosure roof |
| **Line supply connection** | | | | At the base of the switch |
| **Motor connection** | ATV 71EXC●D90N4…C28N4<br>ATV 71EXC●D90N…C25N<br>ATV 71EXC●C11Y…C31Y | | | On the terminals |
| | ATV 71EXC●C31N4…C50N4 | | | On the bars of the fan |
| | ATV 71EXC●C31N…C50N<br>ATV 71EXC●C40Y…C63Y | | | On additional bars |
| **Control terminal connection** | | | | Directly on the drive or on option terminals |
| **Colour of SAREL Spacial 6000 Cell enclosures** | | | | RAL 7032 floor-standing enclosure |

## Environmental characteristics *(1)*

| | | | | |
|---|---|---|---|---|
| **Maximum ambient pollution**<br>Definition of insulation | | | | Degree 2 conforming to IEC/EN 61800-5-1 |
| **Vibration resistance** | | | | Conforming to standard IEC/EN 60068-2-6<br>1.5 mm peak to peak from 3 to 10 Hz, 0.6 g from 10 to 200 Hz<br>(3M3 according to IEC/EN 60721-3-3) |
| **Shock resistance** | | | | Conforming to standard IEC/EN 60068-2-7<br>4 g for 11 ms (3M2 according to IEC/EN 60721-3-3) |
| **Ambient air temperature** | Operation | | **°C** | Incoming air temperature 0…+ 40 (- 10…+ 40 with enclosure heater)<br>Up to + 50°C with derating IEC/EN 60721-3-3 class 3K3 |
| | Storage | | **°C** | - 25…+ 70 |
| | Control | | | Internal temperature monitored by a thermostat which can shut down the equipment |
| **Environmental conditions**<br>Use | | | | IEC/EN 60721-3-3 classes 3C2, 3S2 and 3K3, without condensation |
| **Maximum relative humidity** | | | | 95% |
| **Volume of cooling air** | ATV 71EXC●D90N4 | | **m³/h** | 400 |
| | ATV 71EXC●C11N4, C13N4<br>ATV 71EXC●D90N…C13N<br>ATV 71EXC●C11Y…C16Y | | **m³/h** | 600 |
| | ATV 71EXC●C16N4 | | **m³/h** | 800 |
| | ATV 71EXC●C20N4…C28N4<br>ATV 71EXC●C16N…C25N<br>ATV 71EXC●C20Y…C31Y | | **m³/h** | 1200 |
| | ATV 71EXC●C31N4, C40N4 | | **m³/h** | 1800 |
| | ATV 71EXC●C50N4<br>ATV 71EXC●C31N…C50N<br>ATV 71EXC●C40Y…C63Y | | **m³/h** | 2400 |

## Electrical power characteristics *(1)*

| | | | | |
|---|---|---|---|---|
| **Power Supply** | | Voltage | **V** | 380 V – 15% …415 V +10% for ATV 71EXC●●●●N4<br>500 V – 15% for ATV 71EXC●●●●N<br>600…690 V +10% for ATV 71EXC●●●●Y |
| | | Frequency | **Hz** | 50/60 Hz ± 5% |
| **Overvoltage class** | | | | Class 3 according to EN 50178 |
| **Noise level** | ATV 71EXC2 | D90N4…C16N4<br>D90N…C13N<br>C11Y…C16Y | **dBA** | 64 |
| | | C20N4…C40N4<br>C16N…C25N<br>C20Y…C31Y | **dBA** | 66 |
| | | C50N4<br>C31N…C50N<br>C40Y…C63Y | **dBA** | 69 |
| | ATV 71EXC5 | D90N4…C16N4<br>D90N…C13N<br>C11Y…C16Y | **dBA** | 65 |
| | | C20N4…C28N4<br>C16N…C25N<br>C20Y…C31Y | **dBA** | 68 |
| | | C31N4, C40N4 | **dBA** | 78 |
| | | C50N4<br>C31N…C50N<br>C40Y…C63Y | **dBA** | 79 |

*(1) Other characteristics, see pages 10 to 17.*

## Connection characteristics

**Three-phase supply voltage 380…415 V 50/60 Hz**

| Drive terminals | | Power Supply | L1/R, L2/S, L3/T | | | U/T1, V/T2, W/T3 | | | | Recommended cross-section for motor cables |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Upstream fuse protection | Maximum wire size on switch | | Fast-acting semi-conductor fuse | Maximum wire size on terminals | | | | |
| | | | | | | Without motor choke | | With motor choke | | |
| | | | Bar | Terminals | | Bar | Terminals | Bar | Terminals | |
| | | A | mm² | mm² | A | mm² | mm² | mm² | mm² | mm² |
| Cable entry via the bottom | ATV 71EXC●D90N4 | 250 | M10, 2 x 120 | – | 250 | – | 2 x 120 | – | 2 x 120 | 3 x 95 |
| | ATV 71EXC●C11N4 | 315 | M10, 2 x 120 | – | 315 | – | 2 x 120 | – | 2 x 120 | 3 x 120 |
| | ATV 71EXC●C13N4 | 400 | M10, 2 x 120 | – | 400 | – | 2 x 120 | – | 2 x 120 | 3 x 150 |
| | ATV 71EXC●C16N4 | 400 | M10, 2 x 150 | – | 400 | – | 2 x 120 | – | 2 x 120 | 2 (3 x 95) |
| | ATV 71EXC●C20N4 | 500 | 2 x M12, 4 x 240 | – | 500 | – | 2 x 185 | – | 2 x 185 | 2 (3 x 120) |
| | ATV 71EXC●C25N4 | 630 | 2 x M12, 4 x 240 | – | 630 | – | 4 x 120 | – | 4 x 120 | 2 (3 x 150) |
| | ATV 71EXC●C28N4 | 800 | 2 x M12, 4 x 240 | – | 700 | – | 4 x 120 | – | 4 x 120 | 3 (3 x 150) |
| | ATV 71EXC●C31N4 | 800 | 2 x M12, 4 x 240 | – | 800 | 2 x M12, 4 x 240 | – | 2 x M12, 4 x 240 | – | 3 (3 x 185) |
| | ATV 71EXC●C40N4 | 1000 | 2 x M12, 4 x 240 | – | 2 x 500 | 2 x M12, 4 x 240 | – | 2 x M12, 4 x 240 | – | 4 (3 x 185) |
| | ATV 71EXC●C50N4 | 1250 | 3 x M12, 6 x 240 | – | 2 x 630 | 3 x M12, 6 x 240 | – | 3 x M12, 6 x 240 | – | 5 (3 x 185) |
| Cable entry via the top | ATV 71EXC●D90N4 | 250 | – | 2 x 120 | 250 | – | 2 x 120 | – | 2 x 120 | 3 x 95 |
| | ATV 71EXC●C11N4 | 315 | – | 2 x 120 | 315 | – | 2 x 120 | – | 2 x 120 | 3 x 120 |
| | ATV 71EXC●C13N4 | 400 | – | 2 x 120 | 400 | – | 2 x 120 | – | 2 x 120 | 3 x 150 |
| | ATV 71EXC●C16N4 | 400 | – | 2 x 120 | 400 | – | 2 x 120 | – | 2 x 120 | 2 (3 x 95) |
| | ATV 71EXC●C20N4 | 500 | – | 2 x 185 | 500 | – | 2 x 185 | – | 2 x 185 | 2 (3 x 120) |
| | ATV 71EXC●C25N4 | 630 | – | 4 x 120 | 630 | – | 4 x 120 | – | 4 x 120 | 2 (3 x 150) |
| | ATV 71EXC●C28N4 | 800 | – | 4 x 120 | 700 | – | 4 x 120 | – | 4 x 120 | 3 (3 x 150) |
| | ATV 71EXC●C31N4 | 800 | 2 x M12, 4 x 240 | – | 800 | 2 x M12, 4 x 240 | – | 2 x M12, 4 x 240 | – | 3 (3 x 185) |
| | ATV 71EXC●C40N4 | 1000 | 2 x M12, 4 x 240 | – | 2 x 500 | 2 x M12, 4 x 240 | – | 2 x M12, 4 x 240 | – | 4 (3 x 185) |
| | ATV 71EXC●C50N4 | 1250 | 3 x M12, 6 x 240 | – | 2 x 630 | 3 x M12, 6 x 240 | – | 3 x M12, 6 x 240 | – | 5 (3 x 185) |

## Connection characteristics (continued)

**Three-phase supply voltage 500 V 50/60 Hz**

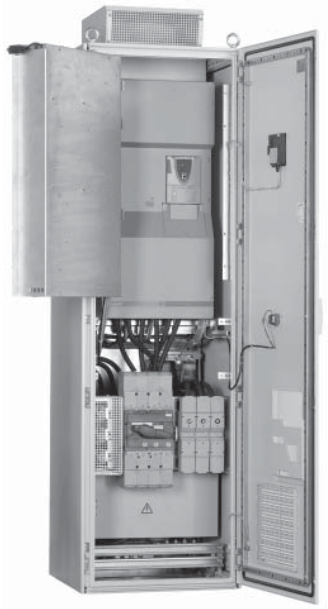
| Drive terminals | | Power Supply | L1/R, L2/S, L3/T | | | U/T1, V/T2, W/T3 | | | | Recommended cross-section for motor cables |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Upstream fuse protection | Maximum wire size on switch | | Fast-acting semi-conductor fuse | Maximum wire size on terminals | | | | |
| | | | | | | Without motor choke | | With motor choke | | |
| | | | Bar | Terminals | | Bar | Terminals | Bar | Terminals | |
| | | A | mm² | mm² | A | mm² | mm² | mm² | mm² | mm² |
| **Cable entry via the bottom** | ATV 71EXC●D90N | 200 | M10, 2 x 120 | – | 200 | – | 2 x 185 | – | 2 x 185 | 3 x 70 |
| | ATV 71EXC●C11N | 200 | M10, 2 x 120 | – | 200 | – | 2 x 185 | – | 2 x 185 | 3 x 95 |
| | ATV 71EXC●C13N | 250 | M10, 2 x 120 | – | 250 | – | 2 x 185 | – | 2 x 185 | 3 x 120 |
| | ATV 71EXC●C16N | 315 | 2 x M12, 4 x 240 | – | 315 | – | 4 x 120 | – | 4 x 120 | 3 x 185 |
| | ATV 71EXC●C20N | 400 | 2 x M12, 4 x 240 | – | 400 | – | 4 x 120 | – | 4 x 120 | 2 (3 x 120) |
| | ATV 71EXC●C25N | 500 | 2 x M12, 4 x 240 | – | 500 | – | 4 x 120 | – | 4 x 120 | 2 (3 x 150) |
| | ATV 71EXC●C31N | 630 | 3 x M12, 6 x 240 | – | 2 x 315 | 3 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 3 (3 x 150) |
| | ATV 71EXC●C40N | 800 | 3 x M12, 6 x 240 | – | 2 x 400 | 3 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 3 (3 x 185) |
| | ATV 71EXC●C50N | 1000 | 3 x M12, 6 x 240 | – | 2 x 500 | 3 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 4 (3 x 185) |
| **Cable entry via the top** | ATV 71EXC●D90N | 200 | – | 2 x 185 | 200 | – | 2 x 185 | – | 2 x 185 | 3 x 70 |
| | ATV 71EXC●C11N | 200 | – | 2 x 185 | 200 | – | 2 x 185 | – | 2 x 185 | 3 x 95 |
| | ATV 71EXC●C13N | 250 | – | 2 x 185 | 250 | – | 2 x 185 | – | 2 x 185 | 3 x 120 |
| | ATV 71EXC●C16N | 315 | 4 x M12, 6 x 240 | – | 315 | 4 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 3 x 185 |
| | ATV 71EXC●C20N | 400 | 4 x M12, 6 x 240 | – | 400 | 4 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 2 (3 x 120) |
| | ATV 71EXC●C25N | 500 | 4 x M12, 6 x 240 | – | 500 | 4 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 2 (3 x 150) |
| | ATV 71EXC●C31N | 630 | 4 x M12, 6 x 240 | – | 2 x 315 | 4 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 3 (3 x 150) |
| | ATV 71EXC●C40N | 800 | 4 x M12, 6 x 240 | – | 2 x 400 | 4 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 3 (3 x 185) |
| | ATV 71EXC●C50N | 1000 | 4 x M12, 6 x 240 | – | 2 x 500 | 4 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 4 (3 x 185) |

## Connection characteristics (continued)

**Three-phase supply voltage 600…690 V 50/60 Hz**

| Drive terminals | | Power Supply | L1/R, L2/S, L3/T | | | U/T1, V/T2, W/T3 | | | | Recommended cross-section for motor cables |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Upstream fuse protection | Maximum wire size on switch | | Fast-acting semi-conductor fuse | Maximum wire size on terminals | | | | |
| | | | | | | Without motor choke | | With motor choke | | |
| | | | Bar | Terminals | | Bar | Terminals | Bar | Terminals | |
| | | A | mm² | mm² | A | mm² | mm² | mm² | mm² | mm² |
| **Cable entry via the bottom** | ATV 71EXC●C11Y | 200 | M10, 2 x 120 | – | 200 | – | 2 x 185 | – | 2 x 185 | 3 x 70 |
| | ATV 71EXC●C13Y | 200 | M10, 2 x 120 | – | 200 | – | 2 x 185 | – | 2 x 185 | 3 x 95 |
| | ATV 71EXC●C16Y | 250 | M10, 2 x 120 | – | 250 | – | 2 x 185 | – | 2 x 185 | 3 x 120 |
| | ATV 71EXC●C20Y | 315 | 2 x M12, 4 x 240 | – | 315 | – | 4 x 120 | – | 4 x 120 | 3 x 185 |
| | ATV 71EXC●C25Y | 400 | 2 x M12, 4 x 240 | – | 400 | – | 4 x 120 | – | 4 x 120 | 2 (3 x 120) |
| | ATV 71EXC●C31Y | 500 | 2 x M12, 4 x 240 | – | 500 | – | 4 x 120 | – | 4 x 120 | 2 (3 x 150) |
| | ATV 71EXC●C40Y | 630 | 3 x M12, 6 x 240 | – | 2 x 315 | 3 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 3 (3 x 150) |
| | ATV 71EXC●C50Y | 800 | 3 x M12, 6 x 240 | – | 2 x 400 | 3 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 3 (3 x 185) |
| | ATV 71EXC●C63Y | 1000 | 3 x M12, 6 x 240 | – | 2 x 500 | 3 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 4 (3 x 185) |
| **Cable entry via the top** | ATV 71EXC●C11Y | 200 | – | 2 x 185 | 200 | – | 2 x 185 | – | 2 x 185 | 3 x 70 |
| | ATV 71EXC●C13Y | 200 | – | 2 x 185 | 200 | – | 2 x 185 | – | 2 x 185 | 3 x 95 |
| | ATV 71EXC●C16Y | 250 | – | 2 x 185 | 250 | – | 2 x 185 | – | 2 x 185 | 3 x 120 |
| | ATV 71EXC●C20Y | 315 | 4 x M12, 6 x 240 | – | 315 | 4 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 3 x 185 |
| | ATV 71EXC●C25Y | 400 | 4 x M12, 6 x 240 | – | 400 | 4 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 2 (3 x 120) |
| | ATV 71EXC●C31Y | 500 | 4 x M12, 6 x 240 | – | 500 | 4 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 2 (3 x 150) |
| | ATV 71EXC●C40Y | 630 | 4 x M12, 6 x 240 | – | 2 x 315 | 4 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 3 (3 x 150) |
| | ATV 71EXC●C50Y | 800 | 4 x M12, 6 x 240 | – | 2 x 400 | 4 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 3 (3 x 185) |
| | ATV 71EXC●C63Y | 1000 | 4 x M12, 6 x 240 | – | 2 x 500 | 4 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 4 (3 x 185) |

# Variable speed drives
## Altivar 71
### IP 23 or IP 54 floor-standing enclosure compact version



*ATV 71EXC2D90N4*

## IP 23 or IP 54 floor-standing enclosure compact version

| Degree of protection | Line supply Max. prospective line Isc *(1)* | With drive | Reference | Weight |
|---|---|---|---|---|
| | kA | | | kg |
| **Three-phase supply voltage 380…415 V 50/60 Hz** | | | | |
| **IP 23** | 100 | ATV 71HD90N4D | **ATV 71EXC2D90N4** | 315.000 |
| | | ATV 71HC11N4D | **ATV 71EXC2C11N4** | 315.000 |
| | | ATV 71HC13N4D | **ATV 71EXC2C13N4** | 335.000 |
| | | ATV 71HC16N4D | **ATV 71EXC2C16N4** | 350.000 |
| | | ATV 71HC20N4D | **ATV 71EXC2C20N4** | 385.000 |
| | | ATV 71HC25N4D | **ATV 71EXC2C25N4** | 485.000 |
| | | ATV 71HC28N4D | **ATV 71EXC2C28N4** | 485.000 |
| | | ATV 71HC31N4D | **ATV 71EXC2C31N4** | 640.000 |
| | | ATV 71HC40N4D | **ATV 71EXC2C40N4** | 680.000 |
| | | ATV 71HC50N4D | **ATV 71EXC2C50N4** | 805.000 |
| **IP 54** | 100 | ATV 71HD90N4D | **ATV 71EXC5D90N4** | 325.000 |
| | | ATV 71HC11N4D | **ATV 71EXC5C11N4** | 325.000 |
| | | ATV 71HC13N4D | **ATV 71EXC5C13N4** | 345.000 |
| | | ATV 71HC16N4D | **ATV 71EXC5C16N4** | 360.000 |
| | | ATV 71HC20N4D | **ATV 71EXC5C20N4** | 390.000 |
| | | ATV 71HC25N4D | **ATV 71EXC5C25N4** | 485.000 |
| | | ATV 71HC28N4D | **ATV 71EXC5C28N4** | 485.000 |
| | | ATV 71HC31N4D | **ATV 71EXC5C31N4** | 660.000 |
| | | ATV 71HC40N4D | **ATV 71EXC5C40N4** | 700.000 |
| | | ATV 71HC50N4D | **ATV 71EXC5C50N4** | 835.000 |
| **Three-phase supply voltage 500 V 50/60 Hz** | | | | |
| **IP 23** | 100 | ATV 71HC11Y | **ATV 71EXC2D90N** | 367.000 |
| | | ATV 71HC13Y | **ATV 71EXC2C11N** | 418.000 |
| | | ATV 71HC16Y | **ATV 71EXC2C13N** | 418.000 |
| | | ATV 71HC20Y | **ATV 71EXC2C16N** | 503.000 |
| | | ATV 71HC25Y | **ATV 71EXC2C20N** | 553.000 |
| | | ATV 71HC31Y | **ATV 71EXC2C25N** | 553.000 |
| | | ATV 71HC40Y | **ATV 71EXC2C31N** | 828.000 |
| | | ATV 71HC50Y | **ATV 71EXC2C40N** | 916.000 |
| | | ATV 71HC63Y | **ATV 71EXC2C50N** | 916.000 |
| **IP 54** | 100 | ATV 71HC11Y | **ATV 71EXC5D90N** | 362.000 |
| | | ATV 71HC13Y | **ATV 71EXC5C11N** | 413.000 |
| | | ATV 71HC16Y | **ATV 71EXC5C13N** | 413.000 |
| | | ATV 71HC20Y | **ATV 71EXC5C16N** | 503.000 |
| | | ATV 71HC25Y | **ATV 71EXC5C20N** | 553.000 |
| | | ATV 71HC31Y | **ATV 71EXC5C25N** | 553.000 |
| | | ATV 71HC40Y | **ATV 71EXC5C31N** | 858.000 |
| | | ATV 71HC50Y | **ATV 71EXC5C40N** | 946.000 |
| | | ATV 71HC63Y | **ATV 71EXC5C50N** | 946.000 |

*(1) These values are given for use with upstream fuses, see pages 49 to 51.*

# Variable speed drives
## Altivar 71
### IP 23 or IP 54 floor-standing enclosure compact version

**IP 23 or IP 54 floor-standing enclosure compact version (continued)**

| Degree of protection | Line supply Max. prospective line Isc (1) | With drive | Reference | Weight |
|---|---|---|---|---|
| | kA | | | kg |
| **Three-phase supply voltage 600…690 V 50/60 Hz** | | | | |
| **IP 23** | 100 | ATV 71HC11Y | **ATV 71EXC2C11Y** | 367.000 |
| | | ATV 71HC13Y | **ATV 71EXC2C13Y** | 418.000 |
| | | ATV 71HC16Y | **ATV 71EXC2C16Y** | 418.000 |
| | | ATV 71HC20Y | **ATV 71EXC2C20Y** | 503.000 |
| | | ATV 71HC25Y | **ATV 71EXC2C25Y** | 553.000 |
| | | ATV 71HC31Y | **ATV 71EXC2C31Y** | 553.000 |
| | | ATV 71HC40Y | **ATV 71EXC2C40Y** | 828.000 |
| | | ATV 71HC50Y | **ATV 71EXC2C50Y** | 916.000 |
| | | ATV 71HC63Y | **ATV 71EXC2C63Y** | 916.000 |
| **IP 54** | 100 | ATV 71HC11Y | **ATV 71EXC5C11Y** | 362.000 |
| | | ATV 71HC13Y | **ATV 71EXC5C13Y** | 413.000 |
| | | ATV 71HC16Y | **ATV 71EXC5C16Y** | 413.000 |
| | | ATV 71HC20Y | **ATV 71EXC5C20Y** | 503.000 |
| | | ATV 71HC25Y | **ATV 71EXC5C25Y** | 553.000 |
| | | ATV 71HC31Y | **ATV 71EXC5C31Y** | 553.000 |
| | | ATV 71HC40Y | **ATV 71EXC5C40Y** | 858.000 |
| | | ATV 71HC50Y | **ATV 71EXC5C50Y** | 946.000 |
| | | ATV 71HC63Y | **ATV 71EXC5C63Y** | 946.000 |

*(1) These values are given for use with upstream fuses, see pages 49 to 51.*

# Variable speed drives
## Altivar 71
## IP 23 or IP 54 floor-standing enclosure compact version
## Common options

### Common options without modification of the enclosure (1)

| Description | Reference | Weight kg |
|---|---|---|
| **Adapter for 115 V ∼ logic inputs** | **VW3 A3E 101** *(2)* | 0.200 |
| **Encoder interface cards with RS 422, 5 V compatible differential outputs** | **VW3 A3E 401** *(3)* | 0.200 |
| **Encoder interface cards with RS 422, 15 V compatible differential outputs** | **VW3 A3E 402** *(3)* | 0.200 |
| **Encoder interface card with 12 V open collector outputs** | **VW3 A3E 403** *(3)* | 0.200 |
| **Encoder interface card with 15 V open collector outputs** | **VW3 A3E 404** *(3)* | 0.200 |
| **Encoder interface card with 12 V push-pull outputs** | **VW3 A3E 405** *(3)* | 0.200 |
| **Encoder interface card with 15 V push-pull outputs** | **VW3 A3E 406** *(3)* | 0.200 |
| **Encoder interface card with 24 V push-pull outputs** | **VW3 A3E 407** *(3)* | 0.200 |
| **Resolver encoder interface card 1.25…5.6 V** | **VW3 A3E 408** *(3)* | 0.200 |
| **Universal encoder interface card with SinCos, SinCos Hiperface®, EnDat® or SSI 5, 8 or 12 V output** | **VW3 A3E 409** *(3)* | 0.200 |
| **Encoder interface card with RS 422 compatible differential outputs with encoder emulation** (RS 422 ESIM) | **VW3 A3E 411** *(3)* | 0.200 |
| **Logic I/O extension card** | **VW3 A3E 201** *(4)* | 0.320 |
| **Extended I/O extension card** | **VW3 A3E 202** *(4)* | 0.300 |
| **"Controller Inside" programmable card** equipped with a 9-way male SUB-D connector | **VW3 A3E 501** *(5) (6)* | 0.300 |
| **Modbus TCP communication card** | **VW3 A3E 310** *(7)* | 0.300 |
| **EtherNet/IP communication card** | **VW3 A3E 316** *(7)* | 0.300 |
| **Modbus/Uni-Telway communication card** | **VW3 A3E 303** *(7)* | 0.300 |
| **Standard Fipio communication card** | **VW3 A3E 311** *(7)* | 0.300 |
| **Substitution Fipio communication card** | **VW3 A3E 301** *(7)* | 0.300 |
| **Modbus Plus communication card** | **VW3 A3E 302** *(7)* | 0.300 |
| **PROFIBUS DP communication card** | **VW3 A3E 307** *(7)* | 0.300 |
| **DeviceNet communication card** | **VW3 A3E 309** *(7)* | 0.300 |
| **INTERBUS communication card** | **VW3 A3E 304** *(7)* | 0.300 |
| **CC-Link communication card** | **VW3 A3E 317** *(7)* | 0.320 |

*(1) For any other configuration, please consult your Regional Sales Office.*
*(2) The technical characteristics of the VW3 A3E 101 adapter are identical to those of the VW3 A3 101 adapter, see page 26.*
*(3) The technical characteristics of the VW3 A3E 401…409 and 411 encoder interface cards are identical to those of the VW3 A3 401…409 and 411 encoder interface cards, see pages 111 to 113.*
*(4) The technical characteristics of the VW3 A3E 201 and VW3 A3E 202 I/O extension cards are identical to those of the VW3 A3 201 and VW3 A3 202 I/O extension cards, see pages 114 and 115.*
*(5) The technical characteristics of the VW3 A3E 501 "Controller Inside" programmable card are identical to those of the VW3 A3 501 "Controller Inside" programmable card, see page 118.*
*(6) If the power consumption table does not exceed 200 mA, the "Controller Inside" programmable card can be powered by Altivar 71 drives. Above 200 mA, the VW3 AE 1401 additional 24 V ⎓ power supply option must be ordered, see page 55.*
*(7) The technical characteristics of the VW3 A3E 301…304, 307, 309…311, 316 and 317 communication cards are identical to those of the VW3 A3 301…304, 307, 309…311, 316 and 317 communication cards, see pages 126 to 131.*

# Variable speed drives
## Altivar 71
## IP 23 or IP 54 floor-standing enclosure compact version
## Common options

### Common options without modification of the floor-standing enclosure *(1)*

| Description | Reference | Weight kg |
|---|---|---|
| **Remote control terminals X12** | **VW3 AE 1201** | 0.700 |
| **Remote option card terminals X13**<br>For I/O extension cards VW3 A3E 201 and 202 | **VW3 AE 1202** *(2)* | 0.900 |
| **External source terminals 230 V ∿** | **VW3 AE 1301** | 0.100 |
| **Additional 24 V ⎓ power supply, nominal current 2 A** *(3)* | **VW3 AE 1401** | 2.200 |
| **External source terminals 24 V ⎓** | **VW3 AE 1402** | 0.100 |
| **Emergency stop button** | **VW3 AE 1501** | 0.100 |
| **"Preventa type AC" fault relay** | **VW3 AE 1502** | 0.100 |
| **"Preventa type ATE" fault relay** | **VW3 AE 1503** | 0.100 |
| **Enclosure lighting** | **VW3 AE 1601** | 1.500 |
| **Key switch (Local Remote)** | **VW3 AE 1801** | 0.200 |
| **Additional electrical input isolation** | **VW3 AE 1901** | 0.100 |
| **Additional electrical output isolation** | **VW3 AE 1902** | 0.100 |
| **PTC relay** | **VW3 AE 2001** | 0.100 |
| **PTC relay with PTB (ATEX) certification** *(4)* | **VW3 AE 2002** | 0.100 |
| **PT100 relay**<br>for motor winding | **VW3 AE 2003** | 0.300 |
| **PT100 relay**<br>for motor bearings | **VW3 AE 2004** | 0.300 |
| **Motor heater 200 W, 230 V** | **VW3 AE 2101** | 0.200 |
| **Power supply circuit with 400 V protection**<br>for 1000 W external fan | **VW3 AE 2102** | 0.200 |
| **Relay for logic output** | **VW3 AE 2201** | 0.100 |
| **Voltmeter**<br>three-phase supply voltage 380…415 V | **VW3 AE 2301** | 0.400 |
| **Voltmeter**<br>three-phase supply voltage 500 V | **VW3 AE 2302** | 0.400 |
| **Voltmeter**<br>three-phase supply voltage 600…690 V | **VW3 AE 2303** | 0.400 |

*(1) For any other configuration, please consult your Regional Sales Office.*
*(2) The X13 terminals, reference VW3 AE 1202, include the X12 terminals, reference VW3 AE 1201.*
*(3) Mandatory when the power consumption table for the option cards exceeds 200 mA.*
*(4) ATEX: see pages 220 and 221.*

# Variable speed drives
## Altivar 71
IP 23 or IP 54 floor-standing enclosure compact version
Options dependent on the drive rating

### Options dependent on the drive rating (1)
**Three-phase supply voltage 380 V…415 V 50/60 Hz**

| Description | For ATV 71 compact floor-standing enclosure | Reference (2) | Weight kg |
|---|---|---|---|
| **Resistance braking unit** | EXC●C20N4…C28N4 | **VW3 A7E 101** (3) | 31.000 |
| | EXC●C31N4…C50N4 | **VW3 AE 1003** | 190.000 |
| **Isolating handle for switch** | EXC●D90N4, C11N4 | **VW3 AE 0103** | 1.000 |
| | EXC●C13N4…C28N4 | **VW3 AE 0104** | 2.000 |
| | EXC●C31N4…C50N4 | **VW3 AE 0105** | 2.000 |
| **Circuit-breaker** | EXC●D90N4, C11N4 | **VW3 AE 0106** | 1.400 |
| | EXC●C13N4…C20N4 | **VW3 AE 0107** | 1.400 |
| | EXC●C25N4…C31N4 | **VW3 AE 0109** | 1.400 |
| | EXC●C40N4 | **VW3 AE 0111** | 9.400 |
| | EXC●C50N4 | **VW3 AE 0112** | 9.400 |
| **Door handle for circuit-breaker** | EXC●D90N4, C11N4 | **VW3 AE 0114** | 1.000 |
| | EXC●C13N4…C31N4 | **VW3 AE 0115** | 2.000 |
| | EXC●C40N4, C50N4 | **VW3 AE 0116** | 2.000 |
| **230 V undervoltage coil for circuit-breaker** | EXC●D90N4…C31N4 | **VW3 AE 0117** | 0.500 |
| | EXC●C40N4, C50N4 | **VW3 AE 0118** | 0.500 |
| **110 V undervoltage coil for circuit-breaker** | EXC●D90N4…C31N4 | **VW3 AE 0119** | 0.500 |
| | EXC●C40N4, EXC●C50N4 | **VW3 AE 0120** | 0.500 |
| **230 V motor for circuit-breaker** | EXC●D90N4, C11N4 | **VW3 AE 0121** | 0.950 |
| | EXC●C13N4…C20N4 | **VW3 AE 0122** | 3.000 |
| | EXC●C25N4…C31N4 | **VW3 AE 0123** | 3.000 |
| | EXC●C40N4 | **VW3 AE 0124** | 7.000 |
| | EXC●C50N4 | **VW3 AE 0125** | 7.000 |
| **110 V motor for circuit-breaker** | EXC●D90N4, C11N4 | **VW3 AE 0127** | 0.950 |
| | EXC●C13N4…C20N4 | **VW3 AE 0128** | 3.000 |
| | EXC●C25N4…C31N4 | **VW3 AE 0129** | 3.000 |
| | EXC●C40N4 | **VW3 AE 0130** | 7.000 |
| | EXC●C50N4 | **VW3 AE 0131** | 7.000 |
| **Line contactor** | EXC●D90N4, C11N4 | **VW3 AE 0206** | 7.000 |
| | EXC●C13N4, C16N4 | **VW3 AE 0218** | 10.000 |
| | EXC●C20N4 | **VW3 AE 0209** | 12.000 |
| | EXC●C25N4…C31N4 | **VW3 AE 0210** | 14.000 |
| | EXC●C40N4 | **VW3 AE 0212** | 24.000 |
| | EXC●C50N4 | **VW3 AE 0213** | 28.000 |

*(1) For any other configuration, please consult your Regional Sales Office.*
*(2) The options depend on the rating of the drive and may lead to modification of the size of the enclosure.*
*(3) The technical characteristics of the VW3 A7E 101 braking units are identical to those of the VW3 A7 101 braking units, see page 134.*

Presentation: page 46 | Characteristics: pages 47 to 51 | Dimensions: pages 60 to 63 | Mounting recommendations: pages 64 and 65 | Schemes: pages 66 to 75

# Variable speed drives
Altivar 71
IP 23 or IP 54 floor-standing enclosure compact version
Options dependent on the drive rating

## Options dependent on the drive rating (continued) (1)

### Three-phase supply voltage 380…415 V 50/60 Hz (continued)

| Description | For ATV 71 compact floor-standing enclosure | Reference (2) | Weight kg |
|---|---|---|---|
| **Control transformer 500 VA ∿, output 230 V ∿** | EXC●D90N4…C28N4 | **VW3 AE 0302** | 8.000 |
| **Control transformer 800 VA ∿, output 230 V ∿** | EXC●C31N4…C50N4 | **VW3 AE 0303** | 11.000 |
| **Ammeter** | EXC●D90N4 | **VW3 AE 0405** | 0.200 |
| | EXC●C11N4, C13N4 | **VW3 AE 0406** | 0.200 |
| | EXC●C16N4 | **VW3 AE 0407** | 0.200 |
| | EXC●C20N4…C28N4 | **VW3 AE 0408** | 0.200 |
| | EXC●C31N4 | **VW3 AE 0409** | 0.200 |
| | EXC●C40N4 | **VW3 AE 0410** | 0.200 |
| | EXC●C50N4 | **VW3 AE 0411** | 0.200 |
| **Enclosure heater** | EXC●D90N4…C28N4 | **VW3 AE 0501** | 0.500 |
| | EXC●C31N4…C50N4 | **VW3 AE 0502** | 1.000 |
| **Motor choke** | EXC●D90N4 | **VW3 AE 0603** | 17.000 |
| | EXC●C11N4, C13N4 | **VW3 AE 0604** | 35.000 |
| | EXC●C16N4, C20N4 | **VW3 AE 0605** | 64.000 |
| | EXC●C25N4, C28N4 | **VW3 AE 0606** | 102.000 |
| | EXC2C31N4 | **VW3 AE 0607** | 192.000 |
| | EXC5C31N4 | **VW3 AE 0611** | 192.000 |
| | EXC2C40N4 | **VW3 AE 0609** | 228.000 |
| | EXC5C40N4 | **VW3 AE 0613** | 228.000 |
| | EXC2C50N4 | **VW3 AE 0610** | 234.000 |
| | EXC5C50N4 | **VW3 AE 0614** | 234.000 |
| **Sinus filter** *(3)* | EXC2D90N4 | **VW3 AE 0641** | 318.000 |
| | EXC5D90N4 | **VW3 AE 0653** | 348.000 |
| | EXC2C11N4 | **VW3 AE 0642** | 318.000 |
| | EXC5C11N4 | **VW3 AE 0654** | 325.000 |
| | EXC2C13N4 | **VW3 AE 0644** | 365.000 |
| | EXC5C13N4 | **VW3 AE 0656** | 365.000 |
| | EXC2C16N4 | **VW3 AE 0645** | 373.000 |
| | EXC5C16N4 | **VW3 AE 0657** | 373.000 |
| | EXC2C20N4 | **VW3 AE 0647** | 384.000 |
| | EXC5C20N4 | **VW3 AE 0659** | 394.000 |
| | EXC2C25N4, C28N4 | **VW3 AE 0648** | 434.000 |
| | EXC5C25N4, C28N4 | **VW3 AE 0660** | 434.000 |
| | EXC2C31N4 | **VW3 AE 0649** | 445.000 |
| | EXC5C31N4 | **VW3 AE 0661** | 445.000 |
| | EXC2C40N4 | **VW3 AE 0651** | 870.000 |
| | EXC5C40N4 | **VW3 AE 0663** | 900.000 |
| | EXC2C50N4 | **VW3 AE 0652** | 900.000 |
| | EXC5C50N4 | **VW3 AE 0664** | 930.000 |

*(1) For any other configuration, please consult your Regional Sales Office.*
*(2) The options depend on the rating of the drive and may lead to modification of the size of the enclosure.*
*(3) Option not compatible with the "Cable entry via the top" option*

# Variable speed drives
## Altivar 71
IP 23 or IP 54 floor-standing enclosure compact version
Options dependent on the drive rating

### Options dependent on the drive rating (continued) (1)
**Three-phase supply voltage 380…415 V 50/60 Hz (continued)**

| Description | Use | For ATV 71 compact floor-standing enclosure | Reference (2) | Weight kg |
|---|---|---|---|---|
| **Cable entry via the top** (3) | Without motor choke | EXC●D90N4, C11N4 | **VW3 AE 0705** | 108.000 |
| | | EXC●C13N4 | **VW3 AE 0706** | 108.000 |
| | | EXC●C16N4 | **VW3 AE 0707** | 108.000 |
| | | EXC●C20N4…C28N4 | **VW3 AE 0708** | 126.000 |
| | | EXC●C31N4 | **VW3 AE 0709** | 216.000 |
| | | EXC●C40N4 | **VW3 AE 0710** | 252.000 |
| | | EXC●C50N4 | **VW3 AE 0711** | 252.000 |
| | With motor choke | EXC●C31N4 | **VW3 AE 0712** | 108.000 |
| | | EXC●C40N4 | **VW3 AE 0713** | 126.000 |
| | | EXC●C50N4 | **VW3 AE 0714** | 126.000 |
| **200 mm plinth** | With or without motor choke | EXC●D90N4…C16N4 | **VW3 AE 0801** | 17.000 |
| | | EXC●C20N4…C28N4 | **VW3 AE 0802** | 20.000 |
| | Without motor choke | EXC●C31N4, C40N4 | **VW3 AE 0803** | 23.000 |
| | | EXC●C50N4 | **VW3 AE 0804** | 24.000 |
| | With motor choke | EXC●C31N4, C40N4 | **VW3 AE 0805** | 38.000 |
| | | EXC●C50N4 | **VW3 AE 0806** | 39.000 |
| | With braking unit | EXC●C31N4…C50N4 | **VW3 AE 0810** | 15.000 |
| **Plinth for cable entry via the top** | With or without motor choke | EXC●D90N4…C28N4 | **VW3 AE 0807** | 15.000 |
| | Without motor choke | EXC●C31N4…C50N4 | **VW3 AE 0808** | 30.000 |
| | With motor choke | EXC●C31N4…C50N4 | **VW3 AE 0809** | 15.000 |
| **Plinth for sinus filter** | – | EXC●D90N4…C31N4 | **VW3 AE 0816** | 17.000 |
| | | EXC●C40N4, C50N4 | **VW3 AE 0817** | 20.000 |

*(1) For any other configuration, please consult your Regional Sales Office.*
*(2) The options depend on the rating of the drive and may lead to modification of the size of the enclosure.*
*(3) Option not compatible with the "Sinus filter" option.*

# Variable speed drives
## Altivar 71
IP 23 or IP 54 floor-standing enclosure compact version
Options dependent on the drive rating

### Options dependent on the drive rating (continued) (1)
**Three-phase supply voltage 500 V and 600…690 V 50/60 Hz (continued)**

| Description | Use | For ATV 71 compact floor-standing enclosure | | Reference (2) | Weight |
|---|---|---|---|---|---|
| | | 500 V | 600…690 V | | kg |
| **Resistance braking unit** | – | EXC●C16N…C25N | EXC●C20Y…C31Y | **VW3 AE 1004** | 190.000 |
| | | EXC●C31N…C50N | EXC●C40Y…C63Y | **VW3 AE 1005** | 190.000 |
| **Isolating handle for switch** | – | EXC●D90N…C13N | EXC●C11Y…C16Y | **VW3 AE 0103** | 1.000 |
| | | EXC●C16N…C25N | EXC●C20Y…C31Y | **VW3 AE 0104** | 2.000 |
| | | EXC●C31N…C50N | EXC●C40Y…C63Y | **VW3 AE 0105** | 2.000 |
| **Ammeter** | – | EXC●D90N | EXC●C11Y | **VW3 AE 0404** | 0.200 |
| | | EXC●C11N, C13N | EXC●C13Y…C20Y | **VW3 AE 0405** | 0.200 |
| | | EXC●C16N | EXC●C25Y | **VW3 AE 0406** | 0.200 |
| | | EXC●C20N | EXC●C31Y | **VW3 AE 0407** | 0.200 |
| | | EXC●C25N, C31N | EXC●C40Y | **VW3 AE 0408** | 0.200 |
| | | EXC●C40N | EXC●C50Y, C63Y | **VW3 AE 0409** | 0.200 |
| | | EXC●C50N | – | **VW3 AE 0410** | 0.200 |
| **Enclosure heater** | – | EXC●D90N…C25N | EXC●C11Y…C31Y | **VW3 AE 0501** | 0.500 |
| | | EXC●C31N…C50N | EXC●C40Y…C63Y | **VW3 AE 0502** | 1.000 |
| **Motor choke** | – | EXC●D90N, C11N | EXC●C11Y, C13Y | **VW3 AE 0603** | 17.000 |
| | | EXC●C13N, C16N | EXC●C16Y, C20Y | **VW3 AE 0604** | 35.000 |
| | | EXC●C20N, C25N | EXC●C25Y, C31Y | **VW3 AE 0605** | 64.000 |
| | | EXC2C31N, C40N | EXC2C40Y, C50Y | **VW3 AE 0626** | 192.000 |
| | | EXC5C31N, C40N | EXC5C40Y, C50Y | **VW3 AE 0628** | 192.000 |
| | | EXC2C50N | EXC2C63Y | **VW3 AE 0627** | 234.000 |
| | | EXC5C50N | EXC5C63Y | **VW3 AE 0629** | 234.000 |
| **Cable entry via the top** | With or without motor choke | EXC●D90N…C13N | EXC●C11Y…C16Y | **VW3 AE 0728** | 108.000 |
| | | EXC●C16N…C25N | EXC●C20Y…C31Y | **VW3 AE 0729** | 126.000 |
| | Without motor choke | EXC●C31N…C50N | EXC●C40Y…C63Y | **VW3 AE 0730** | 252.000 |
| | With motor choke | EXC●C31N…C50N | EXC●C40Y…C63Y | **VW3 AE 0731** | 126.000 |
| **200 mm plinth** | With or without motor choke | EXC●D90N…C13N | EXC●C11Y…C16Y | **VW3 AE 0801** | 17.000 |
| | | EXC●C16N…C25N | EXC●C20Y…C31Y | **VW3 AE 0802** | 20.000 |
| | | EXC●C31N…C50N | EXC●C40Y…C63Y | **VW3 AE 0804** | 24.000 |
| | With motor choke | EXC●C31N…C50N | EXC●C40Y…C63Y | **VW3 AE 0806** | 39.000 |
| | With braking unit | EXC●C16N…C50N | EXC●C20Y…C63Y | **VW3 AE 0810** | 39.000 |
| **Plinth for cable entry via the top** | With or without motor choke | EXC●D90N…C25N | EXC●C11Y…C31Y | **VW3 AE 0807** | 15.000 |
| | Without motor choke | EXC●C31N…C50N | EXC●C40Y…C63Y | **VW3 AE 0808** | 30.000 |
| | With motor choke | EXC●C31N…C50N | EXC●C40Y…C63Y | **VW3 AE 0809** | 15.000 |

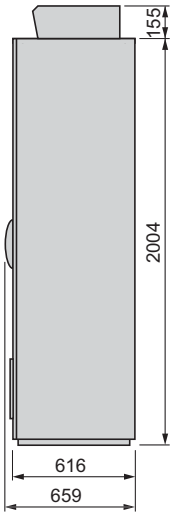
*(1) For any other configuration, please consult your Regional Sales Office.*
*(2) The options depend on the rating of the drive and may lead to modification of the size of the enclosure.*

# Variable speed drives
Altivar 71
IP 23 floor-standing enclosure compact version

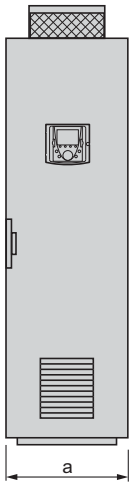
## IP 23 floor-standing enclosure compact version

**ATV 71EXC2D90N4…EXC2C28N4, ATV 71EXC2D90N…EXC2C25N, ATV 71EXC2C11Y…EXC2C31Y**

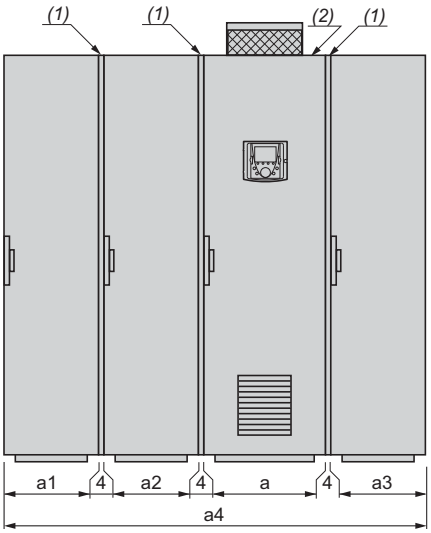
**Common side view**




**Standard compact floor-standing enclosure**




**Standard compact floor-standing enclosure + additional floor-standing enclosures, according to the configuration**




***Note**: The position of the enclosures must be complied with during installation. The number of additional enclosures can vary according to the chosen configuration.*

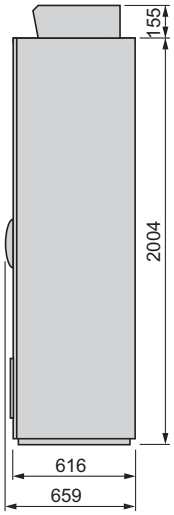
| ATV 71 floor-standing enclosures | Options | a | a1 | a2 | a3 | a4 |
|---|---|---|---|---|---|---|
| **EXC2D90N4…EXC2C16N4** | With or without common options or options *(3)* dependent on the drive rating | 616 | – | – | – | 616 |
| | Cable entry via the top option *(4)* | 608 | – | 408 | – | 1020 |
| | Sinus filter option | 608 | – | – | 608 | 1220 |
| **EXC2C20N4…EXC2C28N4** | With or without common options or options *(6)* dependent on the drive rating | 816 | – | – | – | 816 |
| | Cable entry via the top option *(4)* | 808 | – | 408 | – | 1220 |
| | Sinus filter option | 808 | – | – | 608 | 1420 |
| **EXC2D90N…EXC2C13N, EXC2C11Y…EXC2C16Y** | With or without common options or options dependent on the drive rating | 616 | – | – | – | 616 |
| | Cable entry via the top option | 608 | – | 408 | – | 1020 |
| **EXC2C16N…EXC2C25N, EXC2C20Y…EXC2C31Y** | With or without common options or options dependent on the drive rating | 816 | – | – | – | 816 |
| | Cable entry via the top option | 808 | – | 408 | – | 1220 |
| | Braking unit option | 808 | – | 408 | – | 1220 |
| | Braking unit + cable entry via the top options | 808 | 408 | 400 | – | 1624 |

*(1) Seal. For each floor-standing enclosure added, allow a 4 mm space for the seal.*
*(2) Standard IP 23 compact version floor-standing enclosure.*
*(3) Except sinus filter option, which requires an additional enclosure. See table above. The sinus filter option is not compatible with the cable entry via the top option.*
*(4) The cable entry via the top option is not compatible with the sinus filter option.*

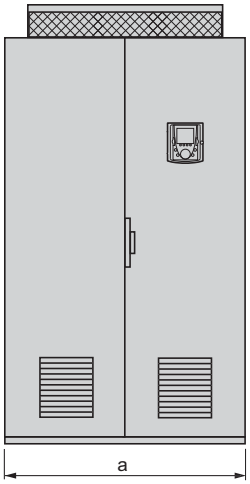
## IP 23 floor-standing enclosure compact version (continued)

**ATV 71EXC2C31N4 ... EXC2C50N4, ATV 71EXC2C31N ... EXC2C50N, ATV 71EXC2C40Y...EXC2C63Y**

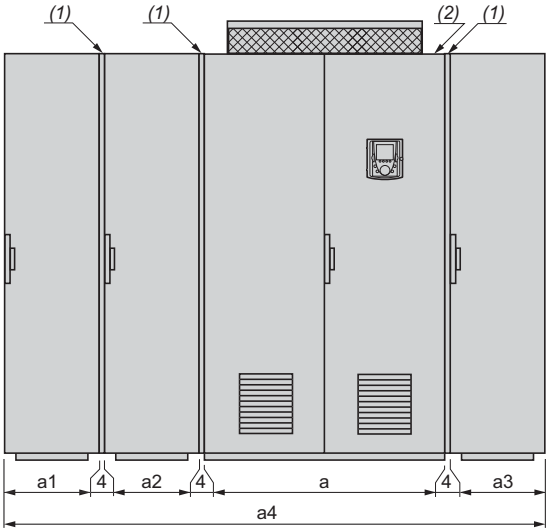
**Common side view**




**Standard compact floor-standing enclosure**




**Standard compact floor-standing enclosure + additional floor-standing enclosures, according to the configuration**




***Note**: The position of the enclosures must be complied with during installation. The number of additional enclosures can vary according to the chosen configuration.*

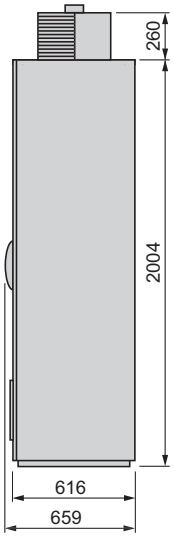
| ATV 71 floor-standing enclosures | Options | a | a1 | a2 | a3 | a4 |
|---|---|---|---|---|---|---|
| **EXC2C31N4** | With or without common options or options *(3)* dependent on the drive rating | 1016 | – | – | – | 1016 |
| | Cable entry via the top option *(4)* | 1000 | – | 408 | 408 | 1824 |
| | Braking unit option only and/or options *(3)* dependent on rating | 1008 | – | 408 | – | 1420 |
| | Braking unit + cable entry via the top options *(4)* | 1000 | 408 | 400 | 408 | 2228 |
| | Motor choke option | 1008 | – | – | 408 | 1420 |
| | Sinus filter option | 1008 | – | – | 608 | 1620 |
| **EXC2C40N4** | With or without common options or options *(3)* dependent on the drive rating | 1016 | – | – | – | 1016 |
| | Cable entry via the top option *(4)* | 1000 | – | 408 | 408 | 1824 |
| | Braking unit option only and/or options *(3)* dependent on rating | 1008 | – | 408 | – | 1420 |
| | Braking unit + cable entry via the top options *(4)* | 1000 | 408 | 400 | 408 | 2228 |
| | Motor choke option | 1008 | – | – | 408 | 1420 |
| | Sinus filter option | 1008 | – | – | 808 | 1820 |
| **EXC2C50N4** | With or without common options or options *(3)* dependent on the drive rating | 1216 | – | – | – | 1216 |
| | Cable entry via the top option *(4)* | 1200 | – | 408 | 408 | 2024 |
| | Braking unit option only and/or options *(3)* dependent on rating | 1208 | – | 408 | – | 1620 |
| | Braking unit + cable entry via the top options *(4)* | 1200 | 408 | 400 | 408 | 2428 |
| | Motor choke option | 1208 | – | – | 408 | 1620 |
| | Sinus filter option | 1208 | – | – | 808 | 2020 |
| **EXC2C31N...EXC2C50N, EXC2C40Y...EXC2C63Y** | With or without common options or options dependent on the drive rating | 1216 | – | – | – | 1216 |
| | Cable entry via the top option | 1200 | – | 408 | 408 | 2024 |
| | Braking unit option only and/or options dependent on rating | 1208 | – | 408 | – | 1620 |
| | Braking unit + cable entry via the top options | 1200 | 408 | 400 | 408 | 2428 |
| | Motor choke option | 1208 | – | – | 408 | 1620 |

*(1) Seal. For each floor-standing enclosure added, allow a 4 mm space for the seal.*
*(2) Standard IP 23 compact version floor-standing enclosure.*
*(3) Except sinus filter option, which requires an additional enclosure. See table above. The sinus filter option is not compatible with the cable entry via the top option.*
*(4) The cable entry via the top option is not compatible with the sinus filter option*

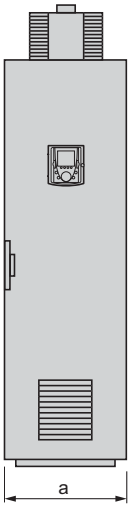
## IP 54 floor-standing enclosure compact version

### ATV 71EXC5D90N4…EXC5C28N4, ATV 71EXC5D90N…EXC5C25N, ATV 71EXC5C11Y…EXC5C31Y

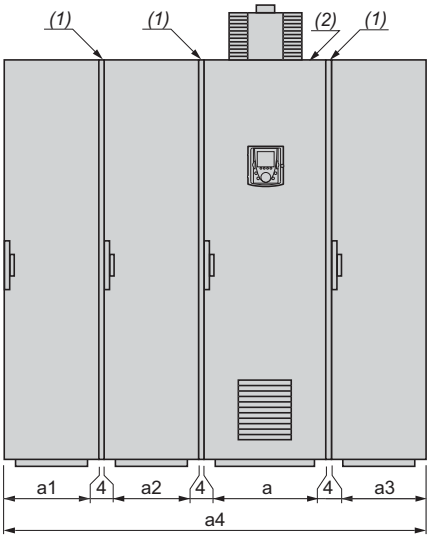
**Common side view**




**Standard compact floor-standing enclosure**




**Standard compact floor-standing enclosure + additional floor-standing enclosures, according to the configuration**




***Note**: The position of the enclosures must be complied with during installation. The number of additional enclosures can vary according to the chosen configuration.*

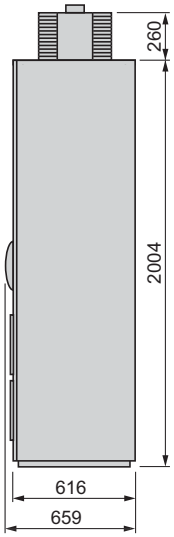
| ATV 71 floor-standing enclosures | Options | a | a1 | a2 | a3 | a4 |
|---|---|---|---|---|---|---|
| **EXC5D90N4…EXC5C16N4** | With or without common options or options *(3)* dependent on the drive rating | 616 | – | – | – | 616 |
| | Cable entry via the top option *(4)* | 608 | – | 408 | – | 1020 |
| | Sinus filter option | 608 | – | – | 608 | 1220 |
| **EXC5C20N4…EXC5C28N4** | With or without common options or options *(3)* dependent on the drive rating | 816 | – | – | – | 816 |
| | Cable entry via the top option *(4)* | 808 | – | 408 | – | 1220 |
| | Sinus filter option | 808 | – | – | 608 | 1420 |
| **EXC5D90N…EXC5C13N, EXC5C11Y…EXC5C16Y** | With or without common options or options dependent on the drive rating | 616 | – | – | – | 616 |
| | Cable entry via the top option | 608 | – | 408 | – | 1020 |
| **EXC5C16N…EXC5C25N, EXC5C20Y…EXC5C31Y** | With or without common options or options dependent on the drive rating | 816 | – | – | – | 816 |
| | Cable entry via the top option | 808 | – | 408 | – | 1220 |
| | Braking unit option | 808 | – | 408 | – | 1220 |
| | Braking unit + cable entry via the top options | 808 | 408 | 400 | – | 1624 |

*(1) Seal. For each floor-standing enclosure added, allow a 4 mm space for the seal.*
*(2) Standard IP 54 compact version floor-standing enclosure.*
*(3) Except sinus filter option, which requires an additional enclosure. See table above. The sinus filter option is not compatible with the cable entry via the top option.*
*(4) Cable entry via the top is not compatible with the sinus filter option.*

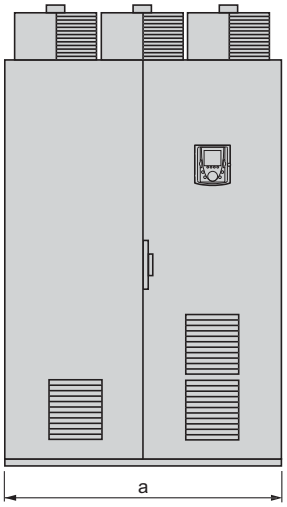
## IP 54 floor-standing enclosure compact version (continued)

**ATV 71EXC5C31N4…EXC5C50N4, ATV 71EXC5C31N…EXC5C50N, ATV 71EXC5C40Y…EXC5C63Y**

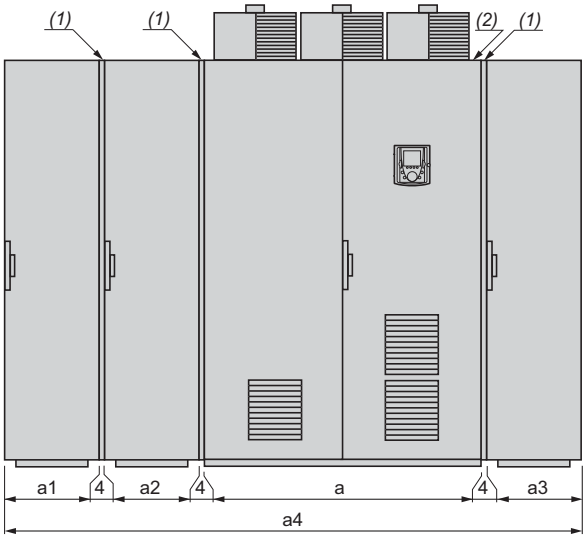
**Common side view**




**Standard compact floor-standing enclosure**




**Standard compact floor-standing enclosure + additional floor-standing enclosures, according to the configuration**




***Note**: The position of the enclosures must be complied with during installation. The number of additional enclosures can vary according to the chosen configuration.*

| ATV 71 floor-standing enclosures | Options | a | a1 | a2 | a3 | a4 |
|---|---|---|---|---|---|---|
| **EXC5C31N4** | With or without common options or options *(3)* dependent on the drive rating | 1016 | – | – | – | 1016 |
| | Cable entry via the top option *(4)* | 1000 | – | 408 | 408 | 1824 |
| | Braking unit option only and/or options *(3)* dependent on rating | 1008 | – | 408 | – | 1420 |
| | Braking unit + cable entry via the top options *(4)* | 1000 | 408 | 400 | 408 | 2228 |
| | Motor choke option | 1008 | – | – | 408 | 1420 |
| | Sinus filter option | 1008 | – | – | 608 | 1620 |
| **EXC5C40N4** | With or without common options or options *(3)* dependent on the drive rating | 1016 | – | – | – | 1016 |
| | Cable entry via the top option *(4)* | 1000 | – | 408 | 408 | 1824 |
| | Braking unit option only and/or options *(3)* dependent on rating | 1008 | – | 408 | – | 1420 |
| | Braking unit + cable entry via the top options *(4)* | 1000 | 408 | 400 | 408 | 2228 |
| | Motor choke option | 1008 | – | – | 408 | 1420 |
| | Sinus filter option | 1008 | – | – | 808 | 1820 |
| **EXC5C50N4** | With or without common options or options *(3)* dependent on the drive rating | 1216 | – | – | – | 1216 |
| | Cable entry via the top option *(4)* | 1200 | – | 408 | 408 | 2024 |
| | Braking unit option only and/or options *(3)* dependent on rating | 1208 | – | 408 | – | 1620 |
| | Braking unit + cable entry via the top options *(4)* | 1200 | 408 | 400 | 408 | 2428 |
| | Motor choke option | 1208 | – | – | 408 | 1620 |
| | Sinus filter option | 1208 | – | – | 808 | 2020 |
| **EXC5C31N…EXC5C50N, EXC5C40Y…EXC5C63Y** | With or without common options or options dependent on the drive rating | 1216 | – | – | – | 1216 |
| | Cable entry via the top option | 1200 | – | 408 | 408 | 2024 |
| | Braking unit option only and/or options dependent on rating | 1208 | – | 408 | – | 1620 |
| | Braking unit + cable entry via the top | 1200 | 408 | 400 | 408 | 2428 |
| | Motor choke option | 1208 | – | – | 408 | 1620 |

*(1) Seal. For each floor-standing enclosure added, allow a 4 mm space for the seal.*
*(2) Standard IP 54 compact version floor-standing enclosure.*
*(3) Except sinus filter option, which requires an additional enclosure. See table above. The sinus filter option is not compatible with the cable entry via the top option.*
*(4) The cable entry via the top option is not compatible with the sinus filter option.*

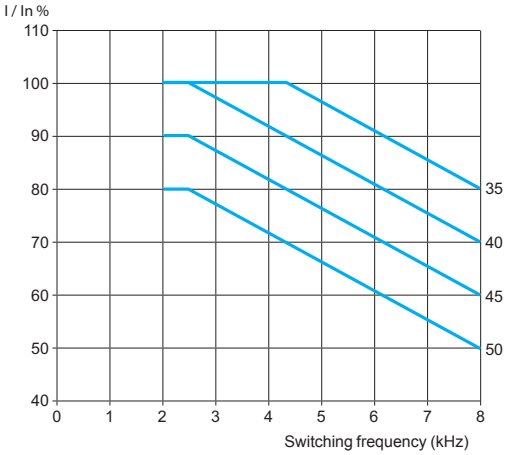
## Installation recommendations

The derating curves for the drive nominal current (In) are dependent on the temperature and switching frequency.
For intermediate temperatures, interpolate between 2 curves.

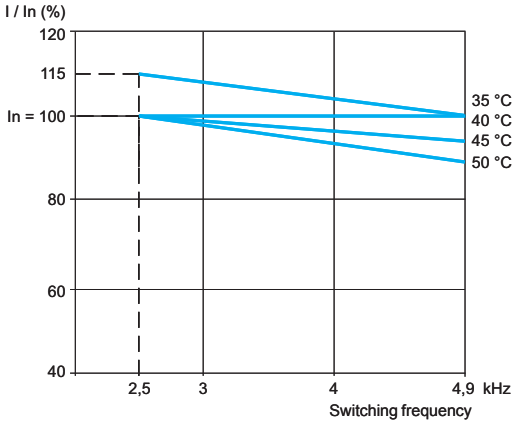
***Note:*** *The drive will reduce the switching frequency automatically in the event of excessive temperature rise.*

### Derating curves for ATV 71EXC●D90N4…EXC●C50N4, ATV 71EXC●D90N…EXC●C20N, ATV 71EXC●C11Y…EXC●C25Y *(1)*

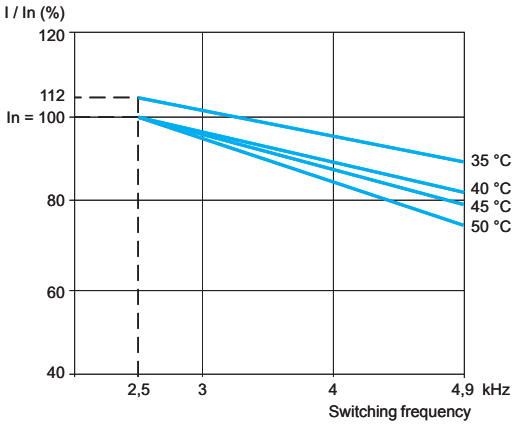
#### ATV 71EXC●D90N4…EXC●C50N4



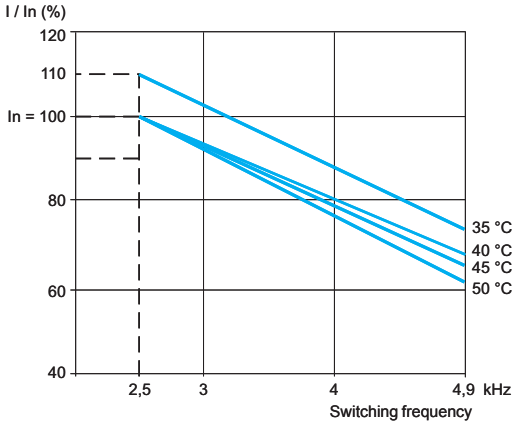

#### ATV 71EXC●D90N, ATV 71EXC●C11Y



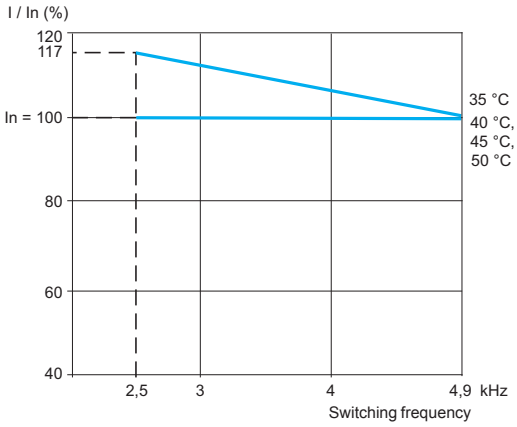

#### ATV 71EXC●C11N, ATV 71EXC●C13Y



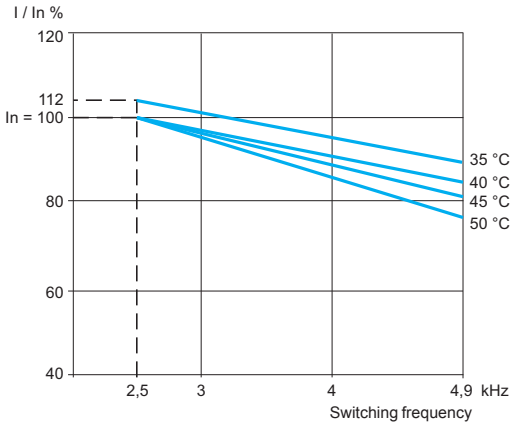

#### ATV 71EXC●C13N, ATV 71EXC●C16Y




#### ATV 71EXC●C16N, ATV 71EXC●C20Y




#### ATV 71EXC●C20N, ATV 71EXC●C25Y

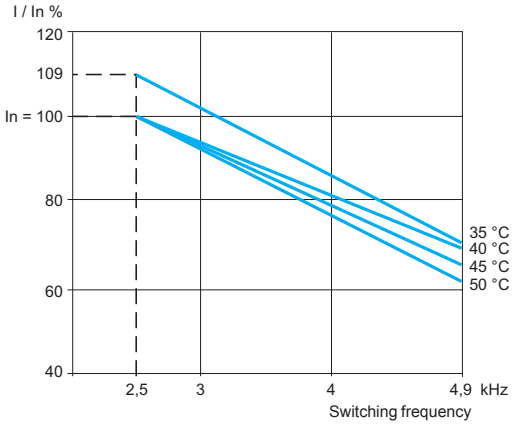



*(1) The temperatures shown correspond to the temperature of the air entering the enclosure.*

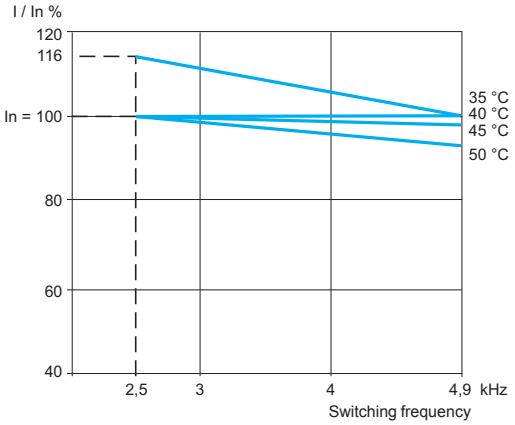
## Mounting recommendations (continued)

### Derating curves for ATV 71EXC●C25N…EXC●C50N, ATV 71EXC●C31Y…EXC●C63Y *(1)*

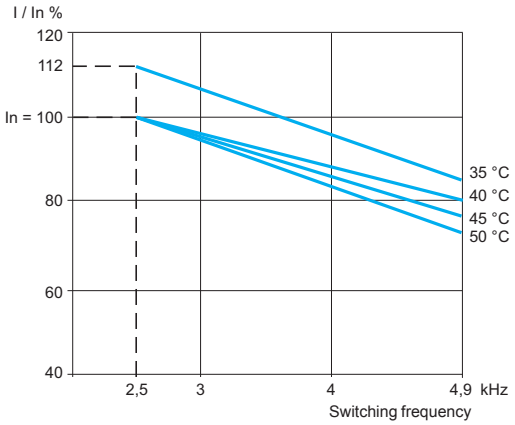
**ATV 71EXC●C25N, ATV 71EXC●C31Y**



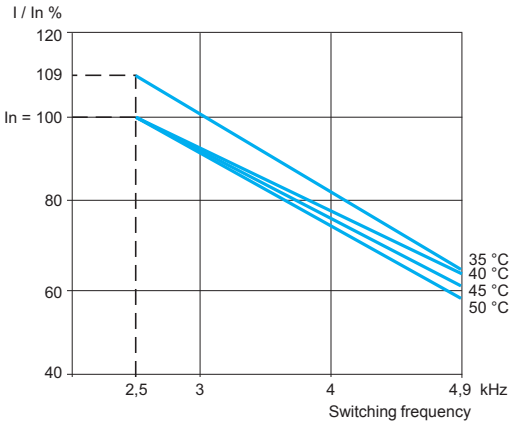

**ATV 71EXC●C31N, ATV 71EXC●C40Y**




**ATV 71EXC●C40N, ATV 71EXC●C50Y**




**ATV 71EXC●C50N, ATV 71EXC●C63Y**

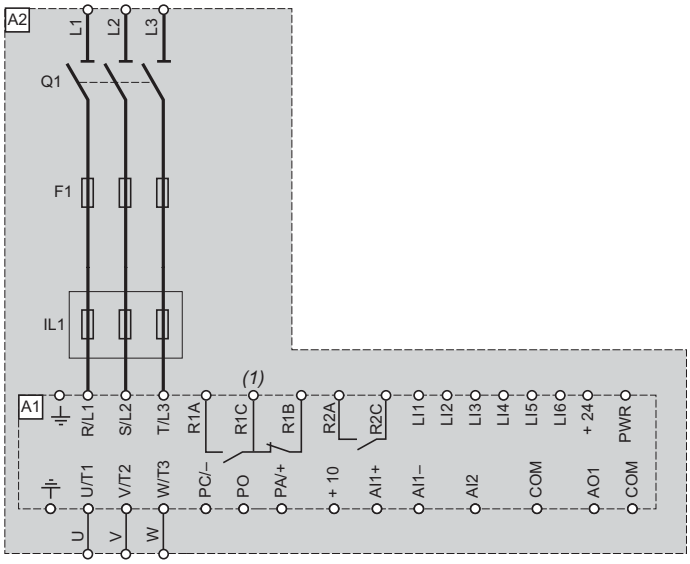



*(1) The temperatures shown correspond to the temperature of the air entering the enclosure.*

# Variable speed drives
Altivar 71
IP 23 or IP 54 floor-standing enclosure compact version

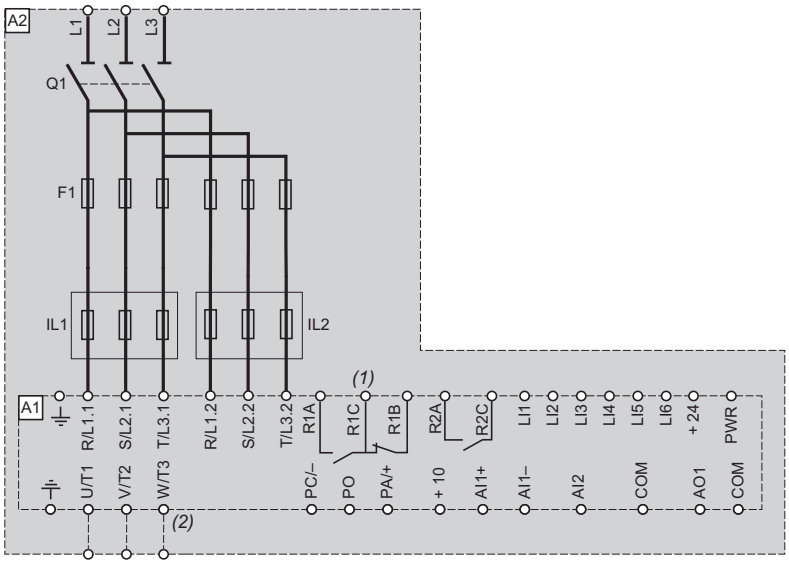
## IP 23 or IP 54 floor-standing enclosure compact version

### ATV 71EXC●D90N4...EXC●C31N4, ATV 71EXC●D90N...EXC●C31N, ATV 71EXC●C11Y... EXC●C31Y




| Reference | Description |
|---|---|
| **A1** | ATV 71 drive, see pages 23 and 25 |
| **A2** | ATV 71EXC● compact version floor-standing enclosure, see pages 52 and 53 |
| **F1** | Fast-acting semi-conductor fuse |
| **IL1** | Line choke |
| **Q1** | Switch |

### ATV 71EXC●C40N4, EXC●C50N4, ATV 71EXC●C40N, EXC●C50N, ATV 71EXC●C40Y...EXC●C63Y

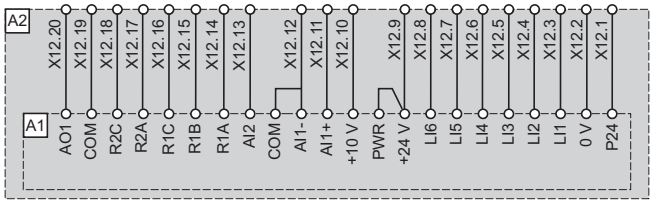



| Reference | Description |
|---|---|
| **A1** | ATV 71 drive, see pages 23 and 25 |
| **A2** | ATV 71EXC● compact version floor-standing enclosure, see pages 52 and 53 |
| **F1** | Fast-acting semi-conductor fuse |
| **IL1, IL2** | Line chokes |
| **Q1** | Switch |

*(1) Fault relay contacts. For remote signalling of drive status.*
*(2) Only for ATV 71 EXC●●●●N and ATV 71 EXC●●●●Y.*

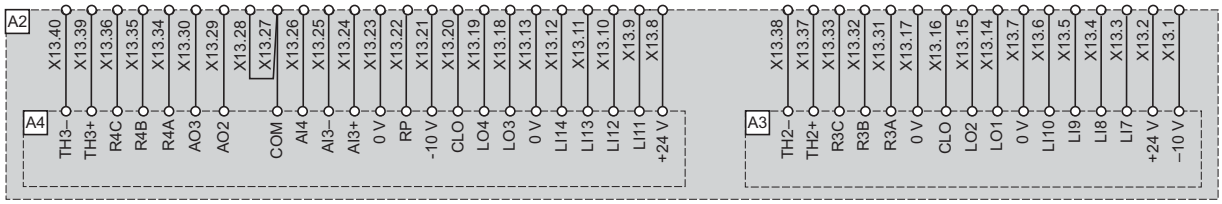
## Options common to all drives

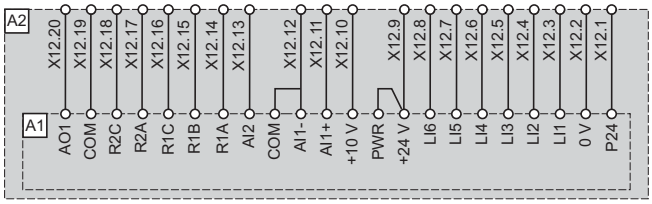
### Remote control terminals X12 - VW3 AE 1201




| Reference | Description |
|---|---|
| **A1** | ATV 71 drive, see pages 23 and 25 |
| **A2** | ATV 71EXC● compact version floor-standing enclosure, see pages 52 and 53 |

### Remote option card terminals X13 - VW3 AE 1202

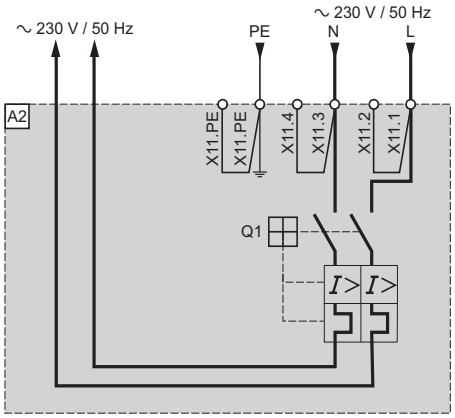



| Reference | Description |
|---|---|
| **A1** | ATV 71 drive, see pages 23 and 25 |
| **A2** | ATV 71EXC● compact version floor-standing enclosure, see pages 52 and 53 |
| **A3** | I/O option card VW3 A3E 201, see page 54 |
| **A4** | I/O option card VW3 A3E 202, see page 54 |

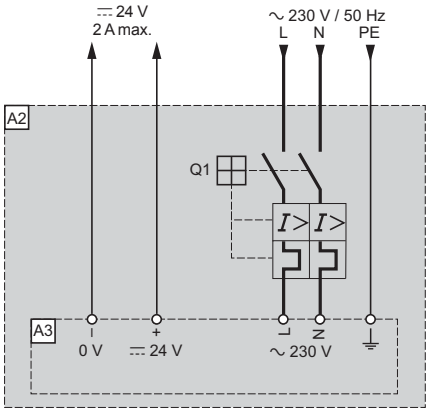
## Options common to all drives (continued)

### External source terminals 230 V ∿ - VW3 AE 1301



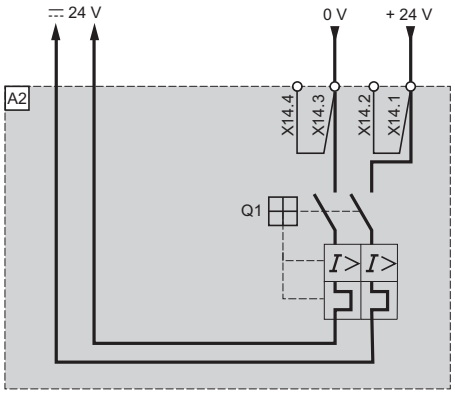

| Reference | Description |
|---|---|
| **A2** | ATV 71EXC● compact version floor-standing enclosure, see pages 52 and 53 |
| **Q1** | 6 A circuit-breaker |
| **X11** | External source terminals 230 V ∿ |

### Additional 24 V ⎓ power supply - VW3 AE 1401




| Reference | Description |
|---|---|
| **A2** | ATV 71EXC● compact version floor-standing enclosure, see pages 52 and 53 |
| **A3** | Additional 24 V ⎓ power supply |
| **Q1** | 2 A circuit-breaker |

### External source terminals 24 V ⎓ - VW3 AE 1402

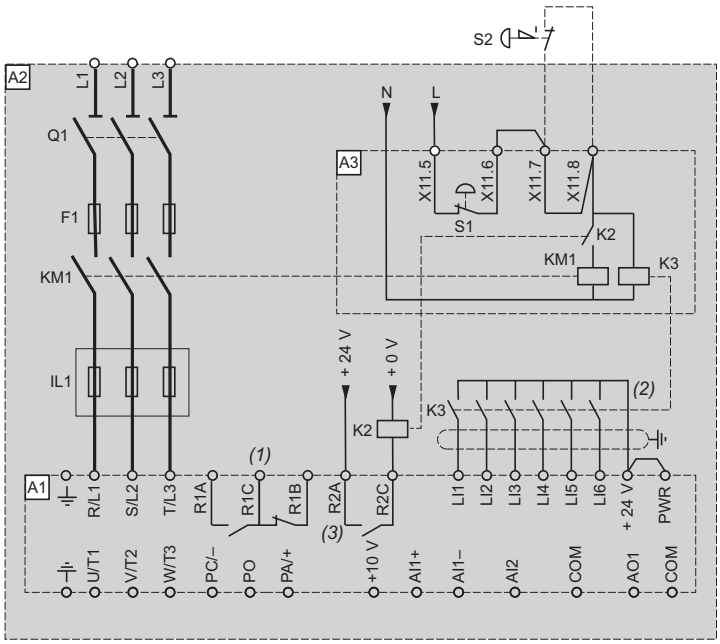



| Reference | Description |
|---|---|
| **A2** | ATV 71EXC● compact version floor-standing enclosure, see pages 52 and 53 |
| **Q1** | 2 A circuit-breaker |
| **X14** | External source terminals 24 V ⎓ |

## Options common to all drives (continued)

### Emergency stop button - VW3 AE 1501

**Scheme conforming to standards EN 954-1 category 1, IEC/EN 61508 capacity SIL1, stopping category 0 in accordance with IEC/EN 60204-1**



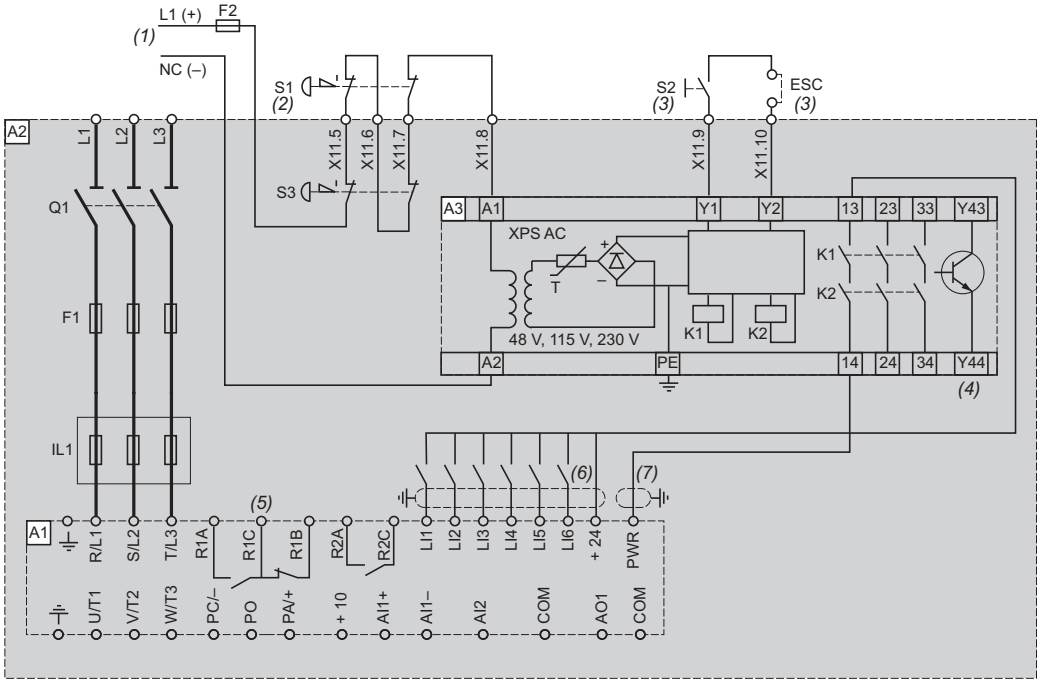

| Reference | Description |
|---|---|
| **A1** | ATV 71 drives, see pages 23 and 25 |
| **A2** | ATV 71EXC● compact version floor-standing enclosure, see pages 52 and 53 |
| **A3** | Emergency stop button |
| **IL1** | Line choke |
| **K2** | Line contactor control contactor |
| **K3** | Logic input control contactor |
| **KM1** | Line contactor |
| **Q1** | Switch |
| **S1** | Emergency stop button mounted on enclosure door |
| **S2** | Emergency stop button |

*(1) Fault relay contacts. For remote signalling of drive status.*
*(2) Connection of the common for the logic inputs depends on the positioning of the SW1 switch: see schemes on page 227.*
*(3) Relay logic output R2A must be assigned to the "Line contactor" parameter.*

## Options common to all drives (continued)

### "Preventa type AC" fault relay - VW3 AE 1502

**Scheme conforming to standards EN 954-1 category 3, IEC/EN 61508 capacity SIL2, stopping category 0 in accordance with IEC/EN 60204-1**



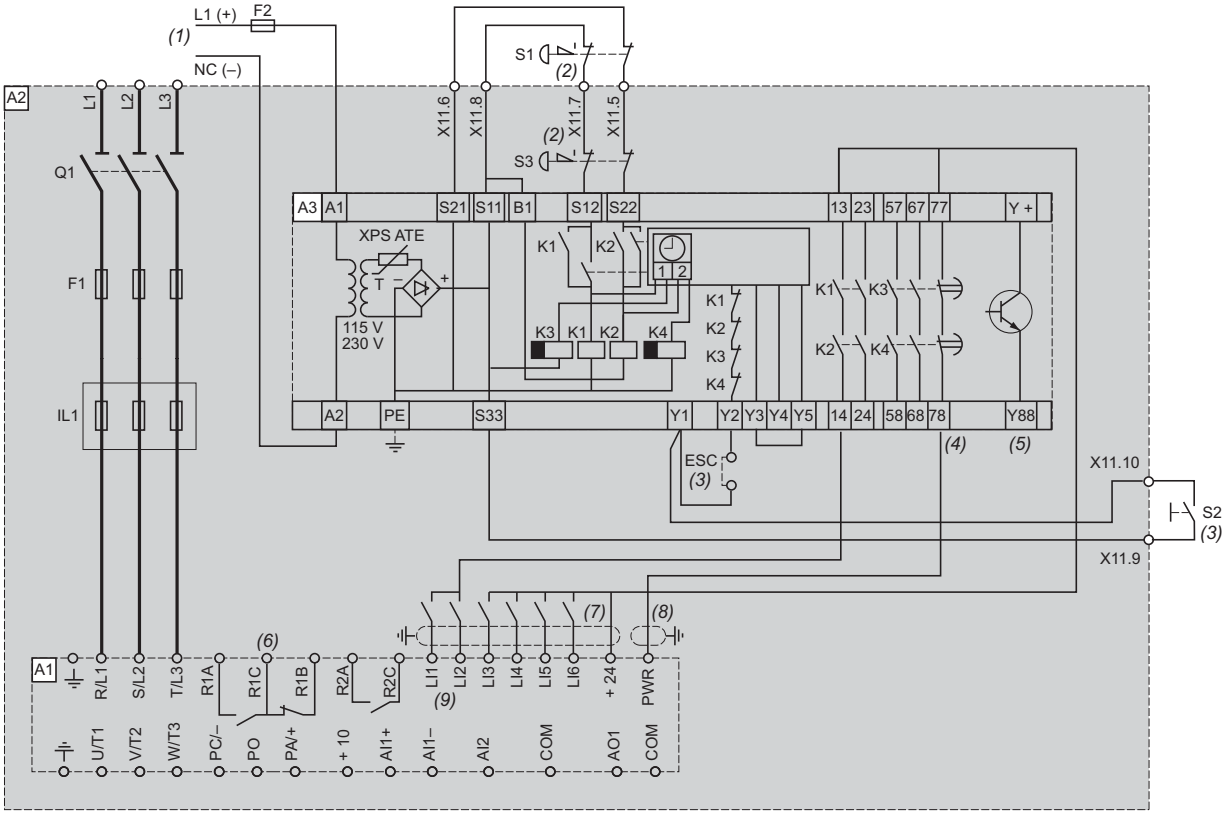

| Reference | Description |
|---|---|
| **A1** | ATV 71 drive, see pages 23 and 25 |
| **A2** | ATV 71EXC● compact version floor-standing enclosure, see pages 52 and 53 |
| **A3** | Preventa XPS AC safety module for monitoring Emergency stops and switches. One safety module can manage the "Power Removal" function for several drives on the same machine. In this case, the PWR terminal on each drive must be connected to the + 24 V via the safety contacts on the XPS AC module. These contacts are independent for each drive. |
| **F1** | Fast-acting semi-conductor fuse |
| **F2** | Fuse |
| **IL1** | Line choke |
| **Q1** | Switch |
| **S1** | Emergency stop button with 2 contacts |
| **S2** | XB4 B or XB5 A pushbutton |
| **S3** | Emergency stop button with 2 contacts, mounted on enclosure door |

*(1) Power supply: 24 V ⎓, 230 V ∿.*
*(2) Requests freewheel stopping of the movement and activates the "Power Removal" safety function.*
*(3) S2: resets the XPS AC module on power-up or after an Emergency stop. ESC can be used to set external starting conditions.*
*(4) The logic output can be used to indicate that the machine is in a safe stop state.*
*(5) Fault relay contacts. For remote signalling of drive status.*
*(6) Connection of the common for the logic inputs depends on the positioning of the SW1 switch: see schemes on page 227.*
*(7) Standardized coaxial cable, type RG174/U according to MIL-C17 or KX3B according to NF C 93-550, external diameter 2.54 mm, maximum length 15 m. The cable shielding must be earthed.*

## Options common to all drives (continued)

### "Preventa type ATE" fault relay - VW3 AE 1503

**Scheme conforming to standards EN 954-1 category 3, IEC/EN 61508 capacity SIL 2, stopping category 1 in accordance with IEC/EN 60204-1**



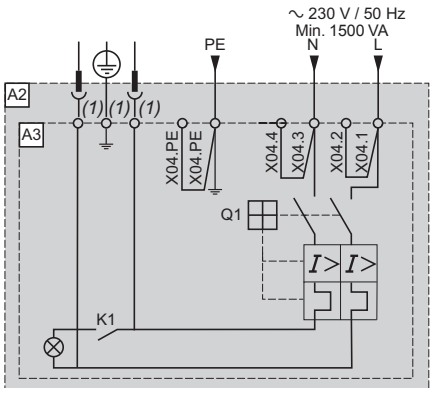

| Reference | Description |
|---|---|
| **A1** | ATV 71 drive, see pages 23 and 25 |
| **A2** | ATV 71EXC● compact version floor-standing enclosure, see pages 52 and 53 |
| **A3** | Preventa XPS ATE safety module for monitoring emergency stops and switches. One safety module can manage the "Power Removal" safety function for several drives on the same machine. In this case the time delay must be adjusted on the drive controlling the motor that requires the longest stopping time. In addition, the PWR terminal on each drive must be connected to the + 24 V via the safety contacts on the XPS ATE module. These contacts are independent for each drive. |
| **F1** | Fast-acting semi-conductor fuse |
| **F2** | Fuse |
| **IL1** | Line choke |
| **Q1** | Switch |
| **S1** | Emergency stop button with 2 contacts |
| **S2** | Run button |
| **S3** | Emergency stop button with 2 contacts, mounted on enclosure door |

*(1) Power supply: 24 V ⎓, 230 V ∿.*
*(2) Requests controlled stopping of the movement and activates the "Power Removal" safety function.*
*(3) S2: resets the XPS ATE module on power-up or after an Emergency stop. ESC can be used to set external starting conditions.*
*(4) For stopping times requiring more than 30 seconds in category 1, use a Preventa XPS AV safety module which can provide a maximum time delay of 300 seconds.*
*(5) The logic output can be used to indicate that the machine is in a safe state.*
*(6) Fault relay contacts. For remote signalling of drive status.*
*(7) Connection of the common for the logic inputs depends on the positioning of the SW1 switch: see schemes on page 227.*
*(8) Standardized coaxial cable, type RG174/U according to MIL-C17 or KX3B according to NF C 93-550, external diameter 2.54 mm, maximum length 15 m. The cable shielding must be earthed.*
*(9) Logic inputs LI1 and LI2 must be assigned to the direction of rotation: LI1 to forward direction and LI2 to reverse direction.*

# Variable speed drives
Altivar 71
IP 23 or IP 54 floor-standing enclosure compact version

## Options common to all drives (continued)

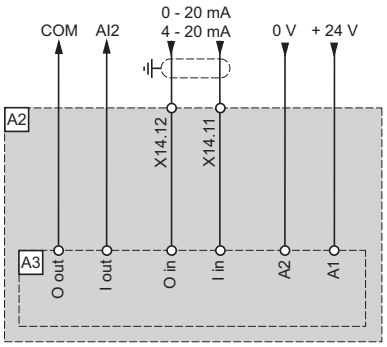
### Floor-standing enclosure lighting - VW3 AE 1601




| Reference | Description |
|---|---|
| **A2** | ATV 71EXC● compact version floor-standing enclosure, see pages 52 and 53 |
| **A3** | Floor-standing lighting |
| **K1** | Door contact |
| **Q1** | 6 A circuit-breaker |

*(1) European standard power socket available.*

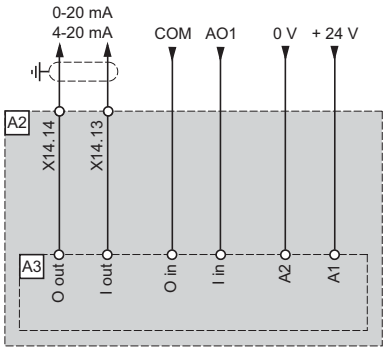
### Additional electrical input isolation - VW3 AE 1901




| Reference | Description |
|---|---|
| **A2** | ATV 71EXC● compact version floor-standing enclosure, see pages 52 and 53 |
| **A3** | Additional electrical input isolation |

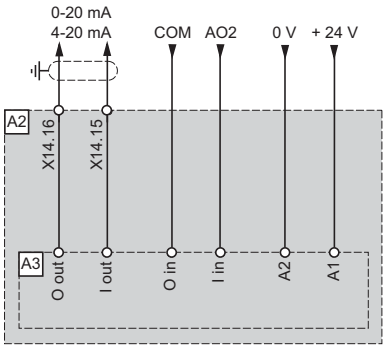
### Additional electrical output isolation - VW3 AE 1902

#### AO1 analog output option



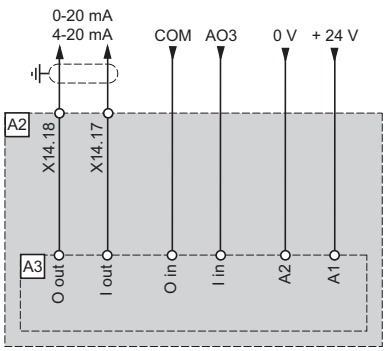

| Reference | Description |
|---|---|
| **A2** | ATV 71EXC● compact version floor-standing enclosure, see pages 52 and 53 |
| **A3** | Additional electrical output isolation |

#### AO2 analog output option




| Reference | Description |
|---|---|
| **A2** | ATV 71EXC● compact version floor-standing enclosure, see pages 52 and 53 |
| **A3** | Additional electrical output isolation |

#### AO3 analog output option

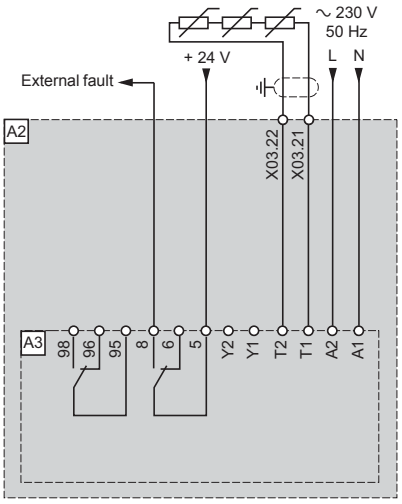



| Reference | Description |
|---|---|
| **A2** | ATV 71EXC● compact version floor-standing enclosure, see pages 52 and 53 |
| **A3** | Additional electrical output isolation |

# Variable speed drives
Altivar 71
IP 23 or IP 54 floor-standing enclosure compact version

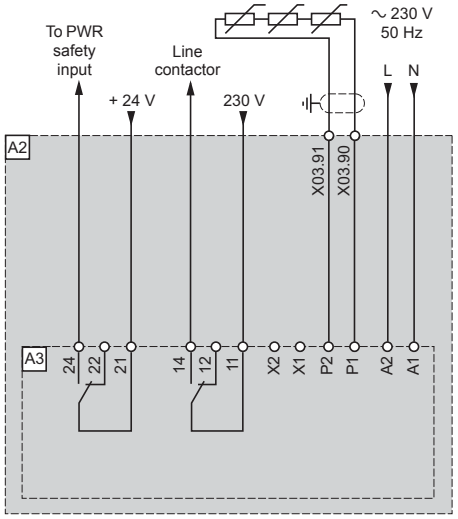
## Options common to all drives (continued)

### PTC relay - VW3 AE 2001




| Reference | Description |
|---|---|
| **A2** | ATV 71EXC● compact version floor-standing enclosure, see pages 52 and 53 |
| **A3** | PTC relay |

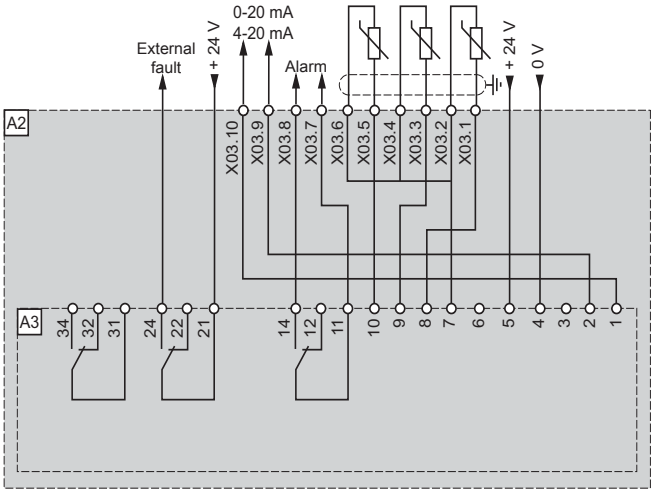
### PTC relay with PTB (ATEX) certification *(1)* - VW3 AE 2002




| Reference | Description |
|---|---|
| **A2** | ATV 71EXC● compact version floor-standing enclosure, see pages 52 and 53 |
| **A3** | PTC relay with PTB (ATEX) certification |

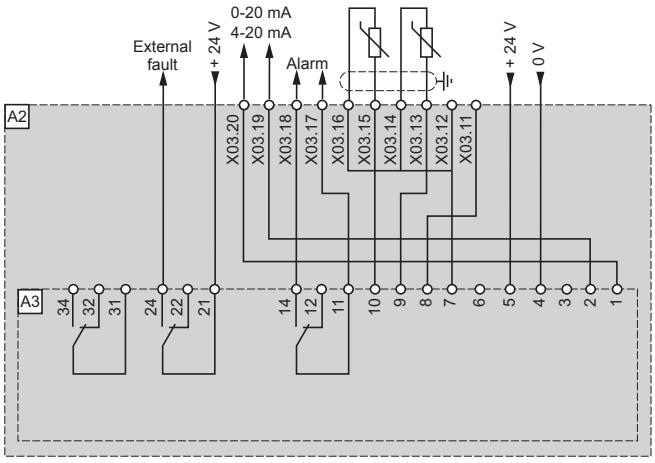
*(1) ATEX: see pages 60295/4 and 60295/5.*

### Relay for PT100 for motor winding - VW3 AE 2003




| Reference | Description |
|---|---|
| **A2** | ATV 71EXC● compact version floor-standing enclosure, see pages 52 and 53 |
| **A3** | PT100 relay for motor winding |

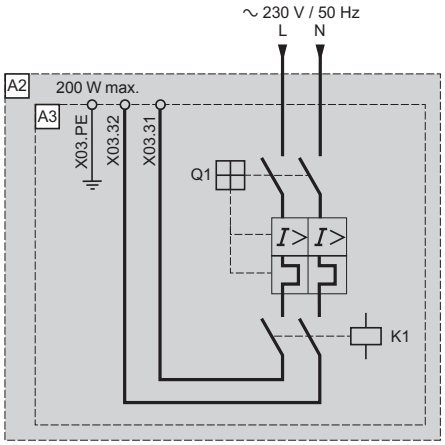
### PT100 relay for motor bearings - VW3 AE 2004




| Reference | Description |
|---|---|
| **A2** | ATV 71EXC● compact version floor-standing enclosure, see pages 52 and 53 |
| **A3** | PT100 relay for motor bearings |

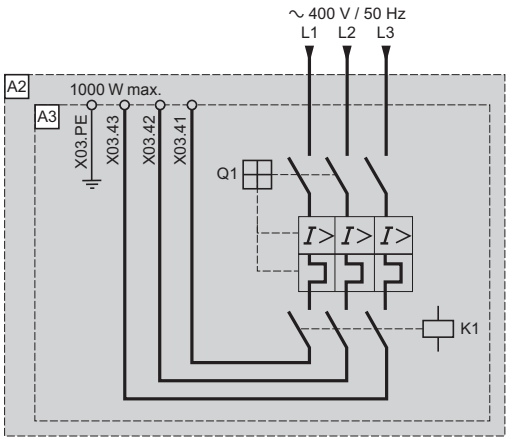
## Options common to all drives (continued)

### Motor heater - VW3 AE 2101




| Reference | Description |
|---|---|
| **A2** | ATV 71EXC● compact version floor-standing enclosure, see pages 52 and 53 |
| **A3** | Motor heater |
| **K1** | Controlled by the drive or the line contactor. This control is activated if the drive is at "Stop" state |
| **Q1** | Circuit-breaker |

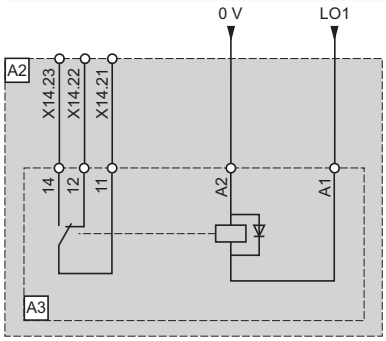
### Power supply circuit with protection for external fan - VW3 AE 2102




| Reference | Description |
|---|---|
| **A2** | ATV 71EXC● compact version floor-standing enclosure, see pages 52 and 53 |
| **A3** | Power supply circuit with protection |
| **K1** | Controlled by the drive or the line contactor. This control is activated if the drive is at "RUN" state |
| **Q1** | Circuit-breaker |

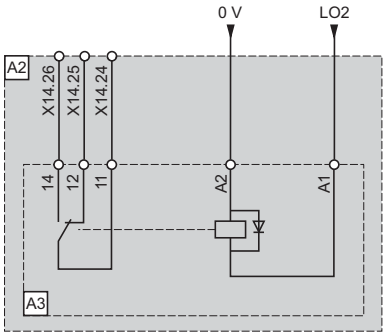
## Relay for logic output - VW3 AE 2201

### Logic output LO1



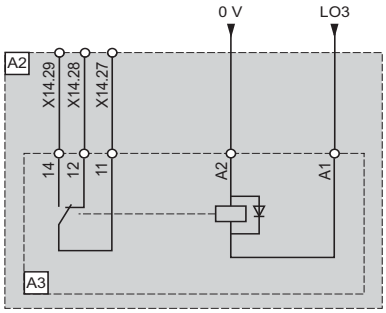

| Reference | Description |
|---|---|
| **A2** | ATV 71EXC● compact version floor-standing enclosure, see pages 52 and 53 |
| **A3** | Relay for logic output |

### Logic output LO2



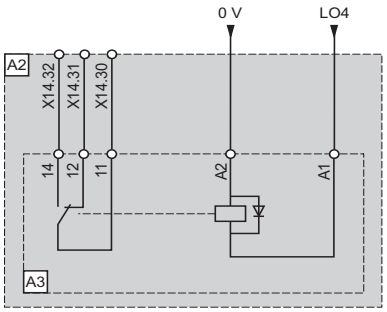

| Reference | Description |
|---|---|
| **A2** | ATV 71EXC● compact version floor-standing enclosure, see pages 52 and 53 |
| **A3** | Relay for logic output |

### Logic output LO3




| Reference | Description |
|---|---|
| **A2** | ATV 71EXC● compact version floor-standing enclosure, see pages 52 and 53 |
| **A3** | Relay for logic output |

### Logic output LO4

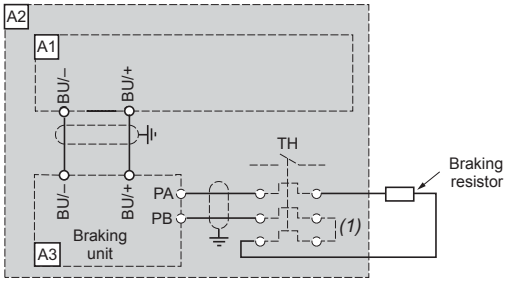



| Reference | Description |
|---|---|
| **A2** | ATV 71EXC● compact version floor-standing enclosure, see pages 52 and 53 |
| **A3** | Relay for logic output |

## Options dependent on drive rating

### Braking units - VW3 A7E 101, VW3 AE 1003…1005

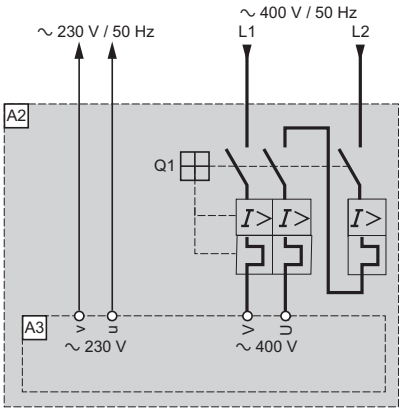
**ATV 71EXC●C20N4…C50N4, ATV 71EXC●C16N…C50N, ATV 71EXC●C20Y…C63Y**




| Components for use together | |
|---|---|
| **Reference** | **Description** |
| **A1** | ATV 71 drive, see pages 23 and 25 |
| **A2** | ATV 71EXC● compact version floor-standing enclosure, see pages 52 and 53 |
| **A3** | Braking unit, see pages 56 and 59 |
| **Braking resistor** | See pages 136 and 137 |

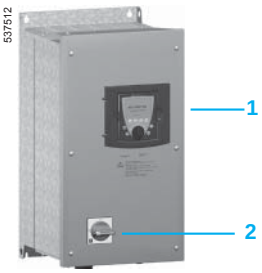
*(1) A thermal overload relay can be added. The contact on this relay must then be integrated in the control circuit.*

### Control transformers 500 VA or 800 VA ∼ - VW3 AE 0302, VW3 AE 0303




| Reference | Description |
|---|---|
| **A2** | ATV 71EXC●D90N4…C50N4 compact version floor-standing enclosure, see pages 52 and 53 |
| **A3** | Control transformer 500 VA ∼ or 800 VA ∼ |
| **Q1** | Circuit-breaker |

# Variable speed drives
## Altivar 71
## UL Type 12/IP 54 drives with Vario




*ATV 71E5●●●N4*

## Presentation

Altivar 71 UL Type 12/IP 54 variable speed drives can be supplied equipped with a Vario switch disconnector.

This ready-assembled offer, ATV 71E5●●●N4, is particularly designed for applications that require an accessible drive as close as possible to the motor (conveyor chain, etc.).

It covers motor power ratings between 0.75 kW and 75 kW, with a three-phase supply voltage of between 380 and 480 V.

## Description

The **ATV 71E5●●●N4** ready-assembled Altivar 71 offer consists of:
- An **ATV 71W●●●N4** drive **1**
- A Vario switch disconnector **2**

One or two (maximum) control units (pushbutton, switch, etc.) and/or signalling units (LED) can be added on the front of the drive *(1) (2)*.

***Note:*** *For the connection diagrams, see pages 218 to 241, and for the mounting and installation recommendations, see pages 264 and 265.*

## Options

The following options, available for ATV 71W●●●N4 drives, can be used at the same rating, with the ATV 71E5●●●N4 offer:
- Adapter for 115 V ∼ logic inputs
- Ready-assembled IP 54 baseplate
- Option cards: encoder interface, I/O extension, programmable “Controller Inside” and communication
- Braking or hoisting resistors
- Network braking units
- DC chokes, line chokes and passive filters
- Additional EMC input filters
- Motor chokes and sinus filters
- PowerSuite software workshop

See the tables summarizing the possible combinations for Altivar 71 UL Type 12/IP 54 drives to determine the options available for each drive (see pages 180, 181, 186 and 187).

***Note:*** *UL Type 1, IP 21 or IP 31 conformity kits are not necessary for this range.*

*(1) The customer is responsible for drilling the front panel and mounting the control or signalling units, see page 79.*
*(2) Please refer to the “Control and signalling components” catalogue*

Characteristics: pages 77 and 10
References: page 78
Dimensions: page 79

# Variable speed drives
Altivar 71
UL Type 12/IP 54 drives with Vario

## Connection characteristics (terminals for the power supply, the motor, the DC bus and the braking resistor) *(1)*

| Drive terminals | | L1/R, L2/S, L3/T | U/T1, V/T2, W/T3, PC/-, PO, PA/+, PA, PB |
|---|---|---|---|
| **Maximum wire size and tightening torque** | ATV 71E5075N4…E5U40N4 | 10 mm², AWG 6<br>2.1 Nm, 18.3 lb.in | 4 mm², AWG 10<br>1.4 Nm, 12.3 lb.in |
| | ATV 71E5U55N4, E5U75N4 | 25 mm², AWG 2<br>5.6 Nm, 50 lb.in | 6 mm², AWG 8<br>3 Nm, 26.5 lb.in |
| | ATV 71E5D11N4 | 25 mm², AWG 2<br>5.6 Nm, 50 lb.in | 16 mm², AWG 4<br>3 Nm, 26.5 lb.in |
| | ATV 71E5D15N4, E5D18N4 | 25 mm², AWG 2<br>5.6 Nm, 50 lb.in | 35 mm², AWG 2<br>5.4 Nm, 47.7 lb.in |
| | ATV 71E5D22N4 | 25 mm², AWG 2<br>5.6 Nm, 50 lb.in | 50 mm², AWG 1/0<br>12 Nm , 102.2 lb.in |
| | ATV 71E5D30N4…E5D37N4 | 95 mm², AWG 4/0<br>22.6 Nm, 200 lb.in | 50 mm², AWG 1/0<br>12 Nm , 102.2 lb.in |
| | ATV 71E5D45N4…E5D75N4 | 95 mm², AWG 4/0<br>22.6 Nm, 200 lb.in | 150 mm², 300 MCM<br>41 Nm, 360 lb.in |

*(1) Other characteristics identical to those of ATV 71W●●●N4 drives at the same rating, see pages 10 to 17.*

# Variable speed drives
## Altivar 71
## UL Type 12/IP 54 drives with Vario

537612



*ATV 71E5D11N4*

### UL Type 12/IP 54 drives with Vario and integrated class A EMC filter

**Three-phase supply voltage: 380…480 V 50/60 Hz**

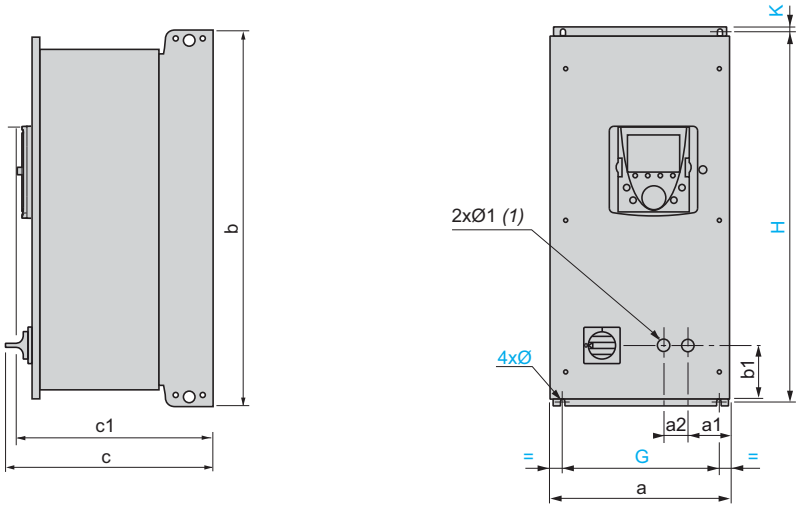
| Motor | | Line supply | | | | Altivar 71 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Power indicated on plate *(1)* | | Max. line current *(2)* | | Apparent power | Max. prospective line Isc | Max. continuous current In *(1)* | | Max. transient current for | | Reference *(3)* | Weight |
| | | 380 V | 480 V | 380 V | | 380 V | 460 V | 60 s | 2 s | | |
| kW | *HP* | A | A | kVA | kA | A | A | A | A | | kg |
| 0.75 | *1* | 3.7 | 3 | 2.4 | 5 | 2.3 | 2.1 | 3.5 | 3.8 | **ATV 71E5075N4** | 12.400 |
| 1.5 | *2* | 5.8 | 5.3 | 3.8 | 5 | 4.1 | 3.4 | 6.2 | 6.8 | **ATV 71E5U15N4** | 12.400 |
| 2.2 | *3* | 8.2 | 7.1 | 5.4 | 5 | 5.8 | 4.8 | 8.7 | 9.6 | **ATV 71E5U22N4** | 12.400 |
| 3 | – | 10.7 | 9 | 7 | 5 | 7.8 | 6.2 | 11.7 | 12.9 | **ATV 71E5U30N4** | 13.400 |
| 4 | *5* | 14.1 | 11.5 | 9.3 | 5 | 10.5 | 7.6 | 15.8 | 17.3 | **ATV 71E5U40N4** | 13.400 |
| 5.5 | *7.5* | 20.3 | 17 | 13.4 | 22 | 14.3 | 11 | 21.5 | 23.6 | **ATV 71E5U55N4** | 16.400 |
| 7.5 | *10* | 27 | 22.2 | 17.8 | 22 | 17.6 | 14 | 26.4 | 29 | **ATV 71E5U75N4** | 16.400 |
| 11 | *15* | 36.6 | 30 | 24.1 | 22 | 27.7 | 21 | 41.6 | 45.7 | **ATV 71E5D11N4** | 18.700 |
| 15 | *20* | 48 | 39 | 31.6 | 22 | 33 | 27 | 49.5 | 54.5 | **ATV 71E5D15N4** | 29.400 |
| 18.5 | *25* | 45.5 | 37.5 | 29.9 | 22 | 41 | 34 | 61.5 | 67.7 | **ATV 71E5D18N4** | 29.400 |
| 22 | *30* | 50 | 42 | 32.9 | 22 | 48 | 40 | 72 | 79.2 | **ATV 71E5D22N4** | 33.700 |
| 30 | *40* | 66 | 56 | 43.4 | 22 | 66 | 52 | 99 | 109 | **ATV 71E5D30N4** | 44.800 |
| 37 | *50* | 84 | 69 | 55.3 | 22 | 79 | 65 | 118.5 | 130 | **ATV 71E5D37N4** | 44.800 |
| 45 | *60* | 104 | 85 | 68.5 | 22 | 94 | 77 | 141 | 155 | **ATV 71E5D45N4** | 67.400 |
| 55 | *75* | 120 | 101 | 79 | 22 | 116 | 96 | 174 | 191 | **ATV 71E5D55N4** | 67.400 |
| 75 | *100* | 167 | 137 | 109.9 | 22 | 160 | 124 | 240 | 264 | **ATV 71E5D75N4** | 67.400 |

*(1) These values are given for a nominal switching frequency of 4 kHz up to ATV 71E5D30N4, or 2.5 kHz for ATV 71E5D37N4…E5D75N4 used in continuous operation.*
*The switching frequency is adjustable from 1…16 kHz for all ratings.*
*Above 2.5 or 4 kHz, depending on the rating, the drive will reduce the switching frequency automatically in the event of excessive temperature rise. For continuous operation above the nominal switching frequency, derate the nominal drive current (see derating curves on page 265).*
*(2) Typical value for the indicated motor power and for the maximum prospective line Isc.*
*(3) All drives are supplied with a plate for EMC mounting.*

Presentation: page 76 Characteristics: page 77 Dimensions: page 79

# Variable speed drives
## Altivar 71
## UL Type 12/IP 54 drives with Vario

### ATV 71E5075N4…E5D75N4 variable speed drives

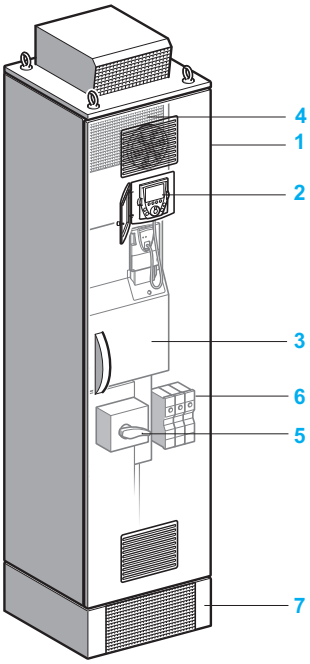



| ATV 71E5 | a | a1 | a2 | b | b1 | c | c1 | G | H | K | Ø | Ø1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **075N4…U22N4** | 240 | 60.5 | 30 | 490 | 80 | 296 | 272 | 200 | 476 | 6 | 6 | 22.3 |
| **U30N4, U40N4** | 240 | 60.5 | 30 | 490 | 80 | 310 | 286 | 200 | 476 | 6 | 6 | 22.3 |
| **U55N4, U75N4** | 260 | 60.5 | 30 | 525 | 80 | 310 | 286 | 220 | 511 | 6 | 6 | 22.3 |
| **D11N4** | 295 | 77 | 30 | 560 | 80 | 339 | 315 | 250 | 544 | 8 | 6 | 22.3 |
| **D15N4, D18N4** | 315 | 77 | 30 | 665 | 81 | 340 | 315 | 270 | 647 | 10 | 6 | 22.3 |
| **D22N4** | 285 | 73 | 30 | 720 | 119 | 335 | 315 | 245 | 700 | 10 | 7 | 22.3 |
| **D30N4, D37N4** | 285 | 69 | 30 | 880 | 218 | 383 | 343 | 245 | 860 | 10 | 7 | 22.3 |
| **D45N4…D75N4** | 362 | 102 | 30 | 1000 | 280 | 404 | 364 | 300 | 975 | 10 | 9 | 22.3 |

*(1) The diameters and positions of the drill holes for mounting control and/or signalling units must be complied with. The customer is responsible for drilling and mounting units.*

Presentation: page 76
Characteristics: page 77
References: page 78

# Variable speed drives
## Altivar 71
## IP 54 floor-standing enclosure with separate air flows




## Presentation

Altivar 71 variable speed drives can be supplied ready-assembled in an IP 54 floor-standing enclosure to facilitate installation and setup and, in particular, to ensure optimum ventilation of the enclosure.
The ATV 71EXS5●●●●● offer consists of a floor-standing enclosure providing IP 54 protection with separate cooling circuits, for harsh and highly polluted environments.
The enclosure is supplied ready to connect.

The ATV 71EXS5●●●●● offer covers motor power ratings from 90 kW to 630 kW with three types of power supply:
- 380…415 V three-phase, 90 kW to 500 kW (**ATV 71EXS5●●●N4**)
- 500 V three-phase, 90 kW to 500 kW (**ATV 71EXS5●●●N**)
- 600…690 V three-phase, 110 kW to 630 kW (**ATV 71EXS5●●●Y**)

The ATV 71EXS5●●●●● offer includes the choice of:
- A standard separate air flow offer
- A modular offer in which a wide selection of options can be incorporated according to the rating of the drive.

### Standard separate air flow offer

It consists of:
- A wired, ready-assembled Sarel “Spacial 6000” enclosure 1
- A drive on heatsink, ATV 71HD90N4…HC50N4 or ATV 71HC11Y…ATV 71HC63Y 3
- An IP 65 remote mounting kit for graphic display terminal 2
- A DC choke 4 (ATV 71EXS5●●●N4) or a line choke in an additional enclosure (ATV 71EXS5●●●N, ATV 71EXS5●●●Y)
- A switch and fast-acting semi-conductor fuses 5
- Motor terminals 6
- A plinth 7

See page 86.

### Modular offer

It consists of:
- The standard separate air flow offer
- One or more options (see pages 87 to 93)

As well as these specific options, all the options available for Altivar 71 drives can be used at the same rating with the enclosed drives offer (see pages 178, 179 and 184 to 187).
For any configurations other than those shown on pages 87 to 93, please consult your Regional Sales Office.

### **Common options** (modular offer only)

- Adapter for 115 V ∼ logic inputs
- Encoder interface cards
- I/O extension cards
- "Controller Inside" programmable card
- Modbus TCP, Fipio, Modbus/Uni-Telway, Modbus Plus, EtherNet/IP, DeviceNet, PROFIBUS DP, INTERBUS and CC-Link communication cards
- PT100 relays
- Motor heater
- Additional 24 V ⎓ power supply
- Emergency stop button
- Enclosure lighting
- Key switch (Local Remote)
- Power supply circuit for external fan

See pages 87 and 88.

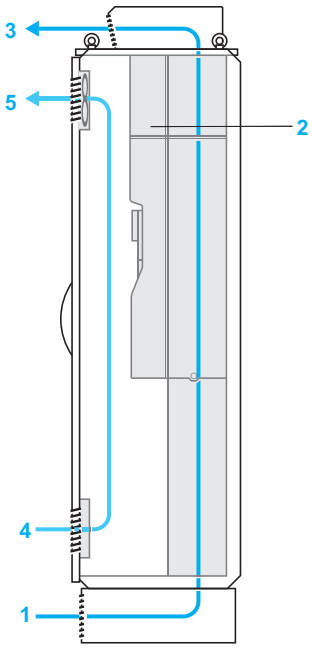
### **Options dependent on the drive rating** (modular offer only)

- Braking unit
- Isolating handle for switch
- Circuit-breaker
- Line contactor
- Control transformer
- Ammeter
- Enclosure heater
- Motor choke
- Sinus filter
- Cable entry via the top
- Air conditioning

See pages 89 to 93.

# Variable speed drives
Altivar 71
IP 54 floor-standing enclosure with separate air flows

## Ventilation




Two separate air circuits ensure optimum enclosure ventilation, cooling the power section and the control section.

**Power section:**
1 Air intake via a grille on the plinth
2 DC choke
3 Air outlet via a metal cover with protection against water splashes, on the enclosure roof

**Control section:**
4 Air intake via a grille with IP 54 filter, on the lower part of the enclosure door
5 Air outlet via a grille with a fan equipped with an IP 54 filter, on the upper part of the enclosure door

# Variable speed drives
## Altivar 71
IP 54 floor-standing enclosure with separate air flows

## Specific characteristics

| | | | |
|---|---|---|---|
| **Enclosure degree of protection** | | | IP 54<br>Two separate air circuits ensure optimum enclosure ventilation, cooling:<br>■ The power section:<br>□ Air intake via a grille on the plinth<br>□ Air outlet via a cover on the roof<br>■ The power section:<br>□ Air intake via a grille with IP 54 filter on the lower part of the door<br>□ Air outlet via a grille and IP 54 fan on the upper part of the door |
| **Line supply connection** | | | At the base of the switch |
| **Motor connection** | ATV 71EXS5D90N4…C28N4<br>ATV 71EXS5D90N…C25N<br>ATV 71EXS5C11Y…C31Y | | On the terminals |
| | ATV 71EXS5C31N4…C50N4 | | On the bars of the drive |
| | ATV 71EXS5C31N…C50N<br>ATV 71EXS5C40Y…C63Y | | On additional bars |
| **Control terminal connection** | | | Directly on the drive or on option terminals |
| **Colour of SAREL Spacial 6000 Cell Enclosures** | | | RAL 7032 enclosure<br>RAL 7022 plinth |

## Environmental characteristics *(1)*

| | | | |
|---|---|---|---|
| **Maximum ambient pollution**<br>Definition of insulation | | | Degree 2 conforming to IEC/EN 61800-5-1 |
| **Vibration resistance** | | | Conforming to standard IEC/EN 60068-2-6<br>1.5 mm peak to peak from 3 to 10 Hz, 0.6 g from 10 to 200 Hz<br>(3M3 according to IEC/EN 60721-3-3) |
| **Shock resistance** | | | Conforming to standard IEC/EN 60068-2-7<br>4 g for 11 ms (3M2 according to IEC/EN 60721-3-3) |
| **Environmental conditions**<br>Use | | | IEC/EN 60721-3-3 classes 3C2, 3S2 and 3K3, without condensation |
| **Maximum relative humidity** | | | 95% |
| **Ambient air temperature** | Operation | **°C** | Incoming air temperature: 0…+ 40 (- 10…+ 40 with enclosure heater)<br>Up to + 50°C with derating. 3K3 according to IEC/EN 60721-3-3 |
| | Storage | **°C** | - 25…+ 70 |
| | Control | | Internal temperature monitored by a thermostat which can shut down the equipment |
| **Volume of cooling air** | ATV 71EXS5D90N4 | **m³/h** | 500 |
| | ATV 71EXS5C11N4 | **m³/h** | 700 |
| | ATV 71EXS5C13N4 | **m³/h** | 750 |
| | ATV 71EXS5C16N4 | **m³/h** | 950 |
| | ATV 71EXS5C20N4…C28N4 | **m³/h** | 1400 |
| | ATV 71EXS5C31N4 | **m³/h** | 2200 |
| | ATV 71EXS5C40N4 | **m³/h** | 2300 |
| | ATV 71EXS5C50N4 | **m³/h** | 3000 |
| | ATV 71EXS5D90N…C13N<br>ATV 71EXS5C11Y…C16Y | **m³/h** | 700 |
| | ATV 71EXS5C16N…C25N<br>ATV 71EXS5C20Y…C31Y | **m³/h** | 1400 |
| | ATV 71EXS5C31N…C50N<br>ATV 71EXS5C40Y…C63Y | **m³/h** | 3000 |

## Electrical power characteristics *(1)*

| | | | | |
|---|---|---|---|---|
| **Power Supply** | | Voltage | **V** | 380 V – 15%…415 V +10% for ATV 71EXS5●●●N4<br>500 V – 15% for ATV 71EXS5●●●N<br>600…690 V +10% for ATV 71EXS5●●●Y |
| | | Frequency | **Hz** | 50/60 Hz ± 5% |
| **Overvoltage class** | | | | Class 3 according to EN 50178 |
| **Noise level** | ATV 71EXS5 | D90N4…C11N4<br>D90N…C13N<br>C11Y…C16Y | **dBA** | 64 |
| | | C13N4…C28N4<br>C16N…C25N<br>C20Y…C31Y | **dBA** | 72 |
| | | C31N4…C50N4<br>C31N…C50N<br>C40Y…C63Y | **dBA** | 73 |

*(1) Other characteristics, see pages 10 to 17.*

## Connection characteristics

**Three-phase supply voltage 380…415 V 50/60 Hz**

| Drive terminals | | Power Supply | L1/R, L2/S, L3/T | | | U/T1, V/T2, W/T3 | | | | Recommended cross-section for motor cables |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Upstream fuse protection | Maximum wire size on switch | | Fast-acting semi-conductor fuse | Maximum wire size on terminals | | | | |
| | | | | | | Without motor choke | | With motor choke | | |
| | | | Bar | Terminals | | Bar | Terminals | Bar | Terminals | |
| | | A | mm² | mm² | A | mm² | mm² | mm² | mm² | mm² |
| **Cable entry via the bottom** | ATV 71EXS5D90N4 | 250 | M10, 2 x 120 | – | 250 | – | 2 x 120 | – | 2 x 120 | 3 x 95 |
| | ATV 71EXS5C11N4 | 315 | M10, 2 x 120 | – | 315 | – | 2 x 120 | – | 2 x 120 | 3 x 120 |
| | ATV 71EXS5C13N4 | 400 | M10, 2 x 120 | – | 400 | – | 2 x 120 | – | 2 x 120 | 3 x 150 |
| | ATV 71EXS5C16N4 | 400 | M10, 2 x 150 | – | 400 | – | 2 x 120 | 2 x M12, 4 x 240 | – | 2 (3 x 95) |
| | ATV 71EXS5C20N4 | 500 | 2 x M12, 4 x 240 | – | 500 | – | 2 x 185 | 2 x M12, 4 x 240 | – | 2 (3 x 120) |
| | ATV 71EXS5C25N4 | 630 | 2 x M12, 4 x 240 | – | 630 | – | 4 x 120 | 2 x M12, 4 x 240 | – | 2 (3 x 150) |
| | ATV 71EXS5C28N4 | 800 | 2 x M12, 4 x 240 | – | 700 | – | 4 x 120 | 2 x M12, 4 x 240 | – | 3 (3 x 150) |
| | ATV 71EXS5C31N4 | 800 | 2 x M12, 4 x 240 | – | 800 | 2 x M12, 4 x 240 | – | 2 x M12, 4 x 240 | – | 3 (3 x 185) |
| | ATV 71EXS5C40N4 | 1000 | 2 x M12, 4 x 240 | – | 2 x 500 | 2 x M12, 4 x 240 | – | 2 x M12, 4 x 240 | – | 4 (3 x 185) |
| | ATV 71EXS5C50N4 | 1250 | 3 x M12, 6 x 240 | – | 2 x 630 | 3 x M12, 6 x 240 | – | 3 x M12, 6 x 240 | – | 5 (3 x 185) |
| **Cable entry via the top** | ATV 71EXS5D90N4 | 250 | – | 2 x 120 | 250 | – | 2 x 120 | – | 2 x 120 | 3 x 95 |
| | ATV 71EXS5C11N4 | 315 | – | 2 x 120 | 315 | – | 2 x 120 | – | 2 x 120 | 3 x 120 |
| | ATV 71EXS5C13N4 | 400 | – | 2 x 120 | 400 | – | 2 x 120 | – | 2 x 120 | 2 x 150 |
| | ATV 71EXS5C16N4 | 400 | – | 2 x 120 | 400 | – | 2 x 120 | 2 x M12, 4 x 240 | – | 2 (3 x 95) |
| | ATV 71EXS5C20N4 | 500 | – | 2 x 185 | 500 | – | 2 x 185 | 2 x M12, 4 x 240 | – | 2 (3 x 120) |
| | ATV 71EXS5C25N4 | 630 | – | 4 x 120 | 630 | – | 4 x 120 | 2 x M12, 4 x 240 | – | 2 (3 x 150) |
| | ATV 71EXS5C28N4 | 800 | – | 4 x 120 | 700 | – | 4 x 120 | 2 x M12, 4 x 240 | – | 3 (3 x 150) |
| | ATV 71EXS5C31N4 | 800 | 2 x M12, 4 x 240 | – | 800 | 2 x M12, 4 x 240 | – | 2 x M12, 4 x 240 | – | 3 (3 x 185) |
| | ATV 71EXS5C40N4 | 1000 | 2 x M12, 4 x 240 | – | 2 x 500 | 2 x M12, 4 x 240 | – | 2 x M12, 4 x 240 | – | 4 (3 x 185) |
| | ATV 71EXS5C50N4 | 1250 | 3 x M12, 6 x 240 | – | 2 x 630 | 3 x M12, 6 x 240 | – | 3 x M12, 6 x 240 | – | 5 (3 x 185) |

## Connection characteristics (continued)

**Three-phase supply voltage 500 V 50/60 Hz**

| Drive terminals | | Power Supply | L1/R, L2/S, L3/T | | | U/T1, V/T2, W/T3 | | | | Recommended cross-section for motor cables |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Upstream fuse protection | Maximum wire size on switch | | Fast-acting semi-conductor fuse | Maximum wire size on terminals | | | | |
| | | | | | | Without motor choke | | With motor choke | | |
| | | | Bar | Terminals | | Bar | Terminals | Bar | Terminals | |
| | | A | mm² | mm² | A | mm² | mm² | mm² | mm² | mm² |
| **Cable entry via the bottom** | ATV 71EXS5D90N | 200 | M10, 2 x 120 | – | 200 | – | 2 x 185 | – | 2 x 185 | 3 x 70 |
| | ATV 71EXS5C11N | 200 | M10, 2 x 120 | – | 200 | – | 2 x 185 | – | 2 x 185 | 3 x 95 |
| | ATV 71EXS5C13N | 250 | M10, 2 x 120 | – | 250 | – | 2 x 185 | – | 2 x 185 | 3 x 120 |
| | ATV 71EXS5C16N | 315 | 2 x M12, 4 x 240 | – | 315 | – | 4 x 120 | 4 x M12, 6 x 240 | – | 3 x 185 |
| | ATV 71EXS5C20N | 400 | 2 x M12, 4 x 240 | – | 400 | – | 4 x 120 | 4 x M12, 6 x 240 | – | 2 (3 x 120) |
| | ATV 71EXS5C25N | 500 | 2 x M12, 4 x 240 | – | 500 | – | 4 x 120 | 4 x M12, 6 x 240 | – | 2 (3 x 150) |
| | ATV 71EXS5C31N | 630 | 3 x M12, 6 x 240 | – | 2 x 315 | 3 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 3 (3 x 150) |
| | ATV 71EXS5C40N | 800 | 3 x M12, 6 x 240 | – | 2 x 400 | 3 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 3 (3 x 185) |
| | ATV 71EXS5C50N | 1000 | 3 x M12, 6 x 240 | – | 2 x 500 | 3 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 4 (3 x 185) |
| **Cable entry via the top** | ATV 71EXS5D90N | 200 | – | 2 x 185 | 200 | – | 2 x 185 | – | 2 x 185 | 3 x 70 |
| | ATV 71EXS5C11N | 200 | – | 2 x 185 | 200 | – | 2 x 185 | – | 2 x 185 | 3 x 95 |
| | ATV 71EXS5C13N | 250 | – | 2 x 185 | 250 | – | 2 x 185 | – | 2 x 185 | 3 x 120 |
| | ATV 71EXS5C16N | 315 | 4 x M12, 6 x 240 | – | 315 | 4 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 3 x 185 |
| | ATV 71EXS5C20N | 400 | 4 x M12, 6 x 240 | – | 400 | 4 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 2 (3 x 120) |
| | ATV 71EXS5C25N | 500 | 4 x M12, 6 x 240 | – | 500 | 4 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 2 (3 x 150) |
| | ATV 71EXS5C31N | 630 | 4 x M12, 6 x 240 | – | 2 x 315 | 4 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 3 (3 x 150) |
| | ATV 71EXS5C40N | 800 | 4 x M12, 6 x 240 | – | 2 x 400 | 4 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 3 (3 x 185) |
| | ATV 71EXS5C50N | 1000 | 4 x M12, 6 x 240 | – | 2 x 500 | 4 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 4 (3 x 185) |

## Connection characteristics (continued)

**Three-phase supply voltage 600…690 V 50/60 Hz**

| Drive terminals | | Power Supply | L1/R, L2/S, L3/T | | | U/T1, V/T2, W/T3 | | | | Recommended cross-section for motor cables |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Upstream fuse protection | Maximum wire size on switch | | Fast-acting semi-conductor | Maximum wire size on terminals | | | | |
| | | | | | | Without motor choke | | With motor choke | | |
| | | | Bar | Terminals | | Bar | Terminals | Bar | Terminals | |
| | | A | mm² | mm² | A | mm² | mm² | mm² | mm² | mm² |
| **Cable entry via the bottom** | ATV 71EXS5C11Y | 200 | M10, 2 x 120 | – | 200 | – | 2 x 185 | – | 2 x 185 | 3 x 70 |
| | ATV 71EXS5C13Y | 200 | M10, 2 x 120 | – | 200 | – | 2 x 185 | – | 2 x 185 | 3 x 95 |
| | ATV 71EXS5C16Y | 250 | M10, 2 x 150 | – | 250 | – | 2 x 185 | – | 2 x 185 | 3 x 120 |
| | ATV 71EXS5C20Y | 315 | 2 x M12, 4 x 240 | – | 315 | – | 4 x 120 | 4 x M12, 6 x 240 | – | 3 x 185 |
| | ATV 71EXS5C25Y | 400 | 2 x M12, 4 x 240 | – | 400 | – | 4 x 120 | 4 x M12, 6 x 240 | – | 2 (3 x 120) |
| | ATV 71EXS5C31Y | 500 | 2 x M12, 4 x 240 | – | 500 | – | 4 x 120 | 4 x M12, 6 x 240 | – | 2 (3 x 150) |
| | ATV 71EXS5C40Y | 630 | 3 x M12, 6 x 240 | – | 2 x 315 | 3 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 3 (3 x 150) |
| | ATV 71EXS5C50Y | 800 | 3 x M12, 6 x 240 | – | 2 x 400 | 3 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 3 (3 x 185) |
| | ATV 71EXS5C63Y | 1000 | 3 x M12, 6 x 240 | – | 2 x 500 | 3 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 4 (3 x 185) |
| **Cable entry via the top** | ATV 71EXS5C11Y | 200 | – | 2 x 185 | 200 | – | 2 x 185 | – | 2 x 185 | 3 x 70 |
| | ATV 71EXS5C13Y | 200 | – | 2 x 185 | 200 | – | 2 x 185 | – | 2 x 185 | 3 x 95 |
| | ATV 71EXS5C16Y | 250 | – | 2 x 185 | 250 | – | 2 x 185 | – | 2 x 185 | 3 x 120 |
| | ATV 71EXS5C20Y | 315 | 4 x M12, 6 x 240 | – | 315 | 4 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 3 x 185 |
| | ATV 71EXS5C25Y | 400 | 4 x M12, 6 x 240 | – | 400 | 4 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 2 (3 x 120) |
| | ATV 71EXS5C31Y | 500 | 4 x M12, 6 x 240 | – | 500 | 4 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 2 (3 x 150) |
| | ATV 71EXS5C40Y | 630 | 4 x M12, 6 x 240 | – | 2 x 315 | 4 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 3 (3 x 150) |
| | ATV 71EXS5C50Y | 800 | 4 x M12, 6 x 240 | – | 2 x 400 | 4 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 3 (3 x 185) |
| | ATV 71EXS5C63Y | 1000 | 4 x M12, 6 x 240 | – | 2 x 500 | 4 x M12, 6 x 240 | – | 4 x M12, 6 x 240 | – | 4 (3 x 185) |

# Variable speed drives
## Altivar 71
### IP 54 floor-standing enclosure with separate air flows

524528



*ATV 71EXS5C13N4*

## IP 54 floor-standing enclosure with separate air flows

### Three-phase supply voltage 380…415 V 50/60 Hz

| Degree of protection | Line supply Max. prospective line Isc *(1)* | With drive | Reference | Weight |
|---|---|---|---|---|
| | kA | | | kg |
| IP 54 | 50 | ATV 71HD90N4 | **ATV 71EXS5D90N4** | 310.000 |
| | | ATV 71HC11N4 | **ATV 71EXS5C11N4** | 310.000 |
| | | ATV 71HC13N4 | **ATV 71EXS5C13N4** | 335.000 |
| | | ATV 71HC16N4 | **ATV 71EXS5C16N4** | 345.000 |
| | | ATV 71HC20N4 | **ATV 71EXS5C20N4** | 400.000 |
| | | ATV 71HC25N4 | **ATV 71EXS5C25N4** | 480.000 |
| | | ATV 71HC28N4 | **ATV 71EXS5C28N4** | 480.000 |
| | | ATV 71HC31N4 | **ATV 71EXS5C31N4** | 745.000 |
| | | ATV 71HC40N4 | **ATV 71EXS5C40N4** | 765.000 |
| | | ATV 71HC50N4 | **ATV 71EXS5C50N4** | 900.000 |

### Three-phase supply voltage 500 V 50/60 Hz

| Degree of protection | Line supply Max. prospective line Isc *(1)* | With drive | Reference | Weight |
|---|---|---|---|---|
| | kA | | | kg |
| IP 54 | 50 | ATV 71HC11Y | **ATV 71EXS5D90N** | 436.000 |
| | | ATV 71HC13Y | **ATV 71EXS5C11N** | 487.000 |
| | | ATV 71HC16Y | **ATV 71EXS5C13N** | 487.000 |
| | | ATV 71HC20Y | **ATV 71EXS5C16N** | 573.000 |
| | | ATV 71HC25Y | **ATV 71EXS5C20N** | 623.000 |
| | | ATV 71HC31Y | **ATV 71EXS5C25N** | 623.000 |
| | | ATV 71HC40Y | **ATV 71EXS5C31N** | 912.000 |
| | | ATV 71HC50Y | **ATV 71EXS5C40N** | 1000.000 |
| | | ATV 71HC63Y | **ATV 71EXS5C50N** | 1000.000 |

### Three-phase supply voltage 600…690 V 50/60 Hz

| Degree of protection | Line supply Max. prospective line Isc *(1)* | With drive | Reference | Weight |
|---|---|---|---|---|
| | kA | | | kg |
| IP 54 | 50 | ATV 71HC11Y | **ATV 71EXS5C11Y** | 436.000 |
| | | ATV 71HC13Y | **ATV 71EXS5C13Y** | 487.000 |
| | | ATV 71HC16Y | **ATV 71EXS5C16Y** | 487.000 |
| | | ATV 71HC20Y | **ATV 71EXS5C20Y** | 573.000 |
| | | ATV 71HC25Y | **ATV 71EXS5C25Y** | 623.000 |
| | | ATV 71HC31Y | **ATV 71EXS5C31Y** | 623.000 |
| | | ATV 71HC40Y | **ATV 71EXS5C40Y** | 912.000 |
| | | ATV 71HC50Y | **ATV 71EXS5C50Y** | 1000.000 |
| | | ATV 71HC63Y | **ATV 71EXS5C63Y** | 1000.000 |

*(1) These values are given for use with upstream fuses, see pages 83 to 85*

# Variable speed drives
## Altivar 71
## IP 54 floor-standing enclosure with separate air flows
## Common options

### Common options without modification of the enclosure (1)

| Description | Reference | Weight kg |
|---|---|---|
| **Adapter for 115 V ∼ logic inputs** | **VW3 A3E 101** *(2)* | 0.200 |
| **Encoder interface cards with RS 422, 5 V compatible differential outputs** | **VW3 A3E 401** *(3)* | 0.200 |
| **Encoder interface cards with RS 422, 15 V compatible differential outputs** | **VW3 A3E 402** *(3)* | 0.200 |
| **Encoder interface card with 12 V open collector outputs** | **VW3 A3E 403** *(3)* | 0.200 |
| **Encoder interface card with 15 V open collector outputs** | **VW3 A3E 404** *(3)* | 0.200 |
| **Encoder interface card with 12 V push-pull outputs** | **VW3 A3E 405** *(3)* | 0.200 |
| **Encoder interface card with 15 V push-pull outputs** | **VW3 A3E 406** *(3)* | 0.200 |
| **Encoder interface card with 24 V push-pull outputs** | **VW3 A3E 407** *(3)* | 0.200 |
| **Resolver encoder interface card 1.25…5.6 V** | **VW3 A3E 408** *(3)* | 0.200 |
| **Universal encoder interface card with SinCos, SinCos Hiperface®, EnDat® or SSI 5, 8 or 12 V output** | **VW3 A3E 409** *(3)* | 0.200 |
| **Encoder interface card with RS 422 compatible differential outputs with encoder emulation** (RS 422 ESIM) | **VW3 A3E 411** *(3)* | 0.200 |
| **Logic I/O extension card** | **VW3 A3E 201** *(4)* | 0.320 |
| **Extended I/O extension card** | **VW3 A3E 202** *(4)* | 0.300 |
| **"Controller Inside" programmable card** equipped with a 9-way male SUB-D connector | **VW3 A3E 501** *(5) (6)* | 0.300 |
| **Modbus TCP communication card** | **VW3 A3E 310** *(7)* | 0.300 |
| **EtherNet/IP communication card** | **VW3 A3E 316** *(7)* | 0.300 |
| **Modbus/Uni-Telway communication card** | **VW3 A3E 303** *(7)* | 0.300 |
| **Standard Fipio communication card** | **VW3 A3E 311** *(7)* | 0.300 |
| **Substitution Fipio communication card** | **VW3 A3E 301** *(7)* | 0.300 |
| **Modbus Plus communication card** | **VW3 A3E 302** *(7)* | 0.300 |
| **PROFIBUS DP communication card** | **VW3 A3E 307** *(7)* | 0.300 |
| **DeviceNet communication card** | **VW3 A3E 309** *(7)* | 0.300 |
| **INTERBUS communication card** | **VW3 A3E 304** *(7)* | 0.300 |
| **CC-Link communication card** | **VW3 A3E 317** *(7)* | 0.320 |

*(1) For any other configuration, please consult your Regional Sales Office.*
*(2) The technical characteristics of the VW3 A3E 101 adapter are identical to those of the VW3 A3 101 adapter, see page 26.*
*(3) The technical characteristics of the VW3 A3E 401…409 and 411 encoder interface cards are identical to those of the VW3 A3 401…409 and 411 encoder interface cards, see pages 111 to 113.*
*(4) The technical characteristics of the VW3 A3E 201 and VW3 A3E 202 I/O extension cards are identical to those of the VW3 A3 201 and VW3 A3 202 I/O extension cards, see pages 114 and 115.*
*(5) The technical characteristics of the VW3 A3E 501 "Controller Inside" programmable card are identical to those of the VW3 A3 501 "Controller Inside" programmable card, see page 118.*
*(6) If the power consumption table does not exceed 200 mA, the "Controller Inside" programmable card can be powered by Altivar 71 drives. Above 200 mA, the VW3 AE 1401 additional 24 V ⎓ power supply option must be ordered, see page 88.*
*(7) The technical characteristics of the VW3 A3E 301…304, 307, 309…311, 316 and 317 communication cards are identical to those of the VW3 A3 301…304, 307, 309…311, 316 and 317 communication cards, see pages 126 to 131.*

# Variable speed drives
## Altivar 71
## IP 54 floor-standing enclosure with separate air flows
## Common options

### Common options without modification of the enclosure (continued) (1)

| Description | Reference | Weight kg |
|---|---|---|
| **Remote control terminals X12** | **VW3 AE 1201** | 0.700 |
| **Remote option card terminals X13** *(2)*<br>for I/O extension cards VW3 A3E 201 and 202 | **VW3 AE 1202** | 0.900 |
| **External source terminals 230 V ∿** | **VW3 AE 1301** | 0.100 |
| **Additional 24 V ⎓ power supply, nominal current 2 A** *(3)* | **VW3 AE 1401** | 2.200 |
| **External source terminals 24 V ⎓** | **VW3 AE 1402** | 0.100 |
| **Emergency stop button** | **VW3 AE 1501** | 0.100 |
| **"Preventa type AC" fault relay** | **VW3 AE 1502** | 0.100 |
| **"Preventa type ATE" fault relay** | **VW3 AE 1503** | 0.100 |
| **Enclosure lighting** | **VW3 AE 1601** | 1.500 |
| **Key switch (Local Remote)** | **VW3 AE 1801** | 0.200 |
| **Additional electrical input isolation** | **VW3 AE 1901** | 0.100 |
| **Additional electrical output isolation** | **VW3 AE 1902** | 0.100 |
| **PTC relay** | **VW3 AE 2001** | 0.100 |
| **PTC relay with PTB (ATEX) certification** *(4)* | **VW3 AE 2002** | 0.100 |
| **PT100 relay**<br>for motor winding | **VW3 AE 2003** | 0.300 |
| **PT100 relay**<br>for motor bearings | **VW3 AE 2004** | 0.300 |
| **Motor heater 200 W, 230 V** | **VW3 AE 2101** | 0.200 |
| **Power supply circuit with 400 V protection**<br>for 1000 W external fan | **VW3 AE 2102** | 0.200 |
| **Relay for logic output** | **VW3 AE 2201** | 0.100 |
| **Voltmeter**<br>three-phase supply voltage 380…415 V | **VW3 AE 2301** | 0.400 |
| **Voltmeter**<br>three-phase supply voltage 500 V | **VW3 AE 2302** | 0.400 |
| **Voltmeter**<br>three-phase supply voltage 600…690 V | **VW3 AE 2303** | 0.400 |

*(1) For any other configuration, please consult your Regional Sales Office.*
*(2) The X13 terminals, reference VW3 AE 1202, include the X12 terminals, reference VW3 AE 1201.*
*(3) Mandatory when the power consumption table for the option cards exceeds 200 mA.*
*(4) ATEX: see pages 220 and 221.*

# Variable speed drives
## Altivar 71
IP 54 floor-standing enclosure with separate air flows
Options dependent on drive rating

### Options dependent on the drive rating (1)
**Three-phase supply voltage 380…415 V 50/60 Hz**

| Description | For ATV 71 enclosure | Reference (2) | Weight kg |
|---|---|---|---|
| **Resistance braking unit** | EXS5C20N4…C28N4 | **VW3 A7E 101** (3) | 31.000 |
| | EXS5C31N4…C50N4 | **VW3 A7E 102** (3) | 205.000 |
| **Isolating handle for switch** | EXS5D90N4, C11N4 | **VW3 AE 0103** | 1.000 |
| | EXS5C13N4…C28N4 | **VW3 AE 0104** | 2.000 |
| | EXS5C31N4…C50N4 | **VW3 AE 0105** | 2.000 |
| **Circuit-breaker** | EXS5D90N4, C11N4 | **VW3 AE 0106** | 1.400 |
| | EXS5C13N4…C20N4 | **VW3 AE 0107** | 1.400 |
| | EXS5C25N4…C31N4 | **VW3 AE 0109** | 1.400 |
| | EXS5C40N4 | **VW3 AE 0111** | 9.400 |
| | EXS5C50N4 | **VW3 AE 0112** | 9.400 |
| **Door handle for circuit-breaker** | EXS5D90N4, C11N4 | **VW3 AE 0114** | 1.000 |
| | EXS5C13N4…C31N4 | **VW3 AE 0115** | 2.000 |
| | EXS5C40N4, C50N4 | **VW3 AE 0116** | 2.000 |
| **230 V undervoltage coil for circuit-breaker** | EXS5D90N4…C31N4 | **VW3 AE 0117** | 0.500 |
| | EXS5C40N4, C50N4 | **VW3 AE 0118** | 0.500 |
| **110 V undervoltage coil for circuit-breaker** | EXS5D90N4…C31N4 | **VW3 AE 0119** | 0.500 |
| | EXS5C40N4, C50N4 | **VW3 AE 0120** | 0.500 |
| **230 V motor for circuit-breaker** | EXS5D90N4, C11N4 | **VW3 AE 0121** | 0.950 |
| | EXS5C13N4…C20N4 | **VW3 AE 0122** | 3.000 |
| | EXS5C25N4…C31N4 | **VW3 AE 0123** | 3.000 |
| | EXS5C40N4 | **VW3 AE 0124** | 7.000 |
| | EXS5C50N4 | **VW3 AE 0125** | 7.000 |
| **110 V motor for circuit-breaker** | EXS5D90N4, C11N4 | **VW3 AE 0127** | 0.950 |
| | EXS5C13N4…C20N4 | **VW3 AE 0128** | 3.000 |
| | EXS5C25N4…C31N4 | **VW3 AE 0129** | 3.000 |
| | EXS5C40N4 | **VW3 AE 0130** | 7.000 |
| | EXS5C50N4 | **VW3 AE 0131** | 7.000 |
| **Line contactor** | EXS5D90N4, C11N4 | **VW3 AE 0206** | 7.000 |
| | EXS5C13N4 | **VW3 AE 0218** | 10.000 |
| | EXS5C16N4 | **VW3 AE 0215** | 7.000 |
| | EXS5C20N4…C28N4 | **VW3 AE 0216** | 10.000 |
| | EXS5C31N4 | **VW3 AE 0210** | 14.000 |
| | EXS5C40N4 | **VW3 AE 0212** | 24.000 |
| | EXS5C50N4 | **VW3 AE 0213** | 28.000 |

*(1) For any other configuration, please consult your Regional Sales Office.*
*(2) The options depend on the rating of the drive and may lead to modification of the size of the enclosure.*
*(3) The technical characteristics of the VW3 A7E 101 and VW3 A7E 102 braking units are identical to those of the VW3 A7 101 and VW3 A7 102 braking units, see page 134.*

# Variable speed drives
## Altivar 71
IP 54 floor-standing enclosure with separate air flows
Options dependent on drive rating

### Options dependent on the drive rating (continued) *(1)*
**Three-phase supply voltage 380…415 V 50/60 Hz (continued)**

| Description | For ATV 71 enclosure | Reference *(2)* | Weight kg |
|---|---|---|---|
| **Control transformer 500 VA ∿, output 230 V ∿** | EXS5D90N4…C28N4 | **VW3 AE 0302** | 8.000 |
| **Control transformer 800 VA ∿, output 230 V ∿** | EXS5C31N4…C50N4 | **VW3 AE 0303** | 11.000 |
| **Ammeter** | EXS5D90N4 | **VW3 AE 0405** | 0.200 |
| | EXS5C11N4, C13N4 | **VW3 AE 0406** | 0.200 |
| | EXS5C16N4 | **VW3 AE 0407** | 0.200 |
| | EXS5C20N4…C28N4 | **VW3 AE 0408** | 0.200 |
| | EXS5C31N4 | **VW3 AE 0409** | 0.200 |
| | EXS5C40N4 | **VW3 AE 0410** | 0.200 |
| | EXS5C50N4 | **VW3 AE 0411** | 0.200 |
| **Enclosure heater** | EXS5D90N4…C28N4 | **VW3 AE 0501** | 0.500 |
| | EXS5C31N4…C50N4 | **VW3 AE 0502** | 1.000 |
| **Motor choke** | EXS5D90N4 | **VW3 AE 0615** | 37.000 |
| | EXS5C11N4, C13N4 | **VW3 AE 0617** | 55.000 |
| | EXS5C16N4 | **VW3 AE 0619** | 157.000 |
| | EXS5C20N4 | **VW3 AE 0620** | 160.000 |
| | EXS5C25N4, C28N4 | **VW3 AE 0621** | 192.000 |
| | EXS5C31N4 | **VW3 AE 0622** | 197.000 |
| | EXS5C40N4 | **VW3 AE 0624** | 228.000 |
| | EXS5C50N4 | **VW3 AE 0625** | 234.000 |
| **Sinus filter** *(3)* | EXS5D90N4 | **VW3 AE 0665** | 318.000 |
| | EXS2C11N4 | **VW3 AE 0666** | 325.000 |
| | EXS5C13N4 | **VW3 AE 0668** | 365.000 |
| | EXS5C16N4 | **VW3 AE 0669** | 373.000 |
| | EXS5C20N4 | **VW3 AE 0671** | 394.000 |
| | EXS5C25N4…C28N4 | **VW3 AE 0672** | 434.000 |
| | EXS5C31N4 | **VW3 AE 0673** | 445.000 |
| | EXS5C40N4 | **VW3 AE 0675** | 900.000 |
| | EXS5C50N4 | **VW3 AE 0676** | 930.000 |

*(1) For any other configuration, please consult your Regional Sales Office.*
*(2) The options depend on the rating of the drive and may lead to modification of the size of the enclosure.*
*(3) Option not compatible with the "Cable entry via the top" option.*

# Variable speed drives
## Altivar 71
IP 54 floor-standing enclosure with separate air flows
Options dependent on drive rating

### Options dependent on the drive rating (continued) (1)
**Three-phase supply voltage 380…415 V 50/60 Hz (continued)**

| Description | Use | For ATV 71 enclosure | Reference (2) | Weight kg |
|---|---|---|---|---|
| **Cable entry via the top** (3) | Without motor choke | EXS5D90N4, C11N4 | **VW3 AE 0715** | 123.000 |
| | | EXS5C13N4 | **VW3 AE 0716** | 123.000 |
| | | EXS5C16N4 | **VW3 AE 0717** | 123.000 |
| | | EXS5C20N4…C28N4 | **VW3 AE 0718** | 141.000 |
| | | EXS5C31N4 | **VW3 AE 0719** | 123.000 |
| | | EXS5C40N4 | **VW3 AE 0720** | 141.000 |
| | | EXS5C50N4 | **VW3 AE 0721** | 141.000 |
| | With motor choke | EXS5C16N4 | **VW3 AE 0722** | 123.000 |
| | | EXS5C20N4…C28N4 | **VW3 AE 0723** | 141.000 |
| | | EXS5C31N4 | **VW3 AE 0724** | – |
| | | EXS5C40N4 | **VW3 AE 0725** | – |
| | | EXS5C50N4 | **VW3 AE 0726** | – |
| **Plinth equipped with a fine mesh grille** | | EXS5D90N4…C16N4 | **VW3 AE 0812** | 2.000 |
| | | EXS5C20N4…C28N4 | **VW3 AE 0813** | 3.000 |
| | | EXS5C31N4, C40N4 | **VW3 AE 0814** | 4.000 |
| | | EXS5C50N4 | **VW3 AE 0815** | 5.000 |

*(1) For any other configuration, please consult your Regional Sales Office.*
*(2) The options depend on the rating of the drive and may lead to modification of the size of the enclosure.*
*(3) Option not compatible with the "Sinus filter" option.*

# Variable speed drives
## Altivar 71
IP 54 floor-standing enclosure with separate air flows
Options dependent on drive rating

### Options dependent on the drive rating (continued) (1)
**Three-phase supply voltage 380…415 V 50/60 Hz (continued)**

| Description | Use | For ATV 71 enclosure | Reference (2) | Weight kg |
|---|---|---|---|---|
| **Air conditioning** | Without motor choke | EXS5D90N4 | **VW3 AE 0901** | 29.500 |
| | | EXS5C11N4 | **VW3 AE 0902** | 29.500 |
| | | EXS5C13N4 | **VW3 AE 0903** | 26.500 |
| | | EXS5C16N4 | **VW3 AE 0904** | 53.000 |
| | | EXS5C20N4…C28N4 | **VW3 AE 0905** | 68.000 |
| | | EXS5C31N4 | **VW3 AE 0906** | 68.000 |
| | | EXS5C40N4 | **VW3 AE 0907** | 68.000 |
| | | EXS5C50N4 | **VW3 AE 0908** | 83.000 |
| | With motor choke | EXS5D90N4 | **VW3 AE 0909** | 53.000 |
| | | EXS5C11N4 | **VW3 AE 0911** | 53.000 |
| | | EXS5C13N4 | **VW3 AE 0912** | 68.000 |
| | | EXS5C16N4 | **VW3 AE 0914** | 68.000 |
| | | EXS5C20N4…C28N4 | **VW3 AE 0915** | 68.000 |
| | | EXS5C31N4 | **VW3 AE 0916** | 65.000 |
| | | EXS5C40N4 | **VW3 AE 0917** | 80.000 |
| | | EXS5C50N4 | **VW3 AE 0918** | 80.000 |

*(1) For any other configuration, please consult your Regional Sales Office.*
*(2) The options depend on the rating of the drive and may lead to modification of the size of the enclosure.*

# Variable speed drives
## Altivar 71
IP 54 floor-standing enclosure with separate air flows
Options dependent on drive rating

### Options dependent on the drive rating (continued) (1)
**Three-phase supply voltage 500 V and 600…690 V 50/60 Hz (continued)**

| Description | Use | For ATV 71 enclosure | | Reference (2) | Weight |
|---|---|---|---|---|---|
| | | 500 V | 600…690 V | | kg |
| **Resistance braking unit** | – | EXS5C16N…C25N | EXS5C20Y…C31Y | **VW3 A7E 103** (3) | 205.000 |
| | | EXS5C31N…C50N | EXS5C40Y…C63Y | **VW3 A7E 104** (3) | 205.000 |
| **Isolating handle for switch** | – | EXS5D90N…C13N | EXS5C11Y…C16Y | **VW3 AE 0103** | 1.000 |
| | | EXS5C16N…C25N | EXS5C20Y…C31Y | **VW3 AE 0104** | 2.000 |
| | | EXS5C31N…C50N | EXS5C40Y…C63Y | **VW3 AE 0105** | 2.000 |
| **Ammeter** | – | EXS5D90N | EXS5C11Y | **VW3 AE 0404** | 0.200 |
| | | EXS5C11N, C13N | EXS5C13Y…C20Y | **VW3 AE 0405** | 0.200 |
| | | EXS5C16N | EXS5C25Y | **VW3 AE 0406** | 0.200 |
| | | EXS5C20N | EXS5C31Y | **VW3 AE 0407** | 0.200 |
| | | EXS5C25N, C31N | EXS5C40Y | **VW3 AE 0408** | 0.200 |
| | | EXS5C40N | EXS5C50Y, C63Y | **VW3 AE 0409** | 0.200 |
| | | EXS5C50N | – | **VW3 AE 0410** | 0.200 |
| **Enclosure heater** | – | EXS5D90N…C25N | EXS5C11Y…C31Y | **VW3 AE 0501** | 0.500 |
| | | EXS5C31N…C50N | EXS5C40Y…C63Y | **VW3 AE 0502** | 1.000 |
| **Motor choke** | – | EXS5D90N, C11N | EXS5C11Y, C13Y | **VW3 AE 0603** | 17.000 |
| | | EXS5C13N, C16N | EXS5C16Y, C20Y | **VW3 AE 0604** | 35.000 |
| | | EXS5C20N, C25N | EXS5C25Y, C31Y | **VW3 AE 0605** | 64.000 |
| | | EXS5C31N, C40N | EXS5C40Y, C50Y | **VW3 AE 0630** | 197.000 |
| | | EXS5C50N | EXS5C63Y | **VW3 AE 0631** | 234.000 |
| **Cable entry via the top** | Without motor choke | EXS5D90N…C13N | EXS5C11Y…C16Y | **VW3 AE 0732** | – |
| | | EXS5C16N…C25N | EXS5C20Y…C31Y | **VW3 AE 0733** | – |
| | | EXS5C31N…C50N | EXS5C40Y…C63Y | **VW3 AE 0734** | 252.000 |
| | With motor choke | EXS5D90N…C13N | EXS5C11Y…C16Y | **VW3 AE 0735** | 108.000 |
| | | EXS5C16N…C25N | EXS5C20Y…C31Y | **VW3 AE 0736** | 126.000 |
| | | EXS5C31N…C50N | EXS5C40Y…C63Y | **VW3 AE 0737** | 252.000 |
| **Plinth with fine mesh grille** | – | EXS5D90N…C13N | EXS5C11Y…C16Y | **VW3 AE 0812** | 2.000 |
| | | EXS5C16N…C25N | EXS5C20Y…C31Y | **VW3 AE 0813** | 3.000 |
| | | EXS5C31N…C50N | EXS5C40Y…C63Y | **VW3 AE 0815** | 5.000 |
| **Air conditioning** | Without motor choke | EXS5D90N…C13N | EXS5C11Y…C16Y | **VW3 AE 0919** | 29.500 |
| | | EXS5C16N…C25N | EXS5C20Y…C31Y | **VW3 AE 0920** | 56.000 |
| | | EXS5C31N…C50N | EXS5C40Y…C63Y | **VW3 AE 0921** | 71.000 |
| | With motor choke | EXS5D90N…C13N | EXS5C11Y…C16Y | **VW3 AE 0922** | 56.000 |
| | | EXS5C16N…C25N | EXS5C20Y…C31Y | **VW3 AE 0923** | 71.000 |
| | | EXS5C31N, C40N | EXS5C40Y, C50Y | **VW3 AE 0924** | 71.000 |
| | | EXS5C50N | EXS5C63Y | **VW3 AE 0925** | 86.000 |

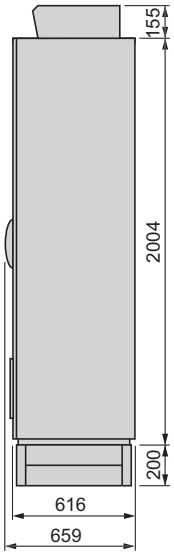
*(1) For any other configuration, please consult your Regional Sales Office.*
*(2) The options depend on the rating of the drive and may lead to modification of the size of the enclosure.*
*(3) The technical characteristics of the VW3 A7E 103 and VW3 A7E 104 braking units are identical to those of the VW3 A7 103 and VW3 A7 104 braking units, see page 134.*

# Variable speed drives
Altivar 71
IP 54 floor-standing enclosure with separate air flows

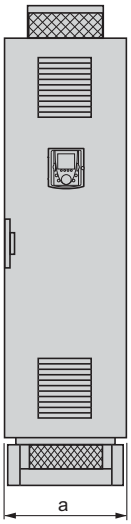
## IP 54 floor-standing enclosure with separate air flows

### ATV 71EXS5D90N4…EXS5C28N4, ATV 71 EXS5D90N…EXS5C25N, ATV 71EXS5C11Y…EXS5C31Y

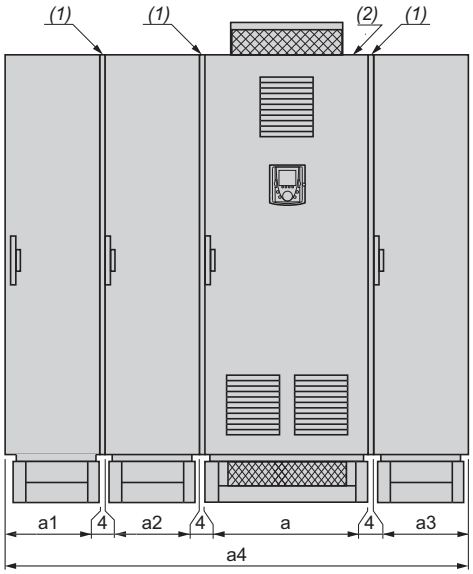
**Common side view**




**Standard floor-standing enclosure**




**Standard floor-standing enclosure + additional enclosures, according to the configuration**




***Note**: The positions of the enclosures must be adhered to during installation. The number of additional enclosures can vary according to the chosen configuration.*

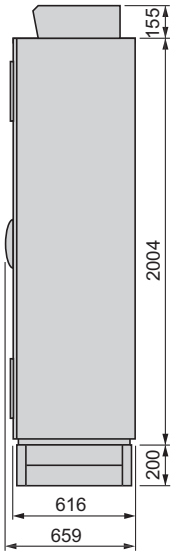
| ATV 71 enclosures | Options | a | a1 | a2 | a3 | a4 |
|---|---|---|---|---|---|---|
| **EXCS5D90N4…EXCS5C13N4** | With or without common options or options *(3)* dependent on the drive rating | 616 | | | | 616 |
| | Cable entry via the top option *(4)* | 608 | | 408 | | 1020 |
| | Sinus filter option | 608 | | | 608 | 1220 |
| **EXCS5C16N4** | With or without common options or options *(3)* dependent on the drive rating | 616 | | | | 616 |
| | Motor choke option | 608 | | | 408 | 1020 |
| | Cable entry via the top option *(4)* | 608 | | 408 | | 1020 |
| | Motor choke + cable entry via the top option | 600 | | 408 | 408 | 1424 |
| | Sinus filter option | 608 | | | 608 | 1220 |
| **EXCS5C20N4…EXCS5C28N4** | With or without common options or options *(3)* dependent on the drive rating | 816 | | | | 816 |
| | Cable entry via the top option *(4)* | 808 | | 408 | | 1220 |
| | Sinus filter option | 808 | | | 608 | 1420 |
| | Motor choke option | 808 | | | 408 | 1220 |
| | Motor choke + cable entry via the top option | 800 | | 408 | 408 | 1624 |
| **EXCS5D90N…EXCS5C13N, EXCS5C11Y…EXCS5C16Y** | With or without common options or options dependent on the drive rating | 608 | | | 408 | 1020 |
| | Cable entry via the top option | 608 | | | 408 | 1020 |
| | Cable entry via the top + motor choke option | 600 | | 408 | 408 | 1424 |
| **EXCS5C16N…EXCS5C25N, EXCS5C20Y…EXCS5C31Y** | With or without common options or options dependent on the drive rating | 808 | | | 408 | 1220 |
| | Cable entry via the top option | 808 | | | 408 | 1220 |
| | Braking unit option | 800 | | 408 | 408 | 1624 |
| | Braking unit + cable entry via the top options | 800 | | 408 | 408 | 1624 |
| | Motor choke + cable entry via the top option | 800 | | 408 | 408 | 1624 |
| | Motor choke + braking unit + cable entry via the top option | 800 | 408 | 400 | 408 | 2028 |

*(1) Seal. For each additional floor-standing enclosure, allow a 4 mm space for the seal.*
*(2) Standard version floor-standing enclosure.*
*(3) Except sinus filter option, which requires an additional enclosure. See table above. The sinus filter option is not compatible with the cable entry via the top option.*
*(4) The cable entry via the top option is not compatible with the sinus filter option.*

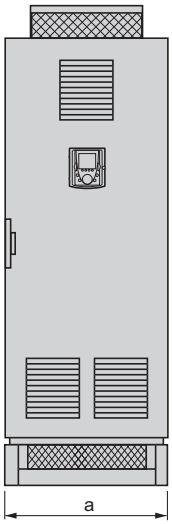
## IP 54 floor-standing enclosure with separate air flows (continued)

**ATV 71EXS5C31N4…EXS5C50N4, ATV 71EXS5C31N…EXS5C50N, ATV 71EXS5C40Y…EXS5C63Y**

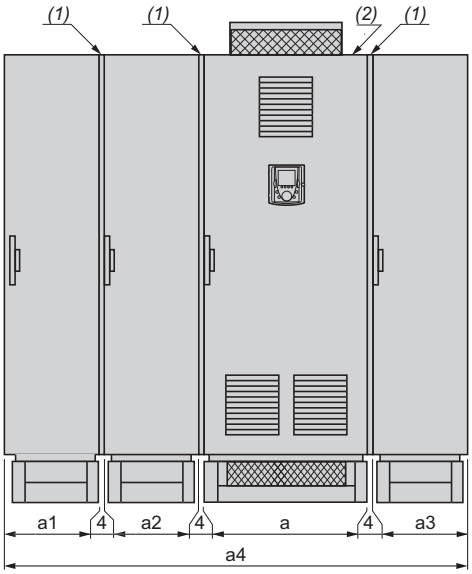
**Common side view**




**Standard floor-standing enclosure**




**Standard floor-standing enclosure + additional enclosures, according to the configuration**



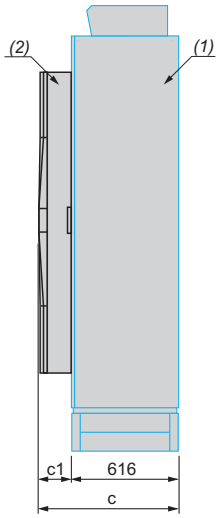

***Note**: The positions of the enclosures must be adhered to during installation. The number of additional enclosures can vary according to the chosen configuration.*

| ATV 71 enclosures | Options | a | a1 | a2 | a3 | a4 |
|---|---|---|---|---|---|---|
| **EXS5C31N4** | With or without common options or options *(3)* dependent on the drive rating | 1008 | | 408 | | 1420 |
| | Cable entry via the top option *(4)* | 1000 | | 408 | 408 | 1824 |
| | Braking unit option only and/or options *(3)* dependent on rating | 1008 | 408 | 400 | | 1824 |
| | Braking unit + cable entry via the top options *(4)* | 1000 | 408 | 400 | 408 | 2228 |
| | Motor choke option | 1000 | | 408 | 408 | 1824 |
| | Sinus filter option | 1000 | | 408 | 608 | 2024 |
| **EXS5C40N4** | With or without common options or options *(3)* dependent on the drive rating | 1008 | | 408 | | 1420 |
| | Cable entry via the top option *(4)* | 1000 | | 408 | 408 | 1824 |
| | Braking unit option only and/or options *(3)* dependent on rating | 1008 | 408 | 400 | | 1824 |
| | Braking unit + cable entry via the top options *(4)* | 1000 | 408 | 400 | 408 | 2228 |
| | Motor choke option | 1000 | | 408 | 408 | 1824 |
| | Sinus filter option | 1000 | | 408 | 808 | 2224 |
| **EXS5C50N4** | With or without common options or options *(3)* dependent on the drive rating | 1208 | | 408 | | 1620 |
| | Cable entry via the top option *(4)* | 1200 | | 408 | 408 | 2024 |
| | Braking unit option only and/or options *(3)* dependent on rating | 1208 | 408 | 400 | | 2024 |
| | Braking unit + cable entry via the top options *(4)* | 1200 | 408 | 400 | 408 | 2428 |
| | Motor choke option | 1200 | | 408 | 408 | 2024 |
| | Sinus filter option | 1200 | | 408 | 808 | 2424 |
| **EXS5C31N…EXS5C50N, EXS5C40Y…EXS5C63Y** | With or without common options or options dependent on the drive rating | 1208 | | 408 | | 1620 |
| | Cable entry via the top option | 1200 | | 408 | 408 | 2024 |
| | Braking unit option only and/or options *(3)* dependent on rating | 1208 | 408 | 400 | | 2024 |
| | Braking unit + cable entry via the top options | 1200 | 408 | 400 | 408 | 2428 |
| | Motor choke option | 1200 | | 408 | 408 | 2024 |

*(1) Seal. For each additional floor-standing enclosure, allow a 4 mm space for the seal.*
*(2) Standard version floor-standing enclosure.*
*(3) Except sinus filter option, which requires an additional enclosure. See table above. The sinus filter option is not compatible with the cable entry via the top option.*
*(4) The cable entry via the top option is not compatible with the sinus filter option.*

## IP 54 floor-standing enclosure with separate air flows (continued)

### Air conditioned option VW3 AE 0901…0909, 0911, 0912, 0914…0918, 0919…0925




| VW3 | c | c1 |
|---|---|---|
| AE 0901…0903 | 847 | 231 |
| AE 0904 | 796 | 180 |
| AE 0905…0907 | 856 | 240 |
| AE 0908 | 976 | 360 |
| AE 0909, 0911, 0912 | 796 | 180 |
| AE 0914…0916 | 856 | 240 |
| AE 0917, 0918 | 976 | 360 |
| AE 0919 | 847 | 231 |
| AE 0920 | 796 | 180 |
| AE 0921 | 856 | 240 |
| AE 0922 | 796 | 180 |
| AE 0923 | 796 | 240 |
| AE 0924 | 856 | 240 |
| AE 0925 | 976 | 360 |

*(1) IP 54 floor-standing enclosure with separate air flows*
*(2) Option: air conditioning*

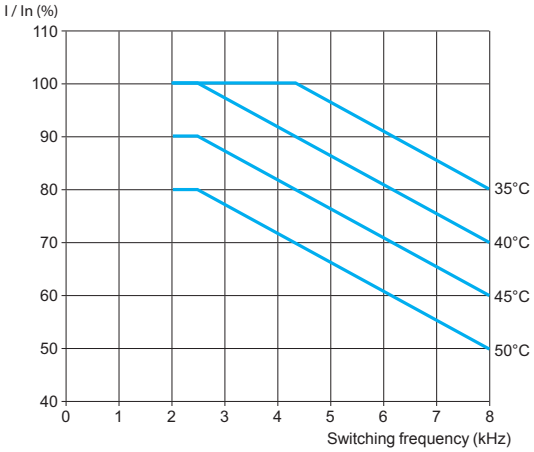
## Installation recommendations

The derating curves for the drive nominal current (In) are dependent on the temperature and switching frequency.
For intermediate temperatures, interpolate between 2 curves.

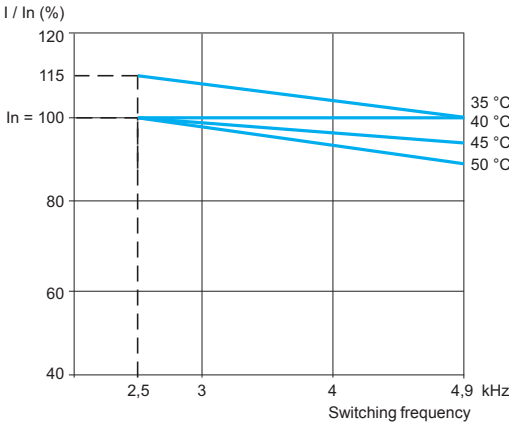
***Note:*** *The drive will reduce the switching frequency automatically in the event of excessive temperature rise.*

### Derating curves for ATV 71EXS5D90N4…EXS5C50N4, ATV 71EXS5D90N…EXS5C13N, ATV 71EXS5C11Y…EXS5C16Y *(1)*

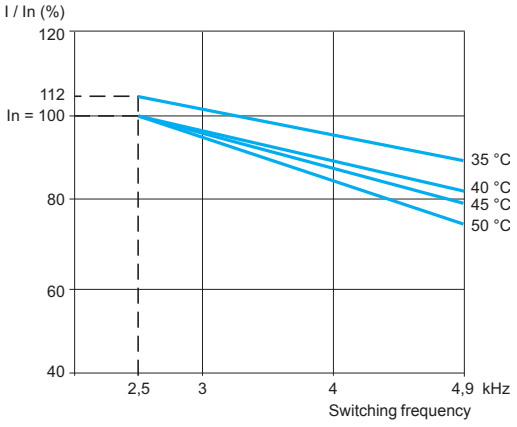
**ATV 71EXS5D90N4… EXS5C50N4**



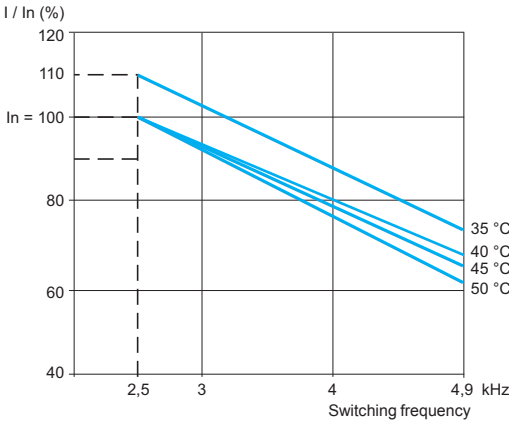

**ATV 71EXS5D90N, ATV 71EXS5C11Y**




**ATV 71EXS5C11N, ATV 71EXS5C13Y**



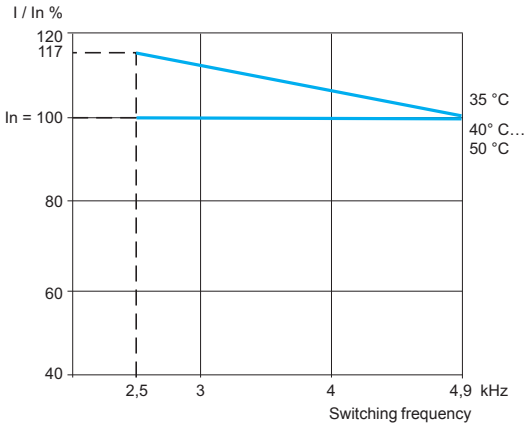

**ATV 71EXS5C13N, ATV 71EXS5C16Y**



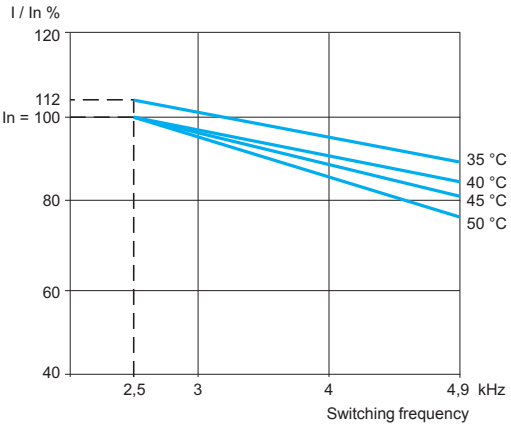

*(1) The temperatures shown correspond to the temperature of the air entering the enclosure.*

## Derating curves for ATV 71EXS5C16N…EXS5C50N, ATV 71EXS5C20Y…EXS5C63Y *(1)*

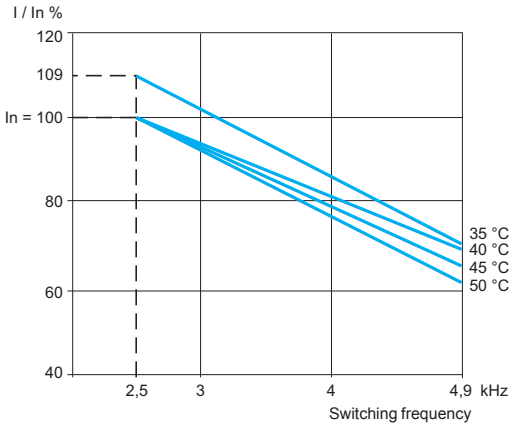
### ATV 71EXS5C16N, ATV 71EXS5C20Y



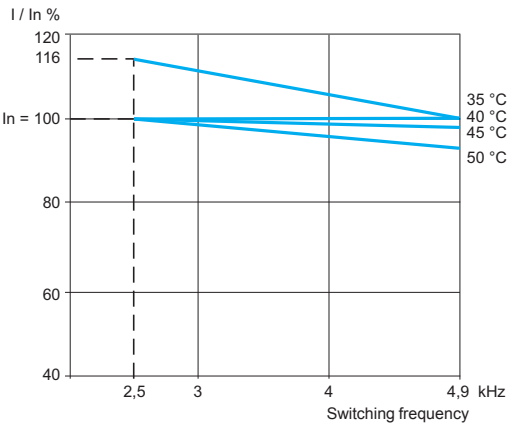

### ATV 71EXS5C20N, ATV 71EXS5C25Y



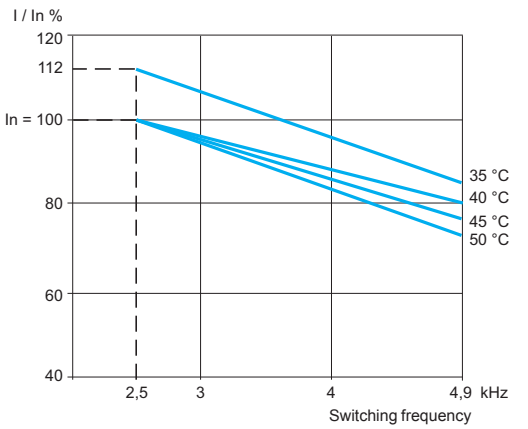

### ATV 71EXS5C25N, ATV 71EXS5C31Y



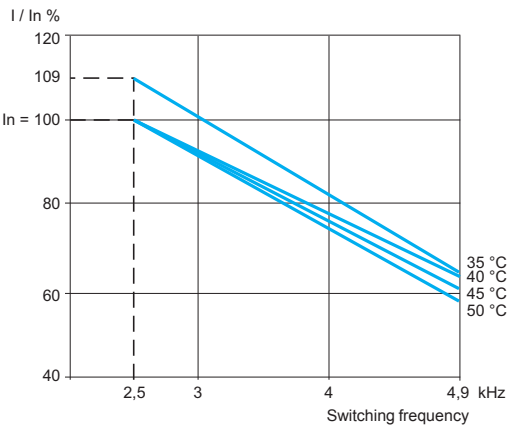

### ATV 71EXS5C31N, ATV 71EXS5C40Y




### ATV 71EXS5C40N, ATV 71EXS5C50Y




### ATV 71EXS5C50N, ATV 71EXS5C63Y

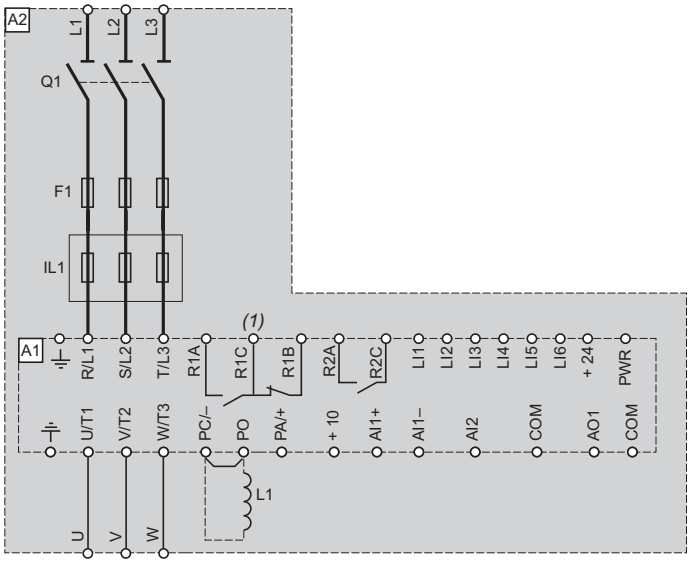



*(1) The temperatures shown correspond to the temperature of the air entering the enclosure.*

# Variable speed drives
Altivar 71
IP 54 floor-standing enclosure with separate air flows

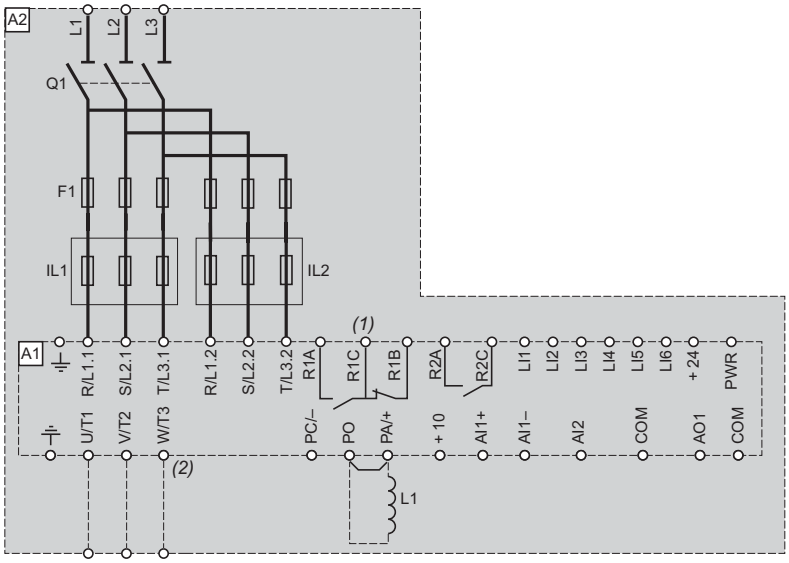
## IP 54 floor-standing enclosure with separate air flows

### ATV 71EXS5D90N4…EXS5C31N4, ATV 71EXS5D90N…EXS5C31N, ATV 71EXS5C11Y…EXS5C31Y




| Reference | Description |
|---|---|
| **A1** | ATV 71 drive, see pages 23 and 25 |
| **A2** | IP 54 floor-standing enclosure with separate air flows ATV 71EXS5, see page 86 |
| **F1** | Fast-acting semi-conductor fuse |
| **IL1** | Line choke for ATV 71EXS5●●●N and ATV 71EXS5●●●Y |
| **L1** | DC choke for ATV 71EXS5●●●N4 |
| **Q1** | Switch |

### ATV 71EXS5C40N4, EXS5C50N4, ATV 71EXS5C40N, EXS5C50N, ATV 71EXS5C40Y…EXS5C63Y



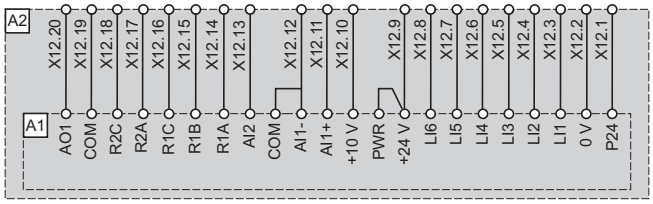

| Reference | Description |
|---|---|
| **A1** | ATV 71 drive, see pages 23 and 25 |
| **A2** | IP 54 floor-standing enclosure with separate air flows ATV 71EXS5, see page 86 |
| **F1** | Fast-acting semi-conductor fuse |
| **IL1, IL2** | Line chokes for ATV 71EXS5●●●N and ATV 71EXS5●●●Y |
| **L1** | DC choke for ATV 71EXS5●●●N4 |
| **Q1** | Switch |

*(1) Fault relay contacts. For remote signalling of drive status.*
*(2) Only for ATV 71EXS5●●●N and ATV 71EXS5●●●Y.*

# Variable speed drives
Altivar 71
IP 54 floor-standing enclosure with separate air flows

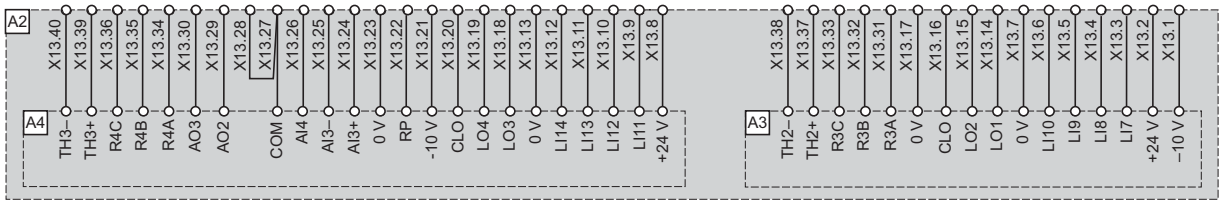
## Options common to all drives

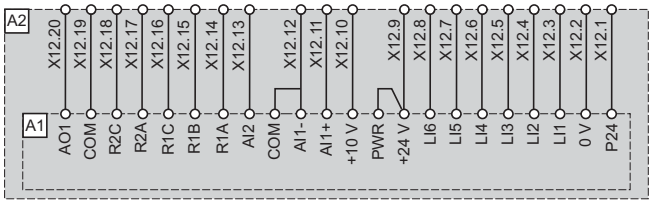
### Remote control terminals X12 - VW3 AE 1201




| Reference | Description |
|---|---|
| **A1** | ATV 71 drive, see pages 23 and 25 |
| **A2** | IP 54 floor-standing enclosure with separate air flows ATV 71EXS5, see page 86 |

### Remote option card terminals X13 - VW3 AE 1202



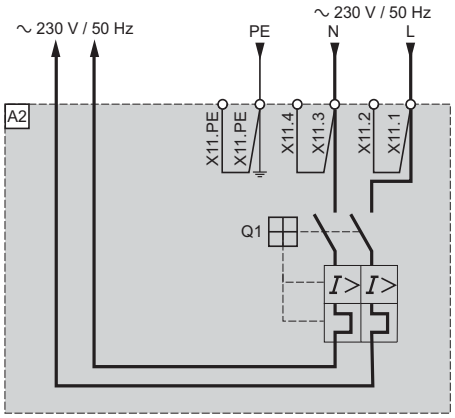




| Reference | Description |
|---|---|
| **A1** | ATV 71 drive, see pages 23 and 25 |
| **A2** | IP 54 floor-standing enclosure with separate air flows ATV 71EXS5, see page 86 |
| **A3** | I/O option card VW3 A3E 201, see page 87 |
| **A4** | I/O option card VW3 A3E 202, see page 87 |

# Variable speed drives
Altivar 71
IP 54 floor-standing enclosure with separate air flows

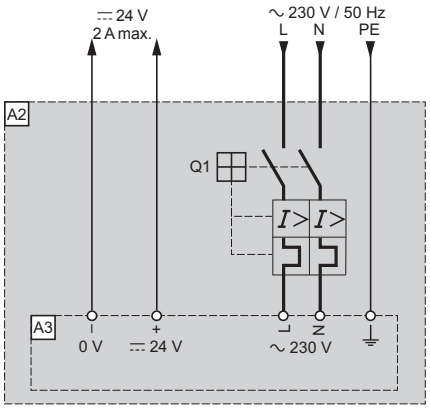
## Options common to all drives (continued)

### External source terminals 230 V ∿ - VW3 AE 1301



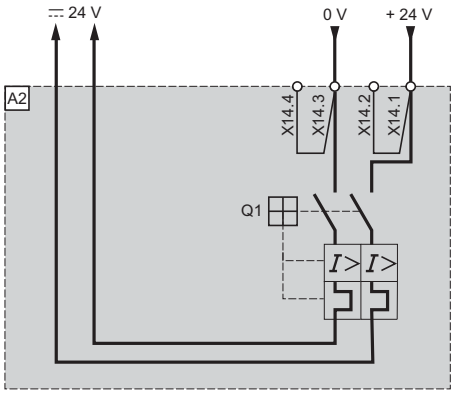

| Reference | Description |
|---|---|
| **A2** | IP 54 floor-standing enclosure with separate air flows ATV 71EXS5, see page 86 |
| **Q1** | 6 A circuit-breaker |
| **X11** | External source terminals 230 V ∿ |

### Additional 24 V ⎓ power supply - VW3 AE 1401




| Reference | Description |
|---|---|
| **A2** | IP 54 floor-standing enclosure with separate air flows ATV 71EXS5, see page 86 |
| **A3** | Additional 24 V ⎓ power supply |
| **Q1** | 2 A circuit-breaker |

### External source terminals 24 V ⎓ - VW3 AE 1402

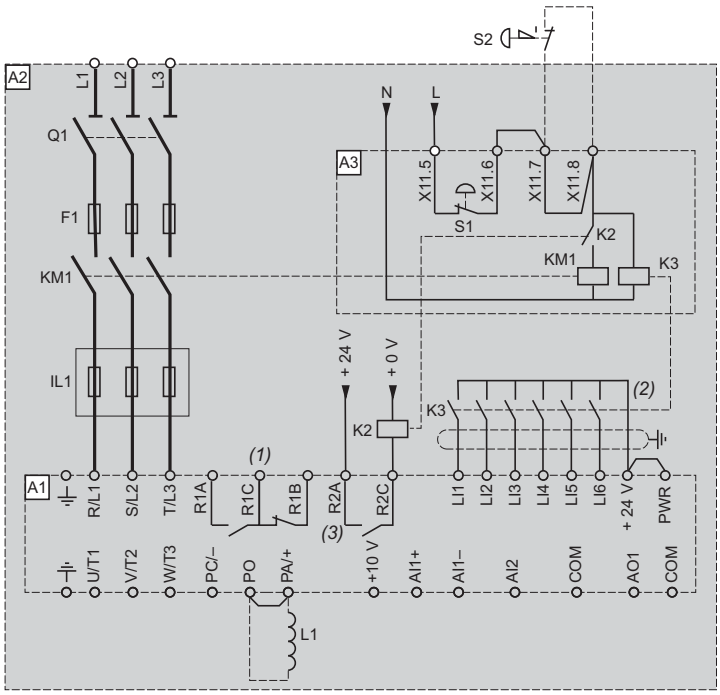



| Reference | Description |
|---|---|
| **A2** | IP 54 floor-standing enclosure with separate air flows ATV 71EXS5, see page 86 |
| **Q1** | 2 A circuit-breaker |
| **X14** | External source terminals 24 V ⎓ |

## Options common to all drives (continued)

### Emergency stop button - VW3 AE 1501

**Scheme conforming to standards EN 954-1 category 1, IEC/EN 61508 capacity SIL1, stopping category 0 in accordance with IEC/EN 60204-1**



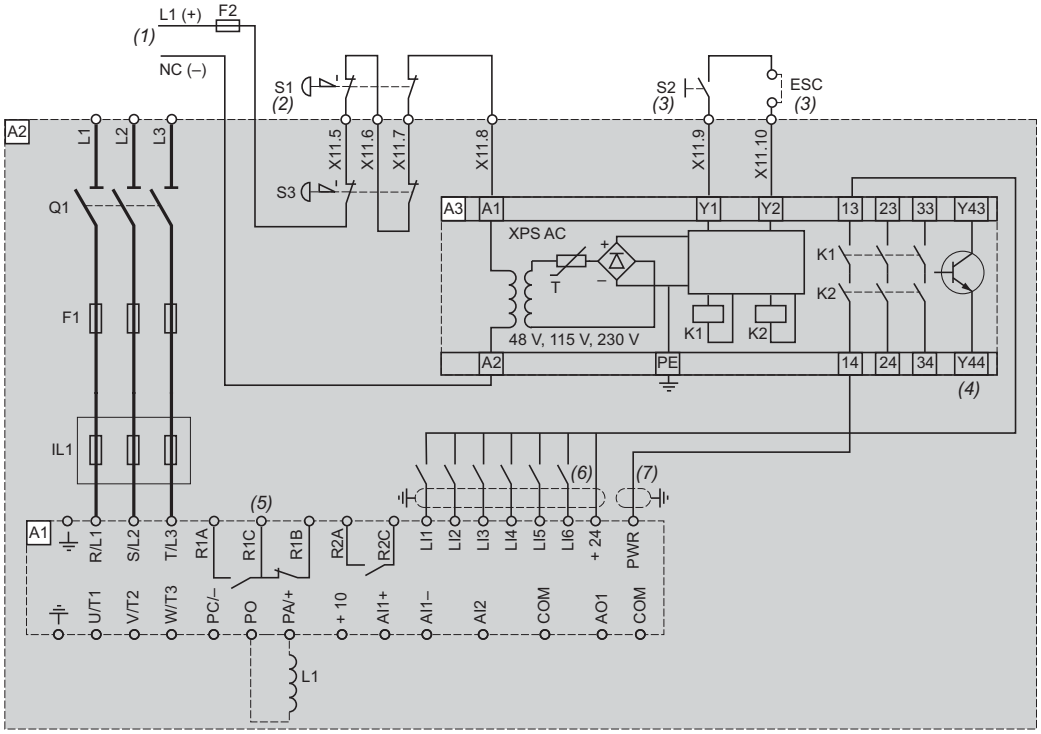

| Reference | Description |
|---|---|
| **A1** | ATV 71 drives, see pages 23 and 25 |
| **A2** | IP 54 floor-standing enclosure with separate air flows ATV 71EXS5, see page 86 |
| **A3** | Emergency stop button |
| **IL1** | Line choke for ATV 71EXS5●●●N and ATV 71EXS5●●●Y |
| **K2** | Line contactor control contactor |
| **K3** | Logic input control contactor |
| **KM1** | Line contactor |
| **L1** | DC choke for ATV 71EXS5●●●N4 |
| **Q1** | Switch |
| **S1** | Emergency stop button mounted on enclosure door |
| **S2** | Emergency stop button |

*(1) Fault relay contacts. For remote signalling of drive status.*
*(2) Connection of the common for the logic inputs depends on the positioning of the SW1 switch: see schemes on page 227.*
*(3) Relay logic output R2A must be assigned to the "Line contactor" parameter.*

## Options common to all drives (continued)

### "Preventa type AC" fault relay - VW3 AE 1502

**Scheme conforming to standards EN 954-1 category 3, IEC/EN 61508 capacity SIL 2, stopping category 0 in accordance with IEC/EN 60204-1**



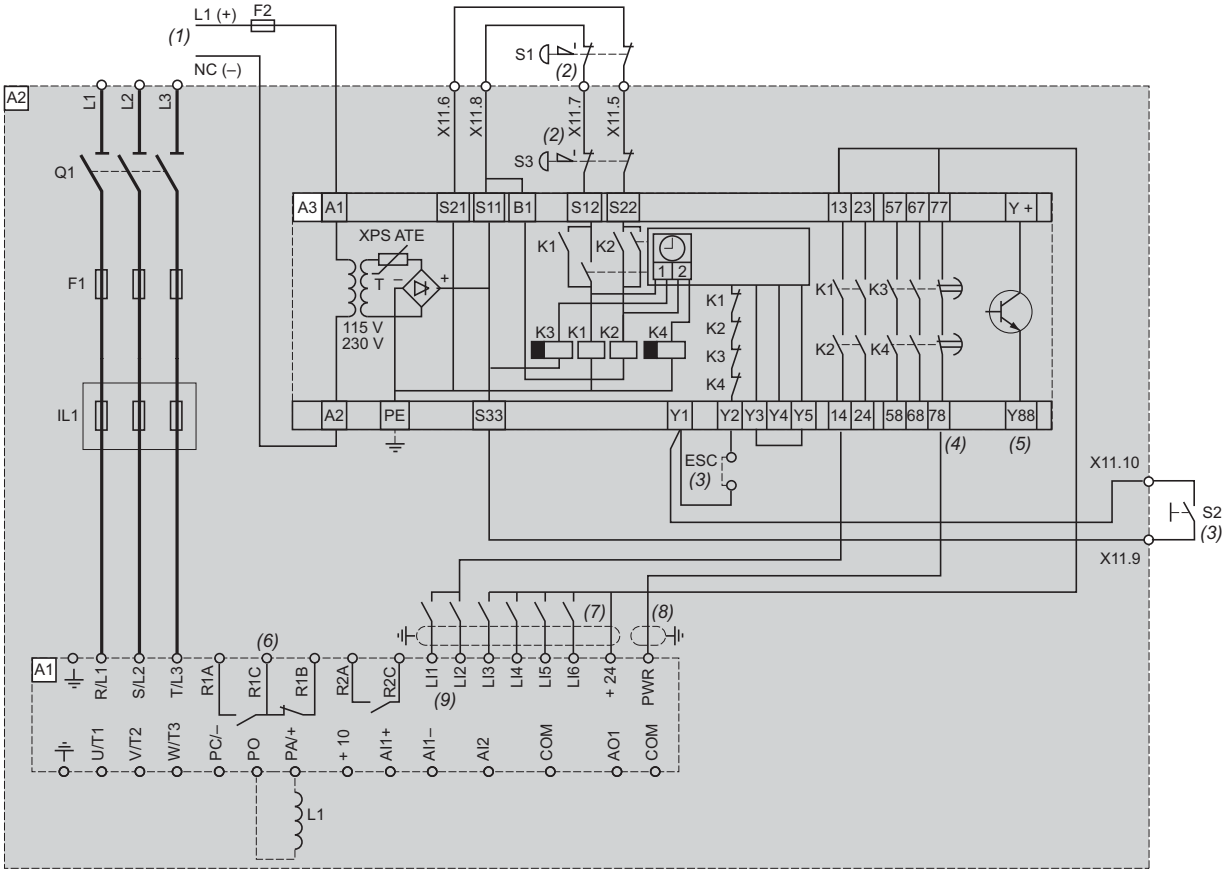

| Reference | Description |
|---|---|
| **A1** | ATV 71 drive, see pages 23 and 25 |
| **A2** | IP 54 floor-standing enclosure with separate air flows ATV 71EXS5, see page 86 |
| **A3** | Preventa XPS AC safety module for monitoring emergency stops and switches. One safety module can manage the "Power Removal" function for several drives on the same machine. In this case, the PWR terminal on each drive must be connected to the + 24 V via the safety contacts on the XPS AC module. These contacts are independent for each drive. |
| **F1** | Fast-acting semi-conductor fuse |
| **F2** | Fuse |
| **IL1** | Line choke for ATV 71EXS5●●●N and ATV 71EXS5●●●Y |
| **L1** | DC choke for ATV 71EXS5●●●N4 |
| **Q1** | Switch |
| **S1** | Emergency stop button with 2 contacts |
| **S2** | XB4 B or XB5 A pushbutton |
| **S3** | Emergency stop button with 2 contacts, mounted on enclosure door |

*(1) Power supply: 24 V ⎓, 230 V ∿.*
*(2) Requests freewheel stopping of the movement and activates the "Power Removal" safety function.*
*(3) S2: resets the XPS AC module on power-up or after an emergency stop. ESC can be used to set external starting conditions.*
*(4) The logic output can be used to indicate that the machine is in a safe stop state.*
*(5) Fault relay contacts. For remote signalling of drive status.*
*(6) Connection of the common for the logic inputs depends on the positioning of the SW1 switch: see schemes on page 227.*
*(7) Standardized coaxial cable, type RG174/U according to MIL-C17 or KX3B according to NF C 93-550, external diameter 2.54 mm, maximum length 15 m. The cable shielding must be earthed.*

## Options common to all drives (continued)

### "Preventa type ATE" fault relay - VW3 AE 1503

**Scheme conforming to standards EN 954-1 category 3, IEC/EN 61508 capacity SIL 2, stopping category 1 in accordance with IEC/EN 60204-1**



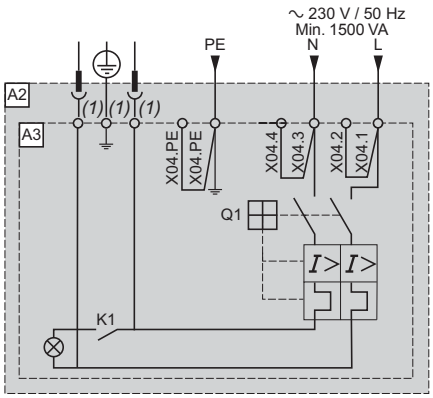

| Reference | Description |
|---|---|
| **A1** | ATV 71 drive, see pages 23 and 25 |
| **A2** | IP 54 floor-standing enclosure with separate air flows ATV 71EXS5, see page 86 |
| **A3** | Preventa XPS ATE safety module for monitoring emergency stops and switches. One safety module can manage the "Power Removal" safety function for several drives on the same machine. In this case the time delay must be adjusted on the drive controlling the motor that requires the longest stopping time. In addition, the PWR terminal on each drive must be connected to the + 24 V via the safety contacts on the XPS ATE module. These contacts are independent for each drive. |
| **F1** | Fast-acting semi-conductor fuse |
| **F2** | Fuse |
| **IL1** | Line choke for ATV 71EXS5●●●N and ATV 71EXS5●●●Y |
| **L1** | DC choke for ATV 71EXS5●●●N4 |
| **Q1** | Switch |
| **S1** | Emergency stop button with 2 contacts |
| **S2** | Run button |
| **S3** | Emergency stop button with 2 contacts, mounted on enclosure door |

*(1) Power supply: 24 V ⎓, 230 V ∿.*
*(2) Requests controlled stopping of the movement and activates the "Power Removal" safety function.*
*(3) S2: resets the XPS ATE module on power-up or after an Emergency stop. ESC can be used to set external starting conditions.*
*(4) For stopping times requiring more than 30 seconds in category 1, use a Preventa XPS AV safety module which can provide a maximum time delay of 300 seconds.*
*(5) The logic output can be used to indicate that the machine is in a safe state.*
*(6) Fault relay contacts. For remote signalling of drive status.*
*(7) Connection of the common for the logic inputs depends on the positioning of the SW1 switch: see schemes on page 227.*
*(8) Standardized coaxial cable, type RG174/U according to MIL-C17 or KX3B according to NF C 93-550, external diameter 2.54 mm, maximum length 15 m. The cable shielding must be earthed.*
*(9) Logic inputs LI1 and LI2 must be assigned to the direction of rotation: LI1 to forward direction and LI2 to reverse direction.*

# Variable speed drives
Altivar 71
IP 54 floor-standing enclosure with separate air flows

## Options common to all drives (continued)

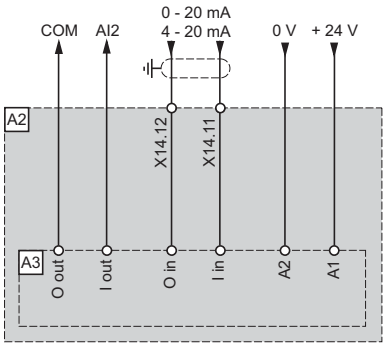
### Enclosure lighting - VW3 AE 1601




| Reference | Description |
|---|---|
| A2 | IP 54 floor-standing enclosure with separate air flows ATV 71EXS5, see page 86 |
| A3 | Enclosure lighting |
| K1 | Door contact |
| Q1 | 6 A circuit-breaker |

*(1) European standard power socket available.*

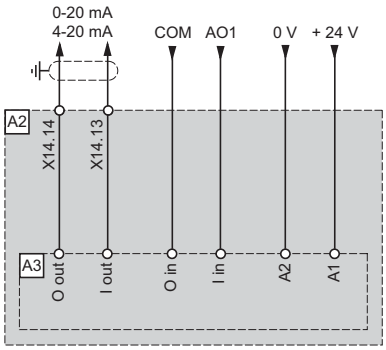
### Additional electrical input isolation - VW3 AE 1901




| Reference | Description |
|---|---|
| A2 | IP 54 floor-standing enclosure with separate air flows ATV 71EXS5, see page 86 |
| A3 | Additional electrical input isolation |

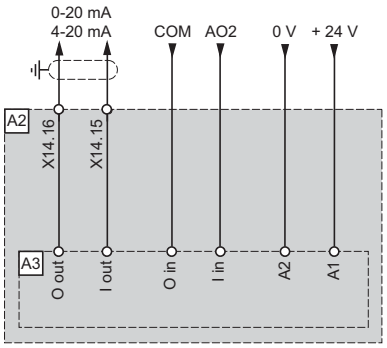
### Additional electrical output isolation - VW3 AE 1902

#### AO1 analog output option



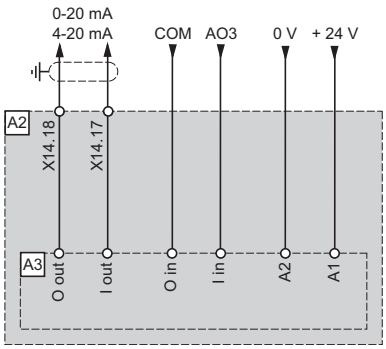

| Reference | Description |
|---|---|
| A2 | IP 54 floor-standing enclosure with separate air flows ATV 71EXS5, see page 86 |
| A3 | Additional electrical output isolation |

#### AO2 analog output option




| Reference | Description |
|---|---|
| A2 | IP 54 floor-standing enclosure with separate air flows ATV 71EXS5, see page 86 |
| A3 | Additional electrical output isolation |

#### AO3 analog output option

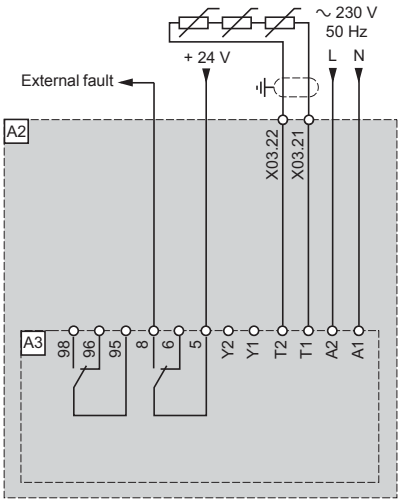



| Reference | Description |
|---|---|
| A2 | IP 54 floor-standing enclosure with separate air flows ATV 71EXS5, see page 86 |
| A3 | Additional electrical output isolation |

# Variable speed drives
Altivar 71
IP 54 floor-standing enclosure with separate air flows

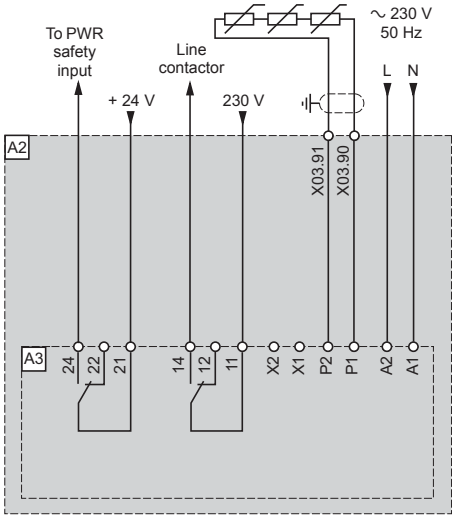
## Options common to all drives (continued)

### PTC relay - VW3 AE 2001




| Reference | Description |
|---|---|
| **A2** | IP 54 floor-standing enclosure with separate air flows ATV 71EXS5, see page 86 |
| **A3** | PTC relay |

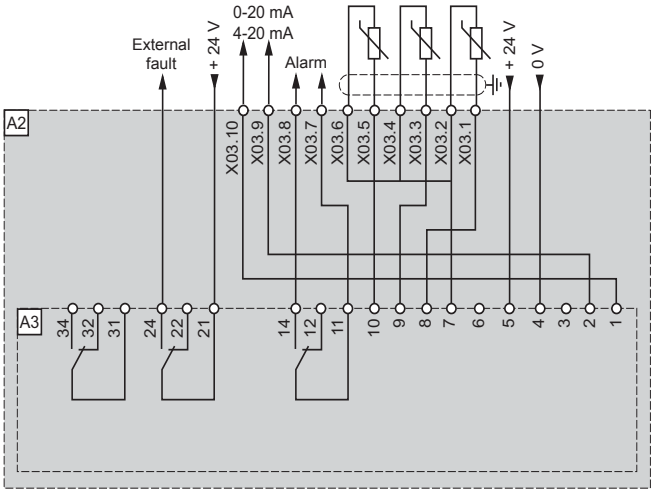
### PTC relay with PTB (ATEX) certification *(1)* - VW3 AE 2002




| Reference | Description |
|---|---|
| **A2** | IP 54 floor-standing enclosure with separate air flows ATV 71EXS5, see page 86 |
| **A3** | PTC relay with PTB (ATEX) certification |

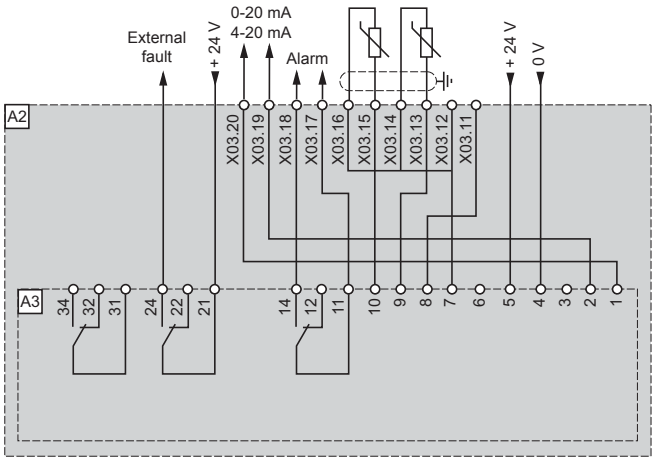
*(1) ATEX: see pages 220 and 221.*

### Relay for PT100 for motor winding - VW3 AE 2003




| Reference | Description |
|---|---|
| **A2** | IP 54 floor-standing enclosure with separate air flows ATV 71EXS5, see page 86 |
| **A3** | PT100 relay for motor winding |

### PT100 relay for motor bearings - VW3 AE 2004

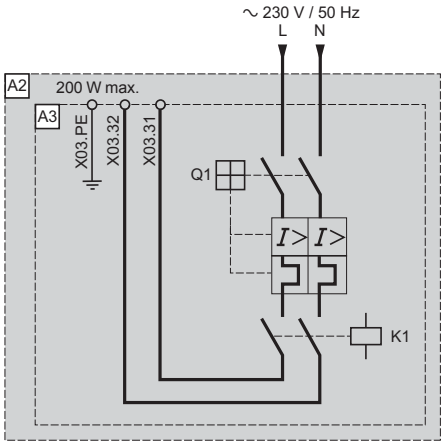



| Reference | Description |
|---|---|
| **A2** | IP 54 floor-standing enclosure with separate air flows ATV 71EXS5, see page 86 |
| **A3** | PT100 relay for motor bearings |

# Variable speed drives
Altivar 71
IP 54 floor-standing enclosure with separate air flows

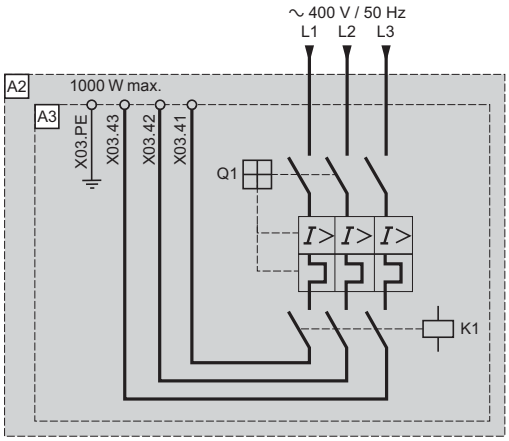
## Options common to all drives (continued)

### Motor heater - VW3 AE 2101




| Reference | Description |
|---|---|
| **A2** | IP 54 floor-standing enclosure with separate air flows ATV 71EXS5, see page 86 |
| **A3** | Motor heater |
| **K1** | Controlled by the drive or the line contactor. This control is activated if the drive is at "Stop" state |
| **Q1** | Circuit-breaker |

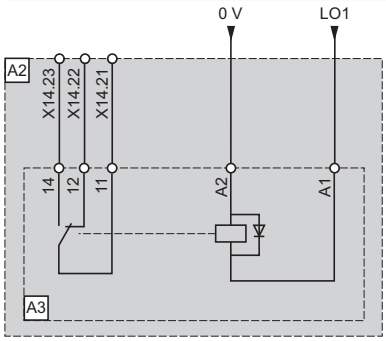
### Power supply circuit with protection for external fan - VW3 AE 2102




| Reference | Description |
|---|---|
| **A2** | IP 54 floor-standing enclosure with separate air flows ATV 71EXS5, see page 86 |
| **A3** | Power supply circuit with protection |
| **K1** | Controlled by the drive or the line contactor. This control is activated if the drive is at "RUN" state |
| **Q1** | Circuit-breaker |

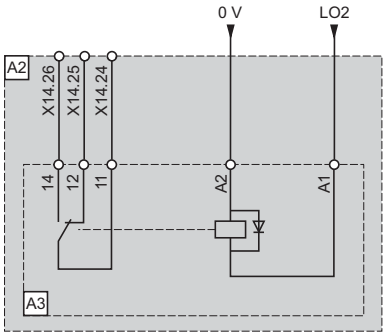
## Relay for logic output - VW3 AE 2201

### Logic output LO1



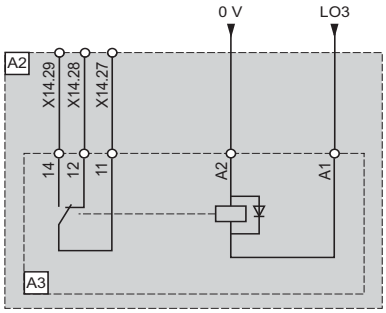

| Reference | Description |
|---|---|
| **A2** | IP 54 floor-standing enclosure with separate air flows ATV 71EXS5, see page 86 |
| **A3** | Relay for logic output |

### Logic output LO2



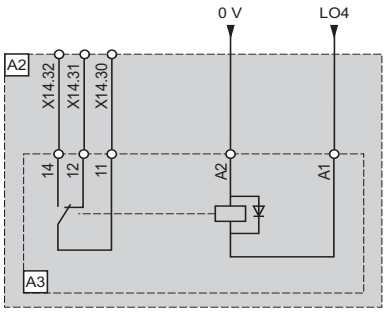

| Reference | Description |
|---|---|
| **A2** | IP 54 floor-standing enclosure with separate air flows ATV 71EXS5, see page 86 |
| **A3** | Relay for logic output |

### Logic output LO3




| Reference | Description |
|---|---|
| **A2** | IP 54 floor-standing enclosure with separate air flows ATV 71EXS5, see page 86 |
| **A3** | Relay for logic output |

### Logic output LO4

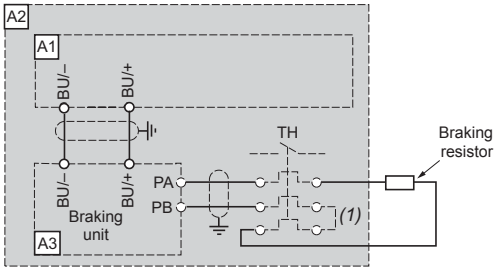



| Reference | Description |
|---|---|
| **A2** | IP 54 floor-standing enclosure with separate air flows ATV 71EXS5, see page 86 |
| **A3** | Relay for logic output |

## Options dependent on drive rating

### Braking units - VW3 A7E 101…104

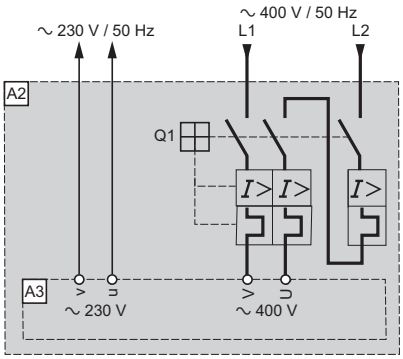
**ATV 71EXS5C20N4…C50N4, ATV 71EXS5C16N…C50N and ATV 71EXS5C20Y…C63Y**




| Reference | Description |
|---|---|
| **A1** | ATV 71 drive, see pages 23 and 25 |
| **A2** | IP 54 floor-standing enclosure with separate air flows ATV 71EXS5, see page 86 |
| **A3** | Braking unit, see pages 89 and 93 |
| **Braking resistor** | See pages 136 and 137 |

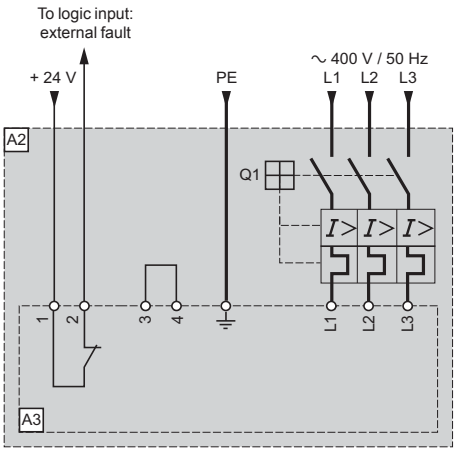
*(1) A thermal overload relay can be added. The contact on this relay must then be integrated in the control circuit.*

### Control transformer 500 VA or 800 VA ∼ - VW3 AE 0302, VW3 AE 0303




| Reference | Description |
|---|---|
| **A2** | IP 54 floor-standing enclosure with separate air flows ATV 71EXS5D90N4…C50N4, see page 86 |
| **A3** | Control transformer 500 VA ∼ or 800 VA ∼, see page 90 |
| **Q1** | Circuit-breaker |

### Air conditioning VW3 AE 09●●




| Reference | Description |
|---|---|
| **A2** | IP 54 floor-standing enclosure with separate air flows ATV 71EXS5D90N4…C50N4, see page 86 |
| **A3** | Air conditioning, see page 92 |
| **Q1** | Circuit-breaker |

# Variable speed drives
## Altivar 71
## Options: dialogue




## Remote graphic display terminal
**(this terminal can be supplied with the drive or ordered separately)**

This display terminal is attached to the front of the drive. It includes the integrated 7-segment display terminal for drives supplied without a graphic display terminal or for ATV 71HU22Y…HC63Y drives.
It can be:
- Used remotely in conjunction with the appropriate accessories (see below)
- Connected to several drives using multidrop link components (see page 109)

It is used:
- To control, adjust and configure the drive
- To display the current values (motor, input/output values, etc.)
- To save and download configurations; 4 configuration files can be saved

The terminal's maximum operating temperature is 60°C and it features IP 54 protection.

### Description

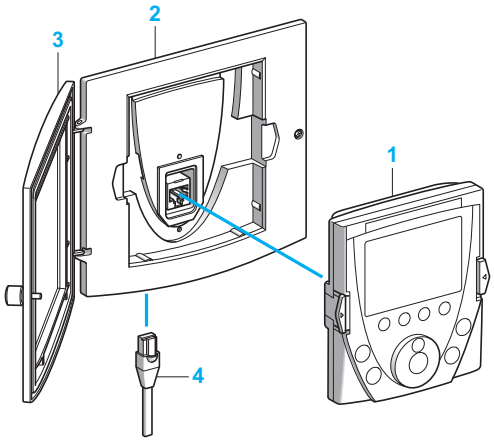
1 Graphic display:
- 8 lines, 240 x 160 pixels
- Large digits that can be read from 5 m away
- Supports display of bar charts

2 Assignable function keys F1, F2, F3, F4:
- Dialogue functions: direct access, help screens, navigation
- Application functions: "Local Remote", preset speed

3 "STOP/RESET" key: local control of motor stop/fault reset
4 "RUN" key: local control of motor operation
5 Navigation button:
- Press: saves the current value (ENT)
- Turn ±: increases or decreases the value, or goes to the next or previous line.

6 "FWD/REV" key: reverses the direction of rotation of the motor
7 "ESC" key: aborts a value, a parameter or a menu to return to the previous selection

***Note:*** *Keys 3, 4 and 6 can be used to control the drive directly.*

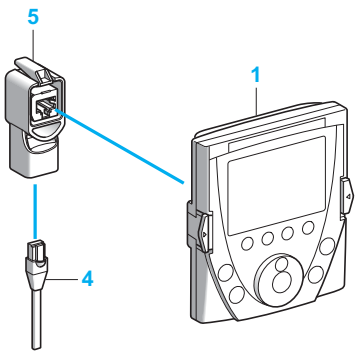



### Reference

| Description | No. | Reference | Weight kg |
|---|---|---|---|
| **Remote graphic display terminal** | 1 | **VW3 A1 101** | 0.145 |

## Remote graphic display terminal accessories

The following accessories are available:
- A remote mounting kit for mounting on an enclosure door with IP 54 degree of protection. It includes:
  - ☐ All the mechanical fittings
  - ☐ Fixing accessories
- A transparent door which attaches to the remote mounting mechanism to achieve IP 65 degree of protection
- A cable equipped with two RJ45 connectors so that the graphic display terminal can be connected to the Altivar 71 drive (1, 3, 5 or 10 m cable lengths available)
- An RJ45 female/female adapter for connecting the graphic display terminal VW3 A1 101 to the remote cable VW3 A1 104 R●●●



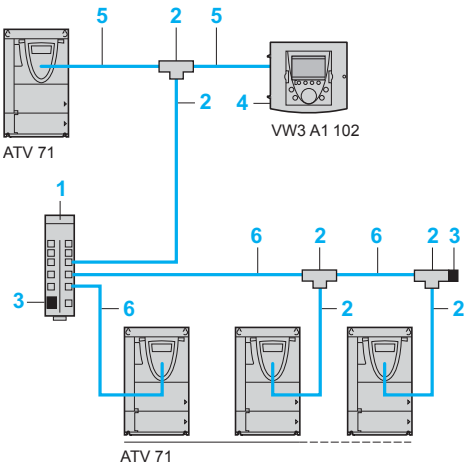

### References

| Description | No. | Length m | Degree of protection | Reference | Weight kg |
|---|---|---|---|---|---|
| **Remote mounting kit** *(1)* | 2 | – | IP 54 | **VW3 A1 102** | 0.150 |
| **Door** *(2)* | 3 | – | IP 65 | **VW3 A1 103** | 0.040 |
| **Remote cables** equipped with 2 RJ45 connectors | 4 | 1 | – | **VW3 A1 104 R10** | 0.050 |
| | 4 | 3 | – | **VW3 A1 104 R30** | 0.150 |
| | 4 | 5 | – | **VW3 A1 104 R50** | 0.250 |
| | 4 | 10 | – | **VW3 A1 104 R100** | 0.500 |
| **RJ45 female/ female adapter** | 5 | – | – | **VW3 A1 105** | 0.010 |

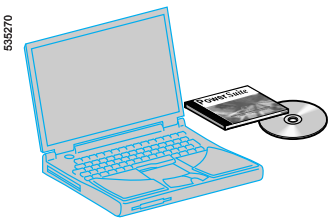
*(1) In this case, use a remote connecting cable VW3 A1 104 R●●●, which must be ordered separately (see above).*
*(2) To be mounted on remote mounting kit VW3 A1 102 (for mounting on an enclosure door), which must be ordered separately (see above).*

Dimensions: page 204

# Variable speed drives
## Altivar 71
## Options: dialogue




*Example of connection via multidrop link*




*PowerSuite software workshop*

## Multidrop link components

These components enable a graphic display terminal to be connected to several drives via a multidrop link. This multidrop link is connected to the Modbus terminal port on the front of the drive.

### Connection accessories

| Description | | | No. | Sold in lots of | Unit reference | Weight kg |
|---|---|---|---|---|---|---|
| **Modbus splitter block** 10 RJ45 connectors and 1 screw terminal | | | 1 | – | **LU9 GC3** | 0.500 |
| **Modbus T-junction boxes** | With integrated cable (0.3 m) | | 2 | – | **VW3 A8 306 TF03** | – |
| | With integrated cable (1 m) | | 2 | – | **VW3 A8 306 TF10** | – |
| **Modbus line terminator** | For RJ45 connector | R = 120 W, C = 1 nF | 3 | 2 | **VW3 A8 306 RC** | – |
| **Remote mounting kit** | For graphic display terminal VW3 A1 101 | | 4 | – | **VW3 A1 102** | 0.150 |

### Connecting cables
(equipped with 2 RJ45 connectors)

| Used for | No. | Length m | Reference | Weight kg |
|---|---|---|---|---|
| **Remote operation of the Altivar 71 drive and the graphic display terminal VW3 A1 101** | 5 | 1 | **VW3 A1 104 R10** | 0.050 |
| | | 3 | **VW3 A1 104 R30** | 0.150 |
| | | 5 | **VW3 A1 104 R50** | 0.250 |
| | | 10 | **VW3 A1 104 R100** | 0.500 |
| **Modbus bus** | 6 | 0.3 | **VW3 A8 306 R03** | 0.025 |
| | | 1 | **VW3 A8 306 R10** | 0.060 |
| | | 3 | **VW3 A8 306 R30** | 0.130 |

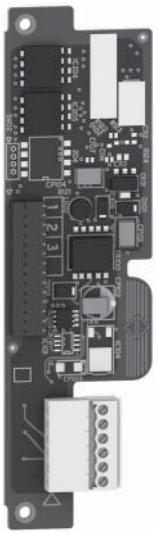
## PowerSuite software workshop

The PowerSuite software workshop offers the following benefits:
- Messages can be displayed in plain text in several languages (English, French, German, Italian and Spanish)
- Work can be prepared in the design office without having to connect the drive to the PC
- Configurations and settings can be saved to floppy disk or hard disk and downloaded to the drive
- Print facility
- Altivar 58 or Altivar 58F files can be converted for transfer to an Altivar 71 drive
- Oscillograms can be displayed

See pages 302 to 305.

Dimensions:
page 204

# Variable speed drives
## Altivar 71
## Option: Encoder interface cards



*VW3 A3 401*

## Presentation

Encoder interface cards are used for Flux Vector Control operation with sensor (FVC mode) for asynchronous motors, or, for synchronous motors, Vector Control operation with speed feedback (FSY mode).
It therefore improves drive performance irrespective of the motor load state:
- Zero speed torque
- Accurate speed regulation
- Torque accuracy
- Shorter response times on a torque surge
- Improved dynamic performance in transient state

For asynchronous motors, in the other control modes (voltage vector control, voltage/frequency ratio), encoder interface cards improve static speed accuracy.

Depending on the model, encoder interface cards can also be used for machine safety, irrespective of the control type:
- Overspeed detection
- Load slipping detection

They can also transmit to the Altivar 71 a reference provided by the encoder input. This use is specific to synchronizing the speed of several drives.

These two functions are available for encoder interface cards VW3 A3 401 to VW3 A3 407 and VW3 A3 411.

The Altivar 71 drive cannot support more than one encoder interface card. It is inserted into a dedicated slot.

Six types of card are available depending on the encoder technology (incremental or absolute):
- RS 422 compatible differential outputs
- Open collector outputs (NPN)
- Push-pull outputs
- Resolver
- SinCos, SinCos Hiperface®, EnDat® or SSI
- RS 422 compatible differential outputs with encoder emulation (RS 422 ESIM)

These last three cards are available only with the following variable speed drives:
- ATV 71H●●●M3383
- ATV 71H●●●M3X383
- ATV 71H●●●N4383

The RS 422 ESIM (Encoder SIMulation) encoder interface card is used to indicate the position and speed of the motor to a motion controller via the ESIM output of the RS 422 interface.
It is also used to establish a master/slave relationship between two Altivar 71 drives.

Schemes:
page 230

# Variable speed drives
Altivar 71
Option: Encoder interface cards

## Characteristics

### Encoder interface cards with RS422 compatible differential outputs

| Type of card | | VW3 A3 401 | | VW3 A3 402 *(1)* | |
|---|---|---|---|---|---|
| **Power Supply** (supplied by the card) | Voltage | 5 V ⎓ (min. 5 V, max. 5.5 V) | | 15 V ⎓ (min. 15 V, max. 16 V) | |
| | Maximum current | 200 mA | | 175 mA | |
| | | Short-circuit and overload protection | | | |
| **Maximum cable length** | | 50 m | | 100 m | |
| **Maximum operating frequency** | | 300 kHz | | | |
| **Input signals** | | A, $\overline{A}$, B, $\overline{B}$ | | | |
| | Impedance | 440 Ω | | | |
| **Number of pulses/encoder revolution** | ATV 71H●●●M3, M3X, N4 | 5000 maximum | | | |
| | ATV 71H●●●●●●383 | 10,000 maximum | | | |
| | | The maximum high-speed frequency should not exceed 300 kHz. | | | |
| **Encoder consumption** | | **100 mA at 4.5 V** | **200 mA at 4.5 V** | **100 mA at 8 V** | **175 mA at 8 V** |
| **Minimum cross-section recommended for the conductors** *(2)* | For a maximum cable length of 25 m | 0.2 mm² (AWG 24) | 0.5 mm² (AWG 20) | 0.2 mm² (AWG 24) | |
| | For a maximum cable length of 50 m | 0.5 mm² (AWG 20) | 0.75 mm² (AWG 18) | 0.2 mm² (AWG 24) | |
| | For a maximum cable length of 100 m | – | – | 0.2 mm² (AWG 24) | |
| **Type of encoder** | | **XCC 1●●●●●●●X, R, RN** *(3)* | | **XCC 1●●●●●●●X** *(3)* | |

### Encoder interface card with open collector outputs

| Type of card | | VW3 A3 403 | | VW3 A3 404 | |
|---|---|---|---|---|---|
| **Power Supply** (supplied by the card) | Voltage | 12 V ⎓ (min. 12 V, max. 13 V) | | 15 V ⎓ (min. 15 V, max. 16 V) | |
| | Maximum current | 175 mA | | | |
| | | Short-circuit and overload protection | | | |
| **Maximum cable length** | | 500 m | | | |
| **Maximum operating frequency** | | 300 kHz | | | |
| **Input signals** | | A, $\overline{A}$, B, $\overline{B}$/AB/A | | | |
| | Impedance | 1 kΩ | | | |
| **Number of pulses/encoder revolution** | ATV 71H●●●M3, M3X, N4 | 5000 maximum | | | |
| | ATV 71H●●●●●●383 | 10,000 maximum | | | |
| | | The maximum high-speed frequency should not exceed 300 kHz. | | | |
| **Encoder consumption** | | **100 mA at 10 V** | **175 mA at 10 V** | **100 mA at 10 V** | **175 mA at 10 V** |
| **Minimum cross-section recommended for the conductors** *(2)* | For a maximum cable length of 100 m | 0.2 mm² (AWG 24) | 0.5 mm² (AWG 20) | 0.2 mm² (AWG 24) | |
| | For a maximum cable length of 200 m | 0.5 mm² (AWG 20) | 0.75 mm² (AWG 18) | 0.2 mm² (AWG 24) | |
| | For a maximum cable length of 500 m | 1 mm² (AWG 17) | 1.5 mm² (AWG 15) | 0.5 mm² (AWG 20) | |

### Encoder interface card with push-pull outputs

| Type of card | | VW3 A3 405 | VW3 A3 406 | VW3 A3 407 |
|---|---|---|---|---|
| **Power Supply** (supplied by the card) | Voltage | 12 V ⎓ (min. 12 V, max. 13 V) | 15 V ⎓ (min. 15 V, max. 16 V) | 24 V ⎓ (min. 20 V, max. 30 V) |
| | Maximum current | 175 mA | | |
| | | Short-circuit and overload protection | | |
| **Maximum cable length** | | 500 m | | |
| **Maximum operating frequency** | | 300 kHz | | |
| **Input signals** | | A, $\overline{A}$, B, $\overline{B}$/AB/A | | |
| | Impedance | 1 kΩ | | 1.6 kΩ |
| | State 0 | If < 1.5 V | | |
| | State 1 | If > 7.7 V and < 13 V | If > 7.7 V and < 16 V | If > 11.5 V and < 25 V |
| **Number of pulses/encoder revolution** | ATV 71H●●●M3, M3X, N4 | 5000 maximum | | |
| | ATV 71H●●●●●●383 | 10,000 maximum | | |
| | | The maximum high-speed frequency should not exceed 300 kHz. | | |

| Encoder consumption | | 100 mA at 10 V | 175 mA at 10 V | 100 mA at 10 V | 175 mA at 10 V | 100 mA at 14 V |
|---|---|---|---|---|---|---|
| **Minimum cross-section recommended for the conductors** *(2)* | For a maximum cable length of 100 m | 0.2 mm² (AWG 24) | 0.5 mm² (AWG 20) | 0.2 mm² (AWG 24) | | |
| | For a maximum cable length of 200 m | 0.5 mm² (AWG 20) | 0.75 mm² (AWG 18) | 0.2 mm² (AWG 24) | | |
| | For a maximum cable length of 500 m | 1 mm² (AWG 17) | 1.5 mm² (AWG 15) | 0.5 mm² (AWG 20) | | 0.2 mm² (AWG 24) |
| **Type of encoder** | | **XCC 1●●●●●●●Y, K, KN** *(3)* | | | | |

*(1) The VW3 A3 402 card ensures compatibility between Altivar 68F drive applications and Altivar 71 drive applications.*
*(2) Shielded cable containing 3 twisted pairs with a pitch of between 20 and 50 mm. Connect the shielding to earth at both ends.Minimum cross-section recommended for the conductors for a minimum encoder voltage in order to limit line voltage drops.*
*(3) To obtain the complete reference of the encoder, consult our "Global Detection" catalogue or our website "www.telemecanique.com".*

Schemes:
page 230

## Characteristics (continued)

**Resolver encoder interface card** (for drives ATV 71H●●●M3383, ATV 71H●●●M3X383 and ATV 71H●●●N4383)

| | | | |
|---|---|---|---|
| **Type of card** | | **VW3 A3 408** | |
| **Excitation voltage** | | 1.25…5.6 V rms with current of 50 mA max. | |
| **Secondary voltage** | | Set at 1 V rms for an excitation voltage of 1.25…5.6 V rms | |
| **Excitation frequency** | | 4, 8 or 12 kHz, adjustable according to the encoder. By default, 8 kHz | |
| **Speed feedback resolution** | | 12 bits, $2^{12}$ maximum (4092), for 360 electrical degrees | |
| **Accuracy** | | ± 1 bit | |
| **Number of encoder poles** | | 2, 4, 6 or 8. The number of motor poles must be an integer multiple of the number of encoder poles | |
| **Transformation ratio** (Turn ratio) | | 4:1, 3:1, 2:1 and 1:1; detection of the ratio is automatic | |
| **Number of pulses/encoder revolution** | | 4096 maximum | |
| **Maximum cable length** | | 200 m | |
| **Maximum motor speed according to the number of resolver encoder poles for a resolution of 12 bits** | | | |
| **Number of encoder poles** | | Maximum motor speed | Number of pulses/rev. |
| 2 | | 7500 rpm | 4096 |
| 4 | | 3750 rpm | 4096 |
| 6 | | 2500 rpm | 4096 |
| 8 | | 1875 rpm | 4096 |
| **Maximum speed of the motor combined with a 2-pole resolver encoder for a resolution of 12 bits** | | | |
| **Number of motor poles** | | Maximum motor speed | Number of pulses/rev. |
| 2 | | 7500 rpm | 4096 |
| 4 | | 3750 rpm | 2048 |
| 6 | | 2500 rpm | 1024 |
| 8 | | 1875 rpm | 512 |
| **Encoder consumption** | | **30 mA** | **50 mA** |
| **Minimum cross-section recommended for the conductors** *(1)* | For a maximum cable length of 25 m | 0.2 mm² (AWG 24) | |
| | For a maximum cable length of 50 m | 0.2 mm² (AWG 24) | 0.5 mm² (AWG 20) |
| | For a maximum cable length of 100 m | 0.5 mm² (AWG 20) | |
| | For a maximum cable length of 200 m | 0.75 mm² (AWG 18) | 1 mm² (AWG 16) |

**Universal encoder interface card with SinCos, SinCos Hiperface®, EnDat® or SSI output** (for drives ATV 71H●●●M3383, ATV 71H●●●M3X383 and ATV 71H●●●N4383)

| | | | | |
|---|---|---|---|---|
| **Type of card** | | **VW3 A3 409** | | |
| **Power Supply** (supplied by the card) | Voltage | 5 V (min. 5 V, max. 5.5 V) | 8 V (min. 8 V, max. 8.5 V) | 12 V (min. 12 V, max. 12.5 V) |
| | Maximum current | 200 mA | | |
| | | Short-circuit and overload protection | | |
| **Maximum cable length** | | 50 m | | |
| **Speed feedback resolution** | | $2^{13}$ maximum (8192) | | |
| **Clock frequency** | | 500 kHz fixed | | |
| **SinCos output** | Number of SinCos lines | 10,000 maximum | | |
| **SinCos Hiperface® output** | Number of SinCos lines | 10,000 maximum | | |
| **EnDat® output** | Type | EnDat 2.1 | | |
| | Frame size | 25 bits maximum | | |
| | Number of bits per encoder revolution | Autoconfigured | | |
| | Number of bits for the encoder revolution number | Autoconfigured | | |
| **SSI output** | Coding keys | Gray or binary configurable | | |
| | Parity | Configurable with no parity, odd parity or even parity | | |
| | Frame size | Configurable from 10 to 27 bits | | |
| | Number of bits per encoder revolution | Configurable from 10 to 25 bits | | |
| | Number of bits for the encoder revolution number | Configurable from 0 to 15 bits | | |
| **Encoder consumption** | | **100 mA at 4.75 V, 7.75 V or 14.75 V** | | **200 mA at 4.75 V, 7.75 V or 14.75 V** |
| **Minimum cross-section recommended for the conductors** *(1)* | For a maximum cable length of 25 m | 0.5 mm² (AWG 20) | | 1 mm² (AWG 17) |
| | For a maximum cable length of 50 m | 0.75 mm² (AWG 18) | | 1.5 mm² (AWG 15) |

*(1) Shielded cable containing 3 twisted pairs with a pitch of between 20 and 50 mm. Connect the shielding to earth at both ends. Minimum cross-section recommended for the conductors for a minimum encoder voltage in order to limit line voltage drops.*

## Characteristics (continued)

**Encoder interface card with RS 422 compatible differential outputs with encoder emulation (RS 422 ESIM)** (for drives ATV 71H●●●M3383, ATV 71H●●●M3X383 and ATV 71H●●●N4383)

| | | | | |
|---|---|---|---|---|
| **Type of card** | | **VW3 A3 411** | | |
| **Power Supply** (supplied by the card) | Voltage | 5 V (min. 5 V, max. 5.5 V) | 15 V (min. 15 V, max. 16 V) | |
| | Maximum current | 200 mA | | |
| | | Short-circuit and overload protection | | |
| **Maximum cable length** | | 50 m | 100 m | |
| **Maximum operating frequency** | | 300 kHz | | |
| **Input signals** (RS 422) | | A, $\overline{A}$, B, $\overline{B}$, Z, $\overline{Z}$, adjustable by switch | | |
| | Impedance | 440 Ω | | |
| **Output signals** | | A $\overline{A}$ / A $\overline{A}$ B $\overline{B}$ / A $\overline{A}$ B $\overline{B}$ Z $\overline{Z}$ | | |
| | Ratio | 1, 1/2, 1/4, 1/8, 1/16, 1/32 or 1/64, adjustable by switch | | |
| **Number of pulses/encoder revolution** | | 10,000 maximum | | |
| **Consumption of the encoder with 5 V supply** | | **50 mA at 4.75 V** | **100 mA at 4.75 V** | **200 mA at 4.75 V** |
| **Minimum cross-section recommended for the conductors** *(1)* | For a maximum cable length of 25 m | 0.2 mm² (AWG 24) | 0.5 mm² (AWG 20) | 1 mm² (AWG 17) |
| | For a maximum cable length of 50 m | 0.5 mm² (AWG 20) | 0.75 mm² (AWG 18) | 1.5 mm² (AWG 15) |
| | For a maximum cable length of 100 m | 0.75 mm² (AWG 18) | 1.5 mm² (AWG 15) | – |
| | For a maximum cable length of 200 m | 1.5 mm² (AWG 15) | – | – |
| **Consumption of the encoder with 15 V supply** | | **50 mA at 14.75 V** | **100 mA at 14.75 V** | **200 mA at 14.75 V** |
| **Minimum cross-section recommended for the conductors** *(1)* | For a maximum cable length of 25 m | 0.2 mm² (AWG 24) | 0.2 mm² (AWG 24) | 0.5 mm² (AWG 20) |
| | For a maximum cable length of 50 m | 0.2 mm² (AWG 24) | 0.5 mm² (AWG 20) | 0.75 mm² (AWG 18) |
| | For a maximum cable length of 100 m | 0.5 mm² (AWG 20) | 0.75 mm² (AWG 18) | 1.5 mm² (AWG 15) |
| | For a maximum cable length of 200 m | 1 mm² (AWG 17) | 1.5 mm² (AWG 15) | – |
| | For a maximum cable length of 300 m | 1.5 mm² (AWG 15) | – | – |

## References *(2)*

| Description | Voltage V | Reference | Weight kg |
|---|---|---|---|
| **Encoder interface cards with RS 422 compatible differential outputs** | 5 | **VW3 A3 401** | 0.200 |
| | 15 | **VW3 A3 402** | 0.200 |
| **Encoder interface cards with open collector outputs** | 12 | **VW3 A3 403** | 0.200 |
| | 15 | **VW3 A3 404** | 0.200 |
| **Encoder interface cards with push-pull outputs** | 12 | **VW3 A3 405** | 0.200 |
| | 15 | **VW3 A3 406** | 0.200 |
| | 24 | **VW3 A3 407** | 0.200 |
| **Resolver encoder interface card** | 1.25…5.6 | **VW3 A3 408** | 0.200 |
| **Universal encoder interface card with SinCos, SinCos Hiperface®, EnDat® or SSI output** | 5, 8 or 12 | **VW3 A3 409** | 0.200 |
| **Encoder interface card with RS 422 compatible differential outputs with encoder emulation** (RS 422 ESIM) | 5 or 15 | **VW3 A3 411** | 0.200 |

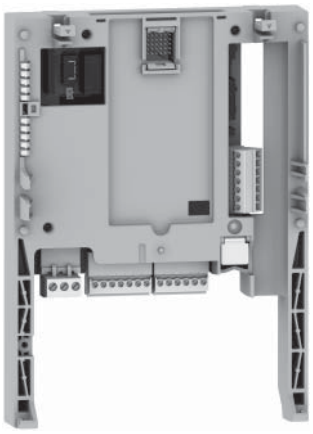
*(1) Shielded cable containing 3 twisted pairs with a pitch of between 20 and 50 mm. Connect the shielding to earth at both ends.Minimum cross-section recommended for the conductors for a minimum encoder voltage in order to limit line voltage drops.*
*2) The Altivar 71 drive cannot support more than one encoder interface card. Consult the summary tables of possible drive, option and accessory combinations, see pages 176 to 187.*

Schemes:
page 230

# Variable speed drives
## Altivar 71
## Option: I/O extension cards

## Presentation

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*VW3 A3 202*

Altivar 71 drives can be specifically adapted to particular application areas by installing I/O extension cards.

Two models are available:
- ■ Card with logic I/O featuring:
  - □ 1 relay logic output ("C/O" contact)
  - □ 4 x 24 V ⎓ positive or negative logic inputs
  - □ 2 x 24 V ⎓ open collector positive or negative logic outputs
  - □ 1 input for PTC probes
- ■ Card with extended I/O featuring:
  - □ 1 differential current analog input 0...20 mA
  - □ 1 software-configurable voltage (0...10 V ⎓) orcurrent (0...20 mA) analog input
  - □ 2 software-configurable voltage (± 10 V, 0...10 V ⎓) or current (0...20 mA) analog outputs
  - □ 1 relay logic output
  - □ 4 x 24 V ⎓ positive or negative logic inputs
  - □ 2 x 24 V ⎓ open collector positive or negative logic outputs
  - □ 1 input for PTC probes
  - □ 1 frequency control input

## Characteristics

### Logic I/O card VW3 A3 201

| | | |
|---|---|---|
| **Available internal supplies** | | Short-circuit and overload protection:<br>■ 1 x 24 V ⎓ supply (min. 21 V, max. 27 V), maximum current 200 mA for the complete drive and I/O extension card assembly<br>■ 1 x 10.5 V ⎓ (± 5%) supply for the reference potentiometer (1 to 10 kΩ), maximum current 10 mA |
| **Configurable relay output** | R3A, R3B, R3C | 1 relay logic output, one "N/C" contact and one "N/O" contact with common point<br>Minimum switching capacity: 3 mA for 24 V ⎓<br>Maximum switching capacity:<br>■ On resistive load (cos φ = 1): 5 A for 250 V ∿ or 30 V ⎓<br>■ On inductive load (cos φ = 0.4 and L/R = 7 ms): 2 A for 250 V ∿ or 30 V ⎓<br>Electrical service life: 100,000 operations<br>Maximum response time: 7 ms ± 0.5 ms |
| **Logic inputs** | LI7…LI10 | 4 programmable logic inputs, 24 V ⎓, compatible with level 1 PLC, IEC/EN 61131-2 standard<br>Impedance 3.5 kΩ<br>Maximum voltage: 30 V<br>Multiple assignment makes it possible to configure several functions on one input<br>Maximum sampling time: 2 ms ± 0.5 ms |
| | Positive logic (Source) | State 0 if ⩽ 5 V or logic input not wired, state 1 if ⩾ 11 V |
| | Negative logic (Sink) | State 0 if ⩾ 16 V or logic input not wired, state 1 if ⩽ 10 V |
| **Logic outputs** | LO1, LO2 | 2 x 24 V ⎓ logic outputs assignable as positive (Source) or negative (Sink) logic open collector type, compatible with level 1 PLC, standard IEC/EN 61131-2<br>24 V ⎓ internal or 24 V ⎓ external power supply (min. 12 V, max. 30 V)<br>Maximum current: 200 mA<br>Logic output common (CLO) isolated from other signals<br>Maximum sampling time: 2 ms ± 0.5 ms The active state is software-configurable as is a delay for each switching operation |
| **Input for PTC probes** | TH1+/TH1- | 1 input for a maximum of 6 PTC probes mounted in series:<br>■ Nominal value < 1.5 kΩ<br>■ Trip resistance 3 kΩ, reset value 1.8 kΩ<br>■ Short-circuit protection < 50 Ω<br>This PTC probe input must never be used for protection of an ATEX motor in applications in a potentially explosive atmosphere *(1)*. |
| **Maximum wire size and tightening torque for I/O** | | 1.5 mm² (AWG 16)<br>0.25 Nm |

*(1) Consult the ATEX manual, available on our website "www.telemecanique.com".*

Schemes :
page 229

## Characteristics (continued)

### Extended I/O card VW3 A3 202

| | | |
|---|---|---|
| **Available internal supplies** | | Short-circuit and overload protection:<br>■ 1 x 24 V ⎓ supply (min. 21 V, max. 27 V), maximum current 200 mA for the complete drive and I/O extension card assembly<br>■ 1 x 10.5 V ⎓ (± 5%) supply for the reference potentiometer (1 to 10 kΩ), maximum current 10 mA |
| **Analog inputs AI** | AI3+/AI3- | 1 X-Y mA differential current analog input by programming X and Y from 0 to 20 mA, with impedance 250 Ω<br>Maximum sampling time: 5 ms ± 1 ms<br>Resolution: 11 bits + 1 sign bit<br>Accuracy: ± 0.6 % for a temperature variation of 60°C<br>Linearity: ± 0.15 % of the maximum value |
| | AI4 | 1 software-configurable voltage or current analog input:<br>■ Voltage analog input, 0...10 V ⎓, impedance 30 kΩ (max. safe voltage 24 V)<br>■ X-Y mA current analog input by programming X and Y from 0 to 20 mA, with impedance 250 Ω<br>Maximum sampling time: 5 ms ± 1 ms<br>Resolution: 11 bits<br>Accuracy: ± 0.6 % for a temperature variation of 60°C<br>Linearity: ± 0.15 % of the maximum value |
| **Analog outputs** | AO2, AO3 | 2 software-configurable voltage or current analog outputs:<br>■ Voltage analog output, ± 10 V, 0...10 V ⎓, minimum load impedance 470 Ω<br>■ X-Y mA current analog output by programming X and Y from 0 to 20 mA, maximum load impedance 500 Ω<br>Maximum sampling time: 5 ms ± 1 ms<br>Resolution: 10 bits<br>Accuracy: ± 1% for a temperature variation of 60°C<br>Linearity: ± 0.2% of the maximum value |
| **Configurable relay output** | R4A, R4B, R4C | 1 relay logic output, one "N/C" contact and one "N/O" contact with common point<br>Minimum switching capacity: 3 mA for 24 V ⎓<br>Maximum switching capacity:<br>■ On resistive load (cos φ = 1): 5 A for 250 V ∿ or 30 V ⎓<br>■ On inductive load (cos φ = 0.4 and L/R = 7 ms): 1.5 A for 250 V ∿ or 30 V ⎓<br>Electrical service life: 100,000 operations<br>Maximum response time: 10 ms ± 1 ms |
| **Logic inputs** | LI11…LI14 | 4 programmable logic inputs, 24 V ⎓, compatible with level 1 PLC, IEC/EN 61131-2 standard<br>Impedance 3.5 kΩ<br>Maximum voltage: 30 V<br>Multiple assignment makes it possible to configure several functions on one input<br>Maximum sampling time: 5 ms ± 1 ms |
| | Positive logic (Source) | State 0 if ⩽ 5 V or logic input not wired, state 1 if ⩾ 11 V |
| | Negative logic (Sink) | State 0 if ⩾ 16 V or logic input not wired, state 1 if ⩽ 10 V |
| **Logic outputs** | LO3, LO4 | 2 x 24 V ⎓ logic outputs assignable as positive (Source) or negative (Sink) logic open collector type, compatible with level 1 PLC, standard IEC/EN 61131-2<br>Maximum voltage: 30 V<br>Maximum current: 200 mA<br>Logic output common (CLO) isolated from other signals<br>Maximum sampling time: 5 ms ± 1 ms The active state is software-configurable as is a delay for each switching operation. |
| **Input for PTC probes** | TH2+/TH2- | 1 input for a maximum of 6 PTC probes mounted in series:<br>■ Nominal value < 1.5 kΩ<br>■ Trip resistance 3 kΩ, reset value 1.8 kΩ<br>■ Short-circuit protection < 50 Ω<br>This PTC probe input must never be used for protection of an ATEX motor in applications in a potentially explosive atmosphere *(1)*. |
| **Frequency control input** | RP | Frequency range: 0…30 kHz<br>Cyclic ratio: 50 % ± 10 %<br>Maximum sampling time: 5 ms ± 1 ms<br>Maximum input voltage 30 V, 15 mA<br>Add a resistor if the input voltage is greater than 5 V (510 Ω for 12 V, 910 Ω for 15 V, 1.3 kΩ for 24 V)<br>State 0 if < 1.2 V, state 1 if > 3.5 V |
| **Maximum wire size and tightening torque for I/O** | | 1.5 mm² (AWG 16)<br>0.25 Nm |

## References

### I/O extension cards *(2)*

| Description | Reference | Weight kg |
|---|---|---|
| **Logic I/O card** | **VW3 A3 201** | 0.300 |
| **Extended I/O card** | **VW3 A3 202** | 0.300 |

*(1) Consult the ATEX manual, available on our website "www.telemecanique.com".*
*(2) The Altivar 71 cannot support more than one I/O card with the same reference.*
*Consult the summary tables of possible drive, option and accessory combinations, see pages 176 to 187.*

Schemes :
page 229

# Variable speed drives
## Altivar 71
## Option: "Controller Inside" programmable card

## Presentation

The "Controller Inside" programmable card is used to adapt the variable speed drive to specific applications by integrating control system functions.

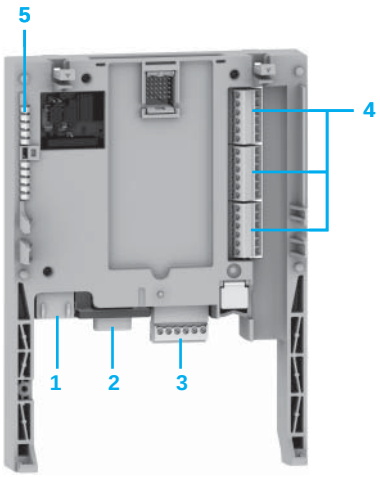
Various predefined, configurable applications are sold by Schneider Electric and its partners.
The PS 1131 software workshop for PC is used for programming and debugging new applications, quickly and in an open-ended manner (see page 119).
It is not possible to transfer the program from the card to the PC, as we need to protect our know-how.

A single "Controller Inside" programmable card can be fitted in the Altivar 71 drive. It can be combined with another option card (I/O extension or communication).
Consult the summary tables of possible drive, option and accessory combinations, see pages 176 to 187.

The "Controller Inside" programmable card has:
- 10 logic inputs, 2 of which can be used for 2 counters or 4 of which can be used for 2 incremental encoders
- 2 analog inputs
- 6 logic outputs
- 2 analog outputs
- A master port for the CANopen machine bus
- A PC port for programming with the PS 1131 software workshop

If the power consumption table does not exceed 200 mA, the "Controller Inside" programmable card can be powered by Altivar 71 drives. Otherwise, an external 24 V ⎓ power supply must be used.
The ATV 71W●●●N4A24 variable speed drives incorporate a 24 V ⎓ power supply, allowing additional consumption of 250 mA.

The "Controller Inside" programmable card can also use:
- The drive I/O
- The I/O extension card I/O
- The encoder interface card points counter
- The drive parameters (speed, current, torque, etc.)



532835

## Description

**1** RJ45 connector for connecting the PS 1131 software workshop via an RS 485 serial link.
Connection to the PC is via a cable and an RS 232/RS 485 converter included in the PowerSuite for PC connection kit, VW3 A8 106.

**2** 9-way male SUB-D connector for connection to the CANopen machine bus.

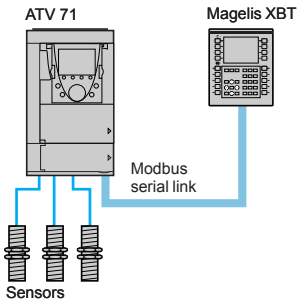
**3** Connector with removable screw terminals, 6 contacts at intervals of 3.81 for the 24 V ⎓ power supply and 4 logic inputs.

**4** 3 connectors with removable screw terminals, 6 contacts at intervals of 3.81 for 6 logic inputs, 6 logic outputs, 2 analog inputs, 2 analog outputs and 2 commons.

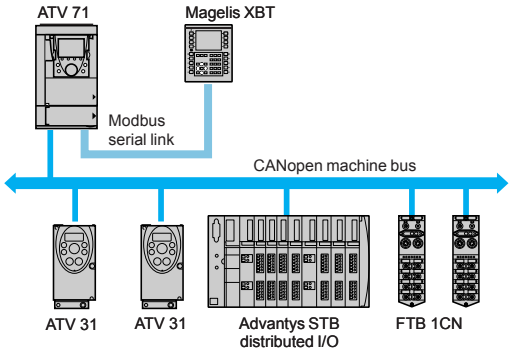
**5** 5 LEDs, comprising:
- 1 to indicate the presence of the 24 V ⎓ power supply
- 1 to indicate a program execution fault
- 2 to indicate the CANopen machine bus communication status
- 1 controlled by the application program

Characteristics: page 118 | Functions: pages 119 to 122 | Schemes: page 231 | References: page 123

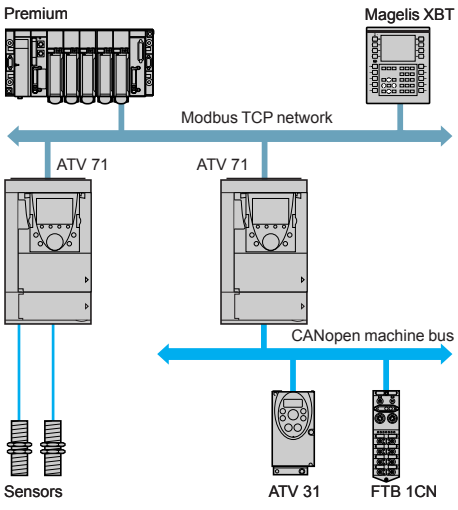
# Variable speed drives
## Altivar 71
## Option: "Controller Inside" programmable card




*Independent machine with multiwire system*




*Independent machine with CANopen machine bus*




*Modular machine with Modbus TCP network*

## Dialogue

Human-machine dialogue with the application programmed in the "Controller Inside" programmable card is possible using:
- The Altivar 71 graphic display terminal
- A Magelis industrial HMI terminal connected to the drive Modbus port
- A Magelis industrial HMI terminal connected to the Modbus TCP network (if the drive is equipped with a Modbus TCP communication card)

There is a dedicated graphic terminal menu for the "Controller Inside" programmable card. This menu can be customized by the card program according to the application.

Any industrial HMI terminal which supports the Modbus protocol can be used to display and modify the "Controller Inside" programmable card parameters. The Modbus server provides access to 2 Kwords (% MW, etc.) in the card.

## Master CANopen communication

The master CANopen port on the "Controller Inside" programmable card can be used to extend the I/O capacity and to control other CANopen slave devices.

## Communication with a PLC

The Altivar 71 drive, which is equipped with a "Controller Inside" programmable card, fits easily into complex architectures.
Regardless of which bus, network or serial link is being used (Modbus TCP, Modbus/Uni-Telway, Fipio, Modbus Plus, PROFIBUS DP, InterBus, etc.), the PLC can communicate with the "Controller Inside" programmable card and the drive. The periodic variables can still be configured as required.

## Clock

A clock backed up by a lithium battery makes it possible to keep a log of events that have occurred. When the "Controller Inside" programmable card is installed in the drive, drive faults are automatically time and date-stamped without the need for any special programming.

Characteristics: page 118
Functions: pages 119 to 122
Schemes: page 231
References: page 123

# Variable speed drives
Altivar 71
Option: "Controller Inside" programmable card

## Electrical characteristics

| | | | |
|---|---|---|---|
| **Power supply** | Voltage | **V** | ⎓ (min. 19, max. 30) |
| **Current consumption** | Maximum | **A** | 2 |
| | No-load | **mA** | 80 |
| | Per logic output | **mA** | 200 maximum *(1)* |
| **Analog inputs** | AI51, AI52 | | 2 current analog inputs 0...20 mA, impedance 250 Ω<br>Resolution: 10 bits<br>Accuracy: ± 1% for a temperature variation of 60°C<br>Linearity: ± 0.2% of the maximum value<br>Common point for all the card I/O *(2)* |
| **Analog outputs** | AO51, AO52 | | 2 current analog outputs 0...20 mA, impedance 500 Ω<br>Resolution: 10 bits<br>Accuracy: ± 1% for a temperature variation of 60°C<br>Linearity: ± 0.2% of the maximum value<br>Common point for all the card I/O *(2)* |
| **Logic inputs** | LI51…LI60 | | Ten 24 V ⎓ logic inputs, compatible with level 1 PLC, IEC/EN 61131-2 standard, 4 of which can be used for:<br>■ 1 counter and/or 1 incremental encoder<br>■ 2 counters<br>Impedance 4.4 kΩ<br>Maximum voltage: 30 V ⎓<br>Switching thresholds:<br>State 0 if ≤ 5 V or logic input not wired<br>State 1 if ≥ 11 V<br>Common point for all the card I/O *(2)* |
| **Logic outputs** | LO51…LO56 | | Six 24 V ⎓ logic outputs, positive logic open collector type (source), compatible with level 1 PLC, IEC/EN 61131-2 standard<br>Maximum switching voltage: 30 V<br>Maximum current: 200 mA<br>Common point for all the card I/O *(2)* |
| **Connection of I/O** | Type of contact | | Screw at intervals of 3.81 mm² |
| | Maximum wire size | **mm²** | 1.5 (AWG 16) |
| | Tightening torque | **Nm** | 0.25 |
| **Lithium battery** | Life | | 8 years approx. |

## Characteristics of the application program

| | | | |
|---|---|---|---|
| **Compiled program** (saved in "flash" memory) | Maximum size | **Kb** | 320 |
| **Data** | Maximum size | **Kwords** | 64 |
| | Saved size (NVRAM) | **Kwords** | 4 |
| | Size accessible by Modbus | **Kwords** | 2 |

## Characteristics of the CANopen communication port

| | | |
|---|---|---|
| **Structure** | Connector | One 9-way male SUB-D connector |
| | Network management | Master |
| | Transmission speed | Configurable via the program:<br>50 kbps, 125 kbps, 250 kbps, 500 kbps or 1 Mbps |
| | Address (Node ID) | 32 slaves maximum |
| **Services** | CANopen application layer | DS 301 V4.02 |
| | Profile | DSP 405 |
| | PDO | 10 receive and transmit PDOs in total for each slave |
| | SDO | 2 client SDOs per slave (1 read and 1 write). Block transfer. |
| | Error check | Node Guarding, producer and consumer Heartbeat |
| | Other services | Emergency, Boot-up, Sync |
| **Diagnostics** | Using LEDs | 2 LEDs: "RU" and "ERROR", conforming to CIA DR303 version 1.0 |

*(1) Otherwise, and external 24 V ⎓ power supply must be used.*
*(2) This common point is also the drive 0 V.*

Presentation: page 116 | Functions: pages 119 to 122 | Schemes: page 231 | References: page 123

# Variable speed drives
Altivar 71
Option: "Controller Inside" programmable card

## PS 1131 software workshop

The PS 1131 software workshop conforms to international standard IEC 61131-3 and includes all the functions for programming and setting up the "Controller Inside" programmable card.
It includes the configurator for CANopen.
It is designed for Microsoft Windows® 98, Microsoft Windows® NT 4.0, Microsoft Windows® Millennium, Microsoft Windows® 2000 Professional and Microsoft Windows® XP operating systems.

It benefits from the user-friendly interface associated with these operating systems:
- Pop-up menus
- Function blocks
- Online help

The PS 1131 software workshop is available in both English and German.

The programming and debugging tools can be accessed via the application browser. This provides the user with an overview of the program and quick access to all application components:
- Program editor
- Function blocks editor
- Variables editor
- Animation tables editor
- Runtime screens editor

## Modular structured programming

The PS 1131 software workshop is used to structure an application into function modules consisting of sections (program code), animation tables and runtime screens. Each program section has a name and is programmed in one of the six available languages. To protect know-how or prevent any accidental modification, each section can be write-protected or read/write-protected.

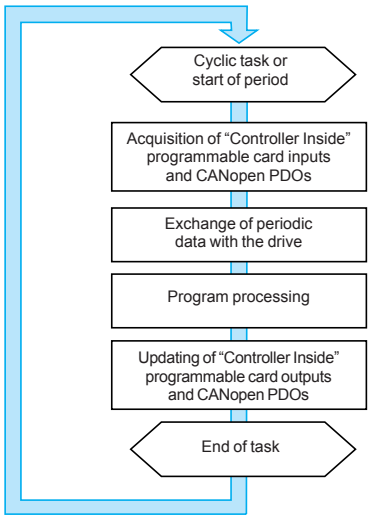
**Exporting/Importing function modules**
It is possible to export all or part of the tree structure in function modules.

### Program structure and execution of an application

The program structure is single-task. It consists of several subroutines.
Exchanges with the drive are performed by a function block available in the standard library.
Cycle execution can be either cyclic or periodic. A software watchdog, which can be configured between 100 and 500 ms by the user, monitors the cycle time.
A task can be synchronized with the drive main task to improve repeat accuracy in motion control applications.

**Cyclic execution**
Once each cycle ends, execution of a new cycle begins. Cycle execution must last for at least 5 ms.

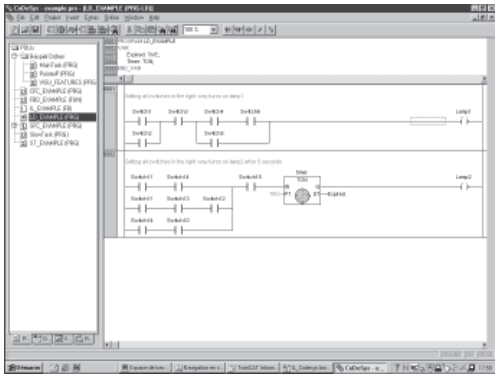
**Periodic execution**
The program is executed periodically, and the period can be set by the user between 5 and 100 ms. Cycle execution must last for less than the defined period. The drive response in the event of the cycle time being exceeded can be managed by the program.



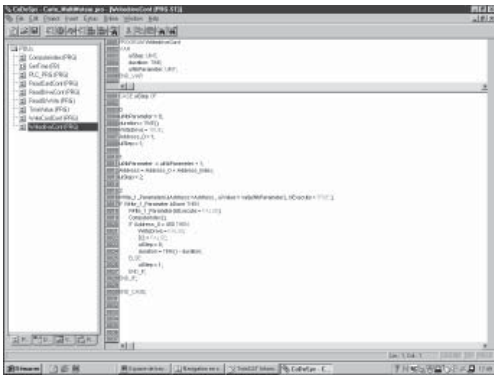

*Example of cycle execution for the "Controller Inside" programmable card connected on a CANopen machine bus*

Presentation: page 116
Characteristics: page 118
Schemes: page 231
References: page 123

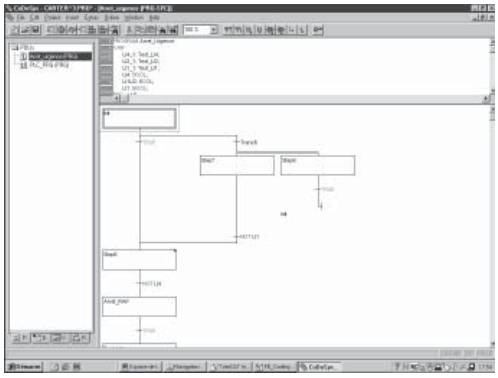
# Variable speed drives
## Altivar 71
## Option: "Controller Inside" programmable card



*Example of Ladder Diagram language programming*



*Example of Structured Text language programming*



*Example of Grafcet language programming*

## Programming languages

**6 programming languages are available:**

- Ladder Diagram (LD)
- Structured Text language (ST)
- Grafcet language (SFC)
- Instruction List language (IL)
- Function Block Diagram (FBD)
- Continuous Flow Chart (CFC)

### Ladder Diagram (LD)

A Ladder Diagram program consists of a set of rungs executed sequentially.
A rung consists of several lines.
A line consists of several contacts and a coil.
The language objects can be entered and displayed as symbols or tags as required.
The Ladder Diagram editor enables the immediate call of entry help functions such as access to function libraries and access to the variables editor

### Structured Text (ST)

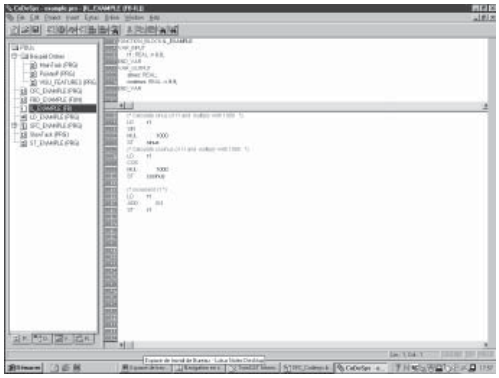
Structured Text language is a sophisticated algorithmic-type language which is particularly well suited to programming complex arithmetical functions, manipulating tables, message handling, etc.
Structured Text language enables direct transcription of an analysis based on a flow chart, and is organized in statements.

### Grafcet language (SFC)

Grafcet language is used to describe the sequential part of the control system in a simple, graphic way. It corresponds to the "Sequential Function Chart" (SFC) language described in standard IEC/EN 61131-3.
Programs written in Grafcet (SFC) language consist of:

- Macro-steps which are groups of steps and transitions
- Steps relating to the actions to be performed
- Transitions relating to the conditions (transition conditions)
- Directed links connecting the steps and transitions

Presentation: page 116 | Characteristics: page 118 | Schemes: page 231 | References: page 123



*Example of Instruction List language programming*




*Example of a function block:*
*Sending the speed reference to the drive.*

## Programming languages (continued)

### Instruction List language (IL)

Instruction List language can be used to write Boolean equations and use all the functions available in the language. It can be used to represent the equivalent of a ladder diagram in text form.
Each instruction consists of an instruction code and a bit or word type operand.
As in Ladder Diagram language, instructions are organized in sequences of instructions called statements (equivalent to a rung).

### Function Block Diagram (FBD)

FBD is a graphic language. It consists of function blocks connected by a rung. The program is executed sequentially.
Each block can be a logical or arithmetical expression, a call to another function block, a jump or a return instruction.

### Continuous Flow Chart (CFC)

Continuous Flow Chart programming is a graphic language. The rung connecting the various function blocks on the page is not necessarily sequential. The output of a function block may be looped back on its input or on the input of a block already inserted in the rung.

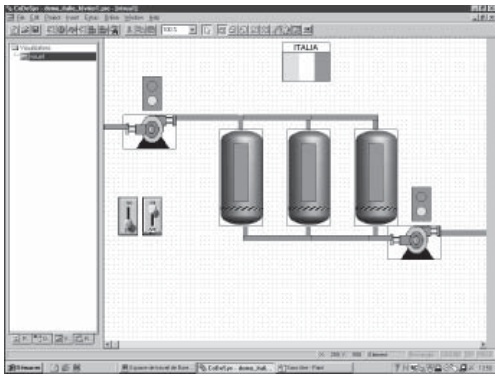
## Function blocks

The PS 1131 software workshop features pre-programmed function blocks (standard library) and offers users the option of creating their own function blocks (user library).

**Standard library**
The standard library contains:
- Logic functions (AND, OR, etc.)
- Mathematical functions (Cos, Sin, Exp, etc.)
- Function blocks dedicated to drives which facilitate data exchange between the drive and the "Controller Inside" programmable card (example: sending the speed reference)
- Function blocks for managing the CANopen machine bus
- Graphic terminal display function blocks

**User library**
Users have the option of creating their own function blocks to help them structure their applications. This also provides a means of protecting the know-how contained in the algorithms by locking access to the user function blocks program.

# Variable speed drives
## Altivar 71
## Option: "Controller Inside" programmable card




*Example of runtime screen*

## Debugging

The PS 1131 software workshop offers a complete set of tools for debugging the application.

### Program execution for debugging

The main debugging functions are:
- Use of breakpoints
- Step-by-step program execution
- Execution of a single cycle
- Direct access to the subroutines that have been called (call stack)

### Realtime program animation

The main realtime program animation functions are as follows:
- Animation of part of the program in any language
- Automatic display of a variables window relating to this part of the program

### Animation tables

Tables containing variables for the application to be monitored can be created and saved.
In both these tools, in addition to animating the data, it is possible to:
- Modify and force the value of any type of data
- Change the display format (binary, hexadecimal, etc.)

### Oscilloscope

The PS 1131 software workshop Oscilloscope function can be used to monitor up to 20 variables in the form of curves.

### Runtime screens

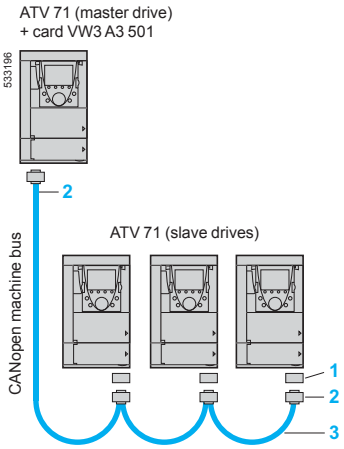
The PS 1131 software workshop has a built-in tool for designing and using application runtime screens. This includes:
- Creation of screen backgrounds
- Animation of graphic objects associated with variables
- Display of messages
- Etc.

### Simulation

The PS 1131 software workshop Simulation function can be used to test the program without having to set up the drive.

Presentation: page 116 | Characteristics: page 118 | Schemes: page 231 | References: page 123

# Variable speed drives
## Altivar 71
## Option: "Controller Inside" programmable card



*Master/slave application*


121625
*VW3 CAN A71*


522855
*TSX CAN KCDF 180 T*

## References

### Card

| Description | Reference | Weight kg |
|---|---|---|
| **"Controller Inside" programmable card** *(1)* equipped with one 9-way male SUB-D connector | **VW3 A3 501** | 0.320 |

### Connection accessories *(2)*

| Description | No. | Reference | Weight kg |
|---|---|---|---|
| **CANopen adapter** to be mounted on the RJ45 socket in the drive control terminals. The adapter features a 9-way male SUB-D connector conforming to the CANopen standard (CIA DRP 303-1). | 1 | **VW3 CAN A71** | – |
| **CANopen connector** 9-way female SUB-D with line terminator that can be disabled | 2 | **TSX CAN KCDF 180T** | – |

### Cables *(2)*

| Description | No. | Length m | Reference | Weight kg |
|---|---|---|---|---|
| **CANopen cables** Standard cable, CE marking. Low smoke emission, halogen-free. Flame retardant (IEC 60332-1). | 3 | 50 | **TSX CAN CA 50** | 4.930 |
| | | 100 | **TSX CAN CA 100** | 8.800 |
| | | 300 | **TSX CAN CA 300** | 24.560 |
| **CANopen cables** UL certification, CE marking. Flame retardant (IEC 60332-2). | 3 | 50 | **TSX CAN CB 50** | 3.580 |
| | | 100 | **TSX CAN CB 100** | 7.840 |
| | | 300 | **TSX CAN CB 300** | 21.870 |
| **CANopen cables** Cable for harsh environments *(3)* or mobile installation, CE marking. Low smoke emission, halogen-free. Flame retardant (IEC 60332-1). | 3 | 50 | **TSX CAN CD 50** | 3.510 |
| | | 100 | **TSX CAN CD 100** | 7.770 |
| | | 300 | **TSX CAN CD 300** | 21.700 |

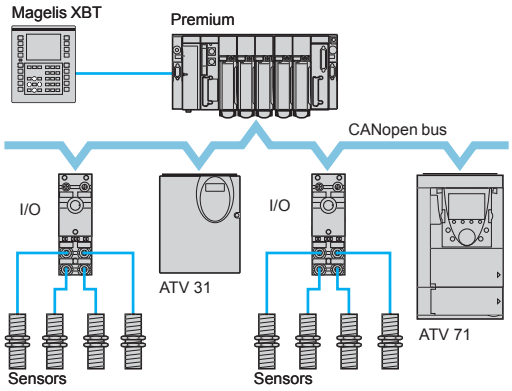
### PS 1131 software workshop

| Description | Reference | Weight kg |
|---|---|---|
| **PS 1131 software workshop** supplied on CD-ROM | *(4)* | – |
| **PC serial port connection kit** including various accessories such as:<br>■ 1 x 3 m cable with 2 RJ45 connectors<br>■ 1 RS 232/RS 485 converter with one 9-way female SUB-D connector and one RJ45 connector | **VW3 A8 106** | 0.350 |

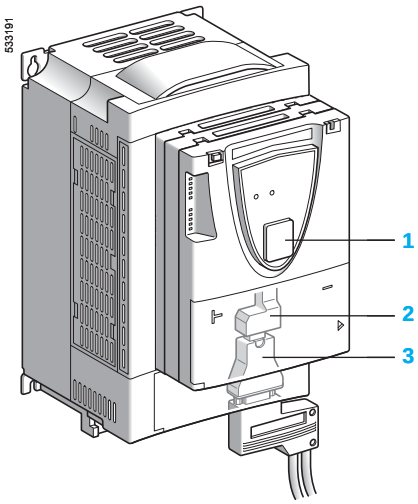
*(1) The Altivar 71 drive can only take one "Controller Inside" programmable card. Consult the summary tables of possible drive, option and accessory combinations, see pages 176 to 187. Please refer to the "Machines and installations with CANopen" catalogue.*
*(3) Harsh environments:*
*- resistance to hydrocarbons, industrial oils, detergents, solder splashes*
*- relative humidity up to 100%*
*- saline atmosphere*
*- significant temperature variations*
*- operating temperature between -10°C and +70°C*
*(4) The product reference is provided as part of the "Controller Inside" programmable card training course. Please consult your Regional Sales Office.*

Presentation: page 116 | Characteristics: page 118 | Functions: pages 119 to 122 | Schemes: page 231

# Variable speed drives
## Altivar 71
## Communication buses and networks




*Example of configuration on CANopen machine bus*




## Presentation

The Altivar 71 drive has been designed to meet all the configuration requirements encountered within the context of industrial communication installations.

It includes Modbus and CANopen communication protocols as standard.

The Modbus protocol can be accessed directly by means of 2 integrated communication ports (for characteristics, see page 17):
- One RJ45 Modbus terminal port **1**, located on the drive front panel. This is for connecting:
  - The remote graphic display terminal
  - A Magelis industrial HMI terminal
  - The PowerSuite software workshop
- One RJ45 Modbus network port **2**, located on the drive's control terminals. It is assigned to control and signalling by a PLC or by another type of controller. It can also be used to connect a terminal or the PowerSuite software workshop.

The CANopen protocol can be accessed from the Modbus network port via the CANopen adapter **3** (for characteristics, see page 17). In this case, terminal port **1** must be used to access the Modbus protocol.

The Altivar 71 drive can also be connected to other industrial communication buses and networks by adding one of the following communication cards:
- Modbus TCP
- Fipio
- Modbus/Uni-Telway. This card can offer functions in addition to those of the integrated ports: Modbus ASCII and 4-wire RS 485
- Modbus Plus
- EtherNet/IP
- DeviceNet
- PROFIBUS DP
- INTERBUS
- CC-Link

The possibility of powering the control section separately enables communication (monitoring, diagnostics) to be maintained even if the power section AC supply is absent.

The main communication functions of the Altivar 58 and Altivar 58F drives are compatible with the Altivar 71 drive *(1)*:
- Connection
- Communication services
- Drive behaviour (profile)
- Control and monitoring parameters
- Standard adjustment parameters

The PowerSuite software workshop can be used to port configurations from Altivar 58 and Altivar 58F drives to the Altivar 71.

*(1) Consult the ATV 58(F)/ATV 71 Substitution Guide supplied on the documentation CD-ROM.*

Functions: page 125
Characteristics: pages 126 to 131
References: pages 132 and 133

# Variable speed drives
Altivar 71
Communication buses and networks

## Functions

All the drive functions can be accessed via the network:
- Control
- Monitoring
- Adjustment
- Configuration

When the drive is equipped with the “Controller Inside” programmable card, its variables (% MW, etc) can be accessed by Modbus messaging via the integrated communication ports or via the Modbus TCP communication card.

The speed or torque command and reference may come from different control sources:
- I/O terminals
- Communication network
- “Controller Inside” programmable card
- Remote graphic display terminal

The advanced functions of the Altivar 71 drive can be used to manage switching of these drive control sources according to the application requirements.

It is possible to choose the assignment of the communication I/O data by means of:
- The network configuration software (Sycon, etc)
- The Altivar 71’s communication scanner function

For the Modbus and CANopen ports and for the communication cards, the Altivar 71 drive can be controlled:
- According to the CiA 402 profile
- According to the I/O profile where control is as simple and adaptable as control via the I/O terminals

The DeviceNet card also supports the ODVA AC Drive and Allen-Bradley drive profiles.

Communication is monitored according to criteria specific to each protocol. However, regardless of the protocol, it is possible to configure how the drive responds to a communication fault:
- Freewheel stop, stop on ramp, fast stop or braked stop
- Maintain last command received
- Fallback position at a predefined speed
- Ignore the fault

A command from the CANopen machine bus is processed with the same priority as one of the drive terminal inputs. This results in excellent response times on the network port via the CANopen adapter.

Presentation: page 124
Characteristics: pages 126 to 131
References: pages 132 and 133

## Characteristics of the Modbus TCP card VW3 A3 310 *(1)*

| | | |
|---|---|---|
| **Structure** | Connector | One RJ45 connector |
| | Transmission speed | 10/100 Mbps, half duplex and full duplex |
| | IP addressing | ■ Manual assignment via the display terminal or the PowerSuite software workshop<br>■ BOOTP (dynamic IP address server depending on the IEEE address)<br>■ DHCP (dynamic address server depending on the Device Name) with automatic reiteration |
| | Physical | Ethernet 2 |
| | Link | LLC: IEEE 802.2<br>MAC: IEEE 802.3 |
| | Network | IP (RFC791)<br>ICMP client for supporting certain IP services such as the "ping" command |
| | Transport | TCP (RFC793), UDP<br>The maximum number of connections is 8 (port 502) |
| **Services** | Transparent Ready class *(2)* | C20 |
| | Web server | Simultaneous access via three Web browsers (more, depending on the number of connections used)<br>Server is factory-configured and modifiable<br>The memory available for the application is approximately 1 MB<br><br>The factory-configured server contains the following pages:<br>■ Altivar viewer: displays the drive status and the state of its I/O, the main measurements (speed, current, etc)<br>■ Data editor: access to the drive parameters for configuration, adjustment and signalling<br>■ Altivar chart: simplified oscilloscope function<br>■ Security: configuration of passwords for viewing and modification access<br>■ FDR Agent: configuration of the “Faulty Device Replacement” parameters<br>■ IO Scanner: configuration of parameters for controlling and monitoring the drive via the PLC, etc.<br>■ Ethernet statistics: drive identification (IP addresses, version, etc.), Ethernet transmission statistics<br>■ E-mail: configuration of the e-mail function |
| | E-mail | E-mail sent on alarm or fault |
| | Messaging | Read Holding Registers (03), 63 words maximum<br>Read Input Registers (04), 63 words maximum<br>Write Single Register (06)<br>Write Multiple Registers (16), 63 words maximum<br>Read/Write Multiple Registers (23)<br>Read Device Identification (43)<br>Diagnostics (08) |
| | I/O data | I/O scanning service (can be inhibited):<br>■ 10 control parameters which can be assigned by the PowerSuite software workshop or the standard Web server<br>■ 10 monitoring parameters which can be assigned by the PowerSuite software workshop or the standard Web server<br>The Global Data service is not supported |
| | FDR (Faulty Device Replacement) | Yes |
| | Communication monitoring | Can be inhibited<br>“Time out” can be set between 0.5 and 60 s via the terminal, the PowerSuite software workshop or the standard Web server |
| | Device profiles | CiA 402 profile: “Device Profile Drives and Motion Control”<br>I/O profile |
| | Network management | SNMP |
| | File transfer | FTP for Web server and TFTP for FDR |
| **Diagnostics** | Using LEDs | 5 LEDs on the card: “RX” (reception), “TX” (transmission), “FLT” (Ethernet fault)<br>“STS” (IP address) and “10/100” Mbps (speed) |
| | Using the graphic display terminal | Control word received<br>Reference received |
| | Via the Web server | Via the “Altivar viewer”, “Data editor” and “Ethernet statistics” pages |

*(1) For Modbus TCP network, see pages 306 to 311.*
*(2) Consult our "Ethernet TCP/IP Transparent Ready" catalogue.*

Presentation: page 124
Functions: page 125
References: pages 132 and 133

## Characteristics of the EtherNet/IP card VW3 A3 316

| | | |
|---|---|---|
| **Structure** | Connector | 2 RJ45 connectors |
| | Transmission speed | 10/100 Mbps, half duplex and full duplex, by manual selection or auto-negotiation |
| | Addresses | Manual assignment via the graphic display terminal or the PowerSuite software workshop<br>BOOTP<br>DHCP |
| | Physical | IEEE 802.3 |
| | Conformity level | Industrial |
| | Link | LLC: IEEE 802.2<br>MAC: IEEE 802.3<br>Automatic switching |
| | Network | IP (RFC791)<br>ICMP client for supporting certain IP services such as the "ping" command |
| | Transport | TCP (RFC793), UDP<br>The maximum number of connections is 8 (port 502) |
| **Services** | CIP I/O data | Master/slave hierarchy<br>■ Speed CIP assemblies, type 20, 21, 70 and 71 (2 parameters)<br>■ Speed/torque CIP assemblies, type 22, 23, 72 and 73 (3 parameters)<br>■ Allen-Bradley assemblies, type 103 and 104 (10 parameters, 8 of which are assignable)<br>■ Communication scanner assemblies, type 100 and 101 (8 parameters) |
| | CIP explicit messaging | Permits access to all the drive's parameters |
| | Web server | HTTP server: simultaneous access via 8 web browsers possible (according to the number of connections used)<br>Server is factory-configured and modifiable<br>The memory available for the application is approximately 1 MB<br><br>The factory-configured server contains the following pages:<br>■ Drive monitor: displays the drive status and the state of its I/O, the main measurements (speed, current, etc)<br>■ Drive parameters: access to the drive parameters for configuration, adjustment and signalling<br>■ Drive recorder: simplified oscilloscope function<br>■ Security: configuration of passwords for reading and modification access<br>■ Ethernet/IP setup: configuration of Ethernet, TCP/IP and CIP parameters<br>■ Ethernet/IP scanner setup: configuration of I/O data (IO messaging)<br>■ Ethernet statistics: drive identification (IP addresses, version, etc), display of Ethernet transmission counters<br>■ Message statistics: display of TCP/IP, CIP and Modbus messaging counters<br>■ E-mail: configuration of the e-mail function |
| | E-mail | E-mail sent on alarm, fault or fault reset |
| | Device profiles | CIP AC Drive (02) profile<br>Allen-Bradley drive profile<br>CiA 402 profile: “Device Profile Drives and Motion Control”<br>I/O profile |
| | Network management | No |
| | File transfer | No |
| Diagnostics | Using LEDs | 5 LEDs on the card: “MS” (Module Status), “NS” (Network Status), “Link” (Link Status), “TX/RX” (Transmit/Receive port 1 and Transmit/Receive port 2) |
| | Using the graphic display terminal | Control word received<br>Reference received<br>Number of frames received |
| | Via the Web server | Via the “Drive monitor”, “Drive parameters”, “Ethernet statistics”, “Message statistics” and “Net IO monitoring” pages |

Presentation: page 124
Functions: page 125
References: pages 132 and 133

## Characteristics of the Fipio cards VW3 A3 311 and VW3 A3 301 (1)

| Type of output | | Standard Fipio card VW3 A3 311 | Substitution Fipio card VW3 A3 301 |
|---|---|---|---|
| **Structure** | Connector | One 9-way male SUB-D connector | |
| | Transmission speed | 1 Mbps | |
| | Addresses | 1 to 62, configurable using switches on the card | |
| **Services** | Adjustment using PLC software (Unity, PL7) | No | Yes (limited to ATV 58 or ATV 58F compatibility parameters) |
| | Periodic variables | 8 control parameters which can be assigned by communication scanner<br>8 monitoring parameters which can be assigned by communication scanner<br>Indexed periodic variable (settings) | 5 control parameters<br>8 monitoring parameters |
| | Communication profile | FED C 32 | Specific to the Altivar 58 or Altivar 58F drive (FSD C 8P) |
| | Device profiles | CiA 402 profile: “Device Profile Drives and Motion Control”<br>I/O profile | |
| | Communication monitoring | Can be inhibited<br>Fixed “time out”: 256 ms | |
| **Diagnostics** | Using LEDs | 4 LEDs on the card: “RUN” (status), “ERR” (fault), “COM” (data exchange) and “I/O” (minor internal fault) | |
| | Using the graphic display terminal | Control word received<br>Reference received<br>Periodic variables (communication scanner) | |

## Characteristics of the Modbus Plus card VW3 A3 302 (2)

| | | |
|---|---|---|
| **Structure** | Connector | One 9-way female SUB-D connector |
| | Transmission speed | 1 Mbps |
| | Addresses | 1 to 64, configurable using switches on the card |
| **Services** | Messaging | Yes (Modbus) |
| | I/O data | “Peer Cop”: 8 control parameters which can be assigned by communication scanner<br>“Global data”: 8 monitoring parameters which can be assigned by communication scanner |
| | Device profiles | CiA 402 profile: “Device Profile Drives and Motion Control” I/O profile |
| | Communication monitoring | Can be inhibited<br>“Time out” can be set between 0.1 and 60 s via the terminal or the PowerSuite software workshop. |
| **Diagnostics** | Using LEDs | 1 LEDs on the card: “MB+” (status) |
| | Using the graphic display terminal | Control word received<br>Reference received<br>I/O data (communication scanner) |

*(1) For the Fipio bus, see pages 312 to 315.*
*(2) For the Modbus Plus network, see pages 320 to 323.*

## Characteristics of the DeviceNet card VW3 A3 309

| | | |
|---|---|---|
| **Structure** | Connector | One removable screw connector, 5 contacts at intervals of 5.08 |
| | Transmission speed | 125 kbps, 250 kbps or 500 kbps, configurable using switches on the card |
| | Addresses | 1 to 63, configurable using switches on the card |
| **Services** | I/O data | ■ Speed CIP assemblies, type 20, 21, 70 and 71 (2 parameters)<br>■ Speed/torque CIP assemblies, type 22, 23, 72 and 73 (3 parameters)<br>■ Allen-Bradley assemblies, type 103, 104 (2 parameters) and 105 (4 parameters, of which 2 are assignable)<br>■ Communication scanner assemblies 100 and 101 (4 assignable parameters) |
| | Periodic exchange mode | Inputs: Polled, Change of state, Cyclic<br>Outputs: Polled |
| | Device profiles | CIP AC Drive (02) profile<br>Allen-Bradley drive profile<br>CiA 402 profile: “Device Profile Drives and Motion Control”<br>I/O profile |
| | Auto Device Replacement | No |
| | Communication monitoring | Can be inhibited<br>“Time out” can be set via the DeviceNet network configurator |
| **Diagnostics** | Using LEDs | One two-tone LED on the card: “MNS” (status) |
| | Using the graphic display terminal | Control word received<br>Reference received |
| **Description file** | | A single eds file is supplied for the whole range on the documentation CD-ROM or can be downloaded from the website "www.telemecanique.com". This file contains the description of the drive parameters. |

## Characteristics of the InterBus card VW3 A3 304

| | | |
|---|---|---|
| **Structure** | Connector | 2 connectors: One 9-way male SUB-D and one 9-way female SUB-D |
| | Power Supply | The card is powered by the drive. To ensure that the InterBus subscriber continues to operate during line supply failures to the power section, fit a separate power supply for the drive control section. |
| **Services** | Messaging | PCP:<br>■ Read: read a parameter<br>■ Write: write a parameter<br>■ Initiate: initialize the communication relationship<br>■ Abort: abort the communication relationship<br>■ Status: communication and drive status<br>■ Get-OV: read an object description<br>■ Identify: identification of the card |
| | I/O data | 2 control parameters (command and reference)<br>2 monitoring parameters (status and speed output) |
| | Device profile | Profile 21 |
| | Communication monitoring | Can be inhibited<br>Fixed “time out”: 640 ms |
| **Diagnostics** | Using LEDs | 5 LEDs on the card: “U” (power supply), “RC” (bus input), “Rd” (bus output), “BA” (periodic data) and “TR” (messaging) |
| | Using the graphic display terminal | Control word received<br>Reference received |

## Characteristics of the CC-Link card VW3 A3 317

| | | |
|---|---|---|
| **Structure** | Connector | One removable screw connector, 5 contacts at intervals of 3.81 |
| | Physical interface | 2-wire RS 485 |
| | Line matching | Switch-configurable line termination (110 Ω or 130 Ω) |
| | Transmission speed | 156 kbps, 625 kbps, 2.5 Mbps, 5 Mbps, 10 Mbps<br>Configurable using rotary switch on the card |
| | Addresses | 1 to 64, configurable using 2 rotary switches on the card |
| **Services** | I/O data | Remote device station<br>32 remote digital inputs (RX)<br>32 remote digital outputs (RY)<br>4 remote input words (RWr)<br>4 remote output words (RWw) |
| | Device profile | Compatible with the CC-Link drive profile |
| | Adjustments | Access to the drive parameters via an indexing mechanism |
| | Communication monitoring | Can be inhibited<br>“Time out” can be set between 0.1 s and 60 s |
| **Diagnostics** | Using LEDs | 5 LEDs on the card: “Power”, “L.RUN” (Running), “SD” (Send Data), “RD” (Receive Data), “L.ERR” (Error) |
| | Using the graphic display terminal or the PowerSuite software workshop | Transmission speed used<br>Drive address |

Presentation: page 124
Functions: page 125
References: pages 132 and 133

## Characteristics of the Profibus DP card VW3 A3 307

| | | |
|---|---|---|
| **Structure** | Connector | One 9-way female SUB-D connector |
| | Transmission speed | 9600 bps, 19.2 kbps, 93.75 kbps, 187.5 kbps, 500 kbps, 1.5 Mbps, 3 Mbps, 6 Mbps or 12 Mbps |
| | Addresses | 1 to 126, configurable using switches on the card |
| **Services** | I/O data | PPO type 5<br>8 control parameters which can be assigned by communication scanner<br>8 monitoring parameters which can be assigned by communication scanner<br>Indexed periodic variable (settings) |
| | Device profiles | CiA 402 profile: “Device Profile Drives and Motion Control”<br>I/O profile |
| | Communication monitoring | Can be inhibited<br>“Time out” can be set via the PROFIBUS DP network configurator |
| **Diagnostics** | Using LEDs | 2 LEDs on the card: “ST” (status) and “DX” (data exchange) |
| | Using the graphic display terminal | Control word received<br>Reference received<br>I/O data (communication scanner) |
| **Description file** | | A single gsd file is supplied for the whole range on the documentation CD-ROM or can be downloaded from the website "www.telemecanique.com". This file does not contain the description of the drive parameters. |

Presentation: page 124
Functions: page 125
References: pages 132 and 133

## Characteristics of the Modbus/Uni-Telway card VW3 A3 303

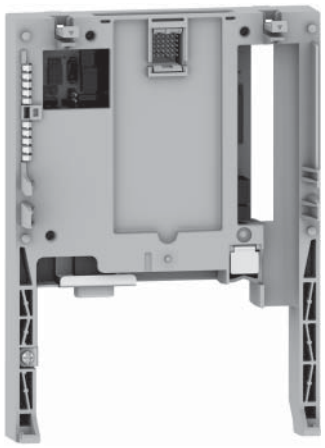
| | | |
|---|---|---|
| **Structure** | Connector | One 9-way female SUB-D connector |
| | Transmission speed | Configurable via the display terminal or the PowerSuite software workshop:<br>■ 4800 bps<br>■ 9600 bps<br>■ 19200 bps |
| | Polarization | Type of polarization can be configured using switches on the card:<br>■ No polarization impedances (supplied by the wiring system, for example, in the master)<br>■ Two 4.7 kΩ polarization resistors |
| | Selection of the protocol | Via the display terminal or the PowerSuite software workshop:<br>■ Modbus RTU<br>■ Modbus ASCII<br>■ Uni-Telway |
| **Services** | Device profiles | CiA 402 profile: “Device Profile Drives and Motion Control”<br>I/O profile |
| | Communication monitoring | Can be inhibited<br>“Time out” fixed at 10 s |
| **Diagnostics** | Using LEDs | 2 LEDs on the card: “RUN” (status) and “ERR” (fault) |
| | Using the graphic display terminal | Control word received<br>Reference received |
| **Characteristics of the Modbus protocol** *(1)* | | |
| **Structure** | Physical interface | 2-wire RS 485, 4-wire RS 485 |
| | Transmission mode | RTU, ASCII |
| | Format | Configurable via the display terminal or the PowerSuite software workshop:<br>In RTU mode only:<br>■ 8 data, odd parity, 1 stop<br>■ 8 data, no parity, 1 stop<br>■ 8 data, even parity, 1 stop<br>■ 8 data, no parity, 2 stop<br><br>In RTU and ASCII modes:<br>■ 7 data, even parity, 1 stop<br>■ 7 data, odd parity, 1 stop<br>■ 7 data, even parity, 2 stop<br>■ 7 data, odd parity, 2 stop |
| | Addresses | 1 to 247, configurable using switches on the card. |
| **Service** | Messaging | Read Holding Registers (03), 63 words maximum<br>Read Input Registers (04), 63 words maximum<br>Write Single Register (06)<br>Write Multiple Registers (16), 61 words maximum<br>Read/Write Multiple Registers (23)<br>Read Device Identification (43)<br>Diagnostics (08) |
| **Characteristics of the Uni-Telway protocol** *(2)* | | |
| **Structure** | Physical interface | 2-wire RS 485 |
| | Format | 8 data, odd parity, 1 stop |
| | Addresses | 1 to 147, configurable using switches on the card. |
| **Service** | Messaging | Read word (04h)<br>Write word (14h)<br>Read object (36h), 63 words maximum<br>Write object (37h), 60 words maximum<br>Identification (0Fh)<br>Protocol version (30h)<br>Mirror (FAh)<br>Read error counters (A2h)<br>Reset counters (A4h) |

*(1) For the Modbus serial link, see pages 316 to 319.*
*(2) For the Uni-Telway serial link, see pages 324 and 325.*

Presentation: page 124
Functions: page 125
References: pages 132 and 133

# Variable speed drives
## Altivar 71
## Communication buses and networks

533192



*VW3 A3 311*

535311



*TSX FP ACC12*

533194



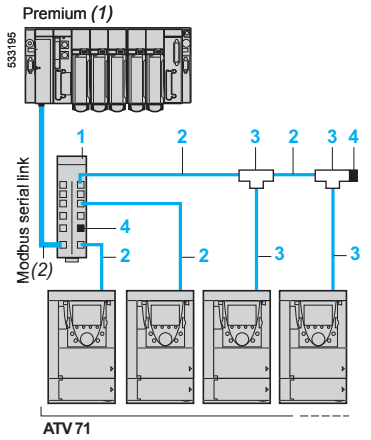
*490 NAD 911 03*

### Communication cards *(1) (2)*

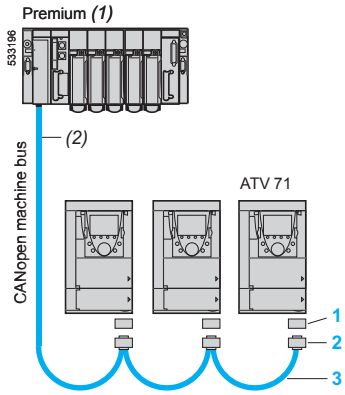
| Description | Use | Reference | Weight kg |
|---|---|---|---|
| **Modbus TCP** *(3)* | To be connected to a Hub or Switch using a cordset 490 NTW 000 ●●.<br>See pages 310 and 311 | **VW3 A3 310** | 0.300 |
| **EtherNet/IP** | To be connected to a Hub or Switch using a cordset 490 NTW 000 ●●.<br>See pages 310 and 311 | **VW3 A3 316** | 0.300 |
| **Standard Fipio** | To be connected using a connector TSX FP ACC 12 with an extension cable TSX FP CC●● or a drop cable TSX FP CA●●.<br>This card should be used for new installations. It is also used to replace an ATV 58 or ATV 58F drive equipped with a VW3 A58 311 card by an ATV 71 drive.<br>To replace an ATV 58 or ATV 58F drive equipped with a VW3 58 301 card by an ATV 71 drive, use the Fipio substitution card VW3 A3 301.<br>See pages 314 and 315 | **VW3 A3 311** | 0.300 |
| **Substitution Fipio** | This card is used to replace an ATV 58 or ATV 58F drive equipped with a VW3 A58 301 card by an ATV 71 drive.<br>To replace an ATV 58 or ATV 58F drive equipped with a VW3 A58 311 card by an ATV 71 drive, use the standard Fipio card VW3 A3 311.<br>See pages 314 and 315 | **VW3 A3 301** | 0.300 |
| **Modbus Plus** | To be connected to the tap Modbus Plus IP 20 990 NAD 230 00 using a cordset 990 NAD 219●0.<br>See pages 322 and 323 | **VW3 A3 302** | 0.300 |
| **DeviceNet** | The card is equipped with a removable terminal block 5-way screw. | **VW3 A3 309** | 0.300 |
| **InterBus** | To be connected using cordset 170 MCI ●●●00 *(4)* | **VW3 A3 304** | 0.300 |
| **CC-Link** | The card is equipped with a removable terminal block 5-way screw. | **VW3 A3 317** | 0.300 |
| **PROFIBUS DP** | To be connected using a connector 490 NAD 911●● to the PROFIBUS cable TSX PBS CA●●00 *(4)* | **VW3 A3 307** | 0.300 |
| **Modbus/ Uni-Telway** | To be connected to subscriber socket TSC SCA 62 using cordset VW3 18 306 2.<br>See pages 317 and 325 | **VW3 A3 303** | 0.300 |

*(1) The Altivar 71 drive can only take one communication card. Consult the summary tables of possible drive, option and accessory combinations, see pages 176 to 187*
*(2) The user manuals are supplied on CD-ROM or can be downloaded from the website "www.telemecanique.com". For the Profibus DP and DeviceNet cards, the description files in gsd or eds format are also supplied on CD-ROM or can be downloaded from the website "www.telemecanique.com".*
*(3) Consult our "Ethernet TCP/IP Transparent Ready" catalogue.*
*(4) Please consult our "Automation platform Modicon Premium and Unity - PL7 software" catalogue.*

# Variable speed drives
## Altivar 71
### Communication buses and networks




*Example of Modbus diagram, connections via splitter blocks and RJ45 connectors*




*Example of CANopen diagram*




*VW3 CAN A71*




*VW3 CAN KCDF 180 T*

## Connection accessories

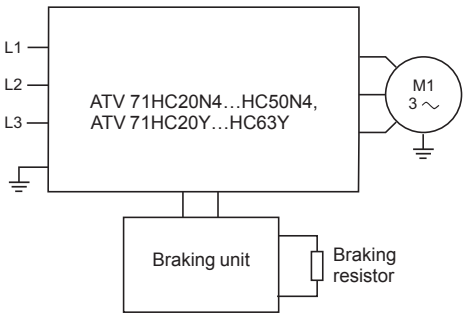
| Description | | No. | Length m | Unit reference | Weight kg |
|---|---|---|---|---|---|
| **Modbus serial link** | | | | | |
| **Modbus splitter block** 10 RJ45 connectors and 1 screw terminal block | | 1 | – | **LU9 GC3** | 0.500 |
| **Cordsets for Modbus serial link** equipped with 2 connectors RJ45 | | 2 | 0.3 | **VW3 A8 306 R03** | 0.025 |
| | | | 1 | **VW3 A8 306 R10** | 0.060 |
| | | | 3 | **VW3 A8 306 R30** | 0.130 |
| **Modbus T-junction boxes** (with integrated cable) | | 3 | 0.3 | **VW3 A8 306 TF03** | 0.190 |
| | | | 1 | **VW3 A8 306 TF10** | 0.210 |
| **Line terminators** For RJ45 connector *(3)* | R = 120 Ω, c = 1 nf | 4 | – | **VW3 A8 306 RC** | 0.010 |
| | R = 150 Ω | 4 | – | **VW3 A8 306 R** | 0.010 |

| Description | No. | Length m | Reference | Weight kg |
|---|---|---|---|---|
| **CANopen machine bus** *(4)* | | | | |
| **CANopen adapter** to be installed in the RJ45 port on the drive's control terminals. The adapter provides a 9-way male SUB-D connector conforming to the CANopen standard (CIA DRP 303-1). | 1 | – | **VW3 CAN A71** | – |
| **CANopen connector** *(5)* 9-way female SUB-D with line terminator(can be disabled) 180° cable outlet for 2 CANopen cables. CAN-H, CAN-L, CAN-GND connection. | 2 | – | **VW3 CAN KCDF 180T** | – |
| **CANopen cables** *(1)* Standard cable, CE marking. Low smoke emission, halogen free. Flame retardant (IEC 60332-1). | 3 | 50 | **TSX CAN CA 50** | 4.930 |
| | | 100 | **TSX CAN CA 100** | 8.800 |
| | | 300 | **TSX CAN CA 300** | 24.560 |
| **CANopen cables** *(1)* UL certification, CE marking. Flame retardant (IEC 60332-2). | 3 | 50 | **TSX CAN CB 50** | 3.580 |
| | | 100 | **TSX CAN CB 100** | 7.840 |
| | | 300 | **TSX CAN CB 300** | 21.870 |
| **CANopen cables** *(1)* Cable for harsh environments *(5)* or mobile installation, CE marking. Low smoke emission, halogen free. Flame retardant (IEC 60332-1). | 3 | 50 | **TSX CAN CD 50** | 3.510 |
| | | 100 | **TSX CAN CD 100** | 7.770 |
| | | 300 | **TSX CAN CD 300** | 21.700 |

*(1) Please consult our "Automation platform Modicon Premium and Unity - PL7 software" and "Automation platform Modicon TSX Micro - PL7 software" specialist catalogues.*
*(2) Cable dependent on the type of controller or PLC.*
*(3) Sold in lots of 2.*
*(4) Please consult our "Machines and installations with CANopen" catalogue.*
*(5) For drives ATV 71H●●●M3, ATV 71H●●●M3383, ATV 71HD11M3X, HD15M3X, ATV 71HD11M3X383, HD15M3X383, ATV 71H075N4…HD18N4, ATV 71H075N4383… HD18N4383 and ATV 71HU22Y…HC63Y, this connector can be replaced by connector TSX CAN KCDF 180T.*
*(6) Harsh environment:*
*- Resistance to hydrocarbons, industrial oils, detergents, solder splashes*
*- Relative humidity up to 100%*
*- Saline atmosphere*
*- Significant temperature variations*
*- Operating temperature between -10°C and +70°C*

# Variable speed drives
## Altivar 71
## Option: resistance braking units

## Presentation




Resistance braking enables the Altivar 71 drive to operate while braking to a standstill or during "generator" operation, by dissipating the energy in the braking resistor.

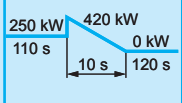
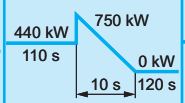
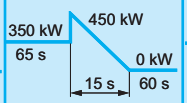
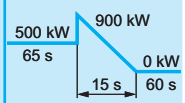
ATV 71H●●●M3, ATV 71H●●●M3X, ATV 71H075N4…HC16N4, ATV 71W●●●N4, ATV 71P●●●N4Z and ATV 71HU22Y…HC16Y drives have a built-in dynamic brake transistor.

For ATV 71HC20N4…HC50N4 and ATV 71HC20Y…HC63Y drives, a braking unit must be used. This is controlled by the drive:
- For ATV 71HC20N4…HC28N4 drives, the braking unit is mounted directly on the left-hand side of the drive, see dimensions on page 189.
- For ATV 71HC40N4, HC50N4 and ATV 71HC20Y…HC63Y drives, the braking unit is an external module, see dimensions on page 204.

### Applications

High-inertia machines, machines with cycles and fast cycles, high-power machines performing vertical movements.

## Characteristics

| Type of braking unit | | | VW3 A7 101 | VW3 A7 102 | VW3 A7 103 | VW3 A7 104 |
|---|---|---|---|---|---|---|
| **Ambient air temperature** around the device | Operation | °C | - 10…+ 50 | | | |
| | Storage | °C | - 25…+ 70 | | | |
| **Degree of protection of the casing** | | | IP 20 | | | |
| **Degree of pollution** | | | 2 according to standard EN 50178 | | | |
| **Relative humidity** | | | Class 3K3 without condensation | | | |
| **Maximum operating altitude** | | m | 2000 | | 1000.<br>1000…2260 by derating the continuous power of the braking unit by 1% per additional 100 m. | |
| **Vibration resistance** | | | 0.2 gn | | | |
| **Nominal line supply voltage and drive supply voltage** (rms value) | | V | 380 - 15%…480 + 10% ~ | | 500 - 15%…690 + 10% ~ | |
| **Engage threshold** | | V | 785 ± 1% ⎓ | | 1075 ± 1% ⎓ | |
| **Maximum DC bus voltage** | | V | 850 | | 1100 | |
| **Maximum line supply braking power** | 400V ~ line supply (785 V ⎓ *(1)*) | kW | 420 | 750 | – | |
| | 690V ~ line supply (1075 V ⎓ *(1)*) | kW | – | | 450 | 900 |
| **Percentage of time of conduction** | at constant power at 785 V ⎓ | | 5 % at 420 kW | 5 % at 750 kW | – | |
| | | | 15 % at 320 kW | 15 % at 550 kW | | |
| | | | 50% at 250 kW | 50% at 440 kW | | |
| | at constant power at 1075 V ⎓ | | – | | 5 % at 450 kW | 5 % at 900 kW |
| | | | | | 15 % at 400 kW | 15 % at 600 kW |
| | | | | | 50% at 350 kW | 50% at 500 kW |
| **Cycle time** | | s | ⩽ 240 | | ⩽ 140 | |
| **Maximum continuous power** | | kW | 200 | 400 | 300 | 400 |
| **Braking power on a vertical movement** *(2)* | | |   |   |   |   |
| **Thermal protection** | | | Integrated, via thermal probe | | | |
| **Forced ventilation** | | m³/h | 100 | 600 | | |
| **Mounting** | | | Vertical | | | |
| **Minimum value of the resistor to be associated with the braking unit** | | Ω | 1.05 | 0.7 | 2 | 1 |

*(1) Braking unit engage threshold*
*(2) Values given for a cycle time of:*
*- 240 s for VW3 A7 101, 102*
*- 140 s for VW3 A7 103, 104*

References: page 135 | Selection: pages 140 to 147 | Dimensions: pages 189 and 204 | Schemes: pages 226 and 235

# Variable speed drives
## Altivar 71
## Option: resistance braking units

### Braking units

| For drives | Power | | Loss | Cable (drive-braking unit) | | Cable (braking unit-resistors) | | Reference | Weight |
|---|---|---|---|---|---|---|---|---|---|
| | Contin. | Max. | Con-tinuous power | Cross-section | Max. length | Cross-section | Max. length | | |
| | kW | kW | W | mm² | m | mm² | m | | kg |
| **Supply voltage: 380…480 V 50/60 Hz** | | | | | | | | | |
| ATV 71HC20N4… HC28N4 | 200 | 420 | 550 | – Internal connections | – | 2 x 95 | 50 | **VW3 A7 101** | 30.000 |
| ATV 71HC31N4… HC50N4 | 400 | 750 | 1050 | 2 x 150 | 1 | 2 x 150 | 50 | **VW3 A7 102** | 80.000 |
| **Supply voltage: 500…690 V 50/60 Hz** | | | | | | | | | |
| ATV 71HC20Y… HC31Y | 300 | 450 | 650 | 2 x 150 | 1 | 2 x 150 | 50 | **VW3 A7 103** | 80.000 |
| ATV 71HC40Y… HC63Y | 400 | 900 | 1150 | 2 x 150 | 1 | 2 x 150 | 50 | **VW3 A7 104** | 80.000 |

***Note:*** *To increase the braking power, several braking resistors can be mounted in parallel on the same braking unit. In this case, do not forget to take account of the minimum resistance value on each unit, see characteristics page 134.*

# Variable speed drives
Altivar 71
Option: braking resistors

## Presentation

The braking resistor enables the Altivar 71 drive to operate while braking to a standstill or during slowdown braking, by dissipating the braking energy.
It enables maximum transient braking torque.
The resistors are designed to be mounted on the outside of the enclosure, but should not inhibit natural cooling. Air inlets and outlets must not be obstructed in any way.
The air must be free of dust, corrosive gas and condensation.

### Applications

Inertia machines, machines with cycles

## General characteristics

| Type of braking resistor | | | VW3 A7 701…709 | VW3 A7 710…718 |
|---|---|---|---|---|
| **Ambient air temperature** around the device | Operation | °C | 0…+ 50 | |
| | Storage | °C | - 25…+ 70 | |
| **Degree of protection of the casing** | | | IP 20 | IP 23 |
| **Thermal protection** | | | Via temperature controlled switch or via the drive | Via thermal overload relay |
| **Temperature controlled switch** *(1)* | Activation temperature | °C | 120 | – |
| | Max. voltage - max. current | | 250 V ∿ - 1 A | – |
| | Min. voltage - min. current | | 24 V ⎓ - 0.1 A | – |
| | Maximum contact resistance | mΩ | 60 | – |
| **Load factor for the dynamic brake transistors** | | | The internal circuits of Altivar 71 drives rated 160 kW or less have a built-in dynamic brake transistor | |
| | ATV 71H●●●M3<br>ATV 71H●●●M3X,<br>ATV 71H075N4…HD75N4<br>ATV 71HU22Y…HD90Y<br>ATV 71W●●●N4<br>ATV 71P●●●N4Z | | The dynamic brake transistor is sized so that it can tolerate:<br>■ The nominal motor power continuously<br>■ 150% of the nominal motor power for 60 s | |
| | ATV 71HD90N4…HC16N4 | | The dynamic brake transistor is sized so that it can tolerate:<br>■ 75% of the nominal motor power continuously<br>■ 150% of the nominal motor power for 10 s | |

## Connection characteristics

| Type of terminal | | | Drive connection | Temperature-controlled switch |
|---|---|---|---|---|
| **Maximum wire size** | VW3 A7 701…703 | | 0.16 in² (AWG 28) | 1.5 mm² (AWG 16) |
| | VW3 A7 704…709 | | Connected on a bar, M6 | 0.10 in² (AWG 14) |
| | VW3 A7 710…718 | | Connected on a bar, M10 | – |

## Minimum ohmic value of the resistors to be associated with the Altivar 71 drive, at 20°C *(2)*

### ATV 71H●●●M3, ATV 71H●●●M3X, ATV 71H●●●N4 and ATV 71H●●●Y drives

| Type of drive | ATV 71H | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Minimum value | Ω | 037M3, 075M3 | U15M3 | U22M3, U30M3 | U40M3 | U55M3 | U75M3 | | | | |
| | | 44 | 33 | 22 | 16 | 11 | 8 | | | | |
| Type of drive | ATV 71H | D11M3X, D15M3X | D18M3X | D22M3X, D30M3X | D37M3X… D55M3X | D75M3X | | | | | |
| Minimum value | Ω | 3 | 4 | 3.3 | 1.7 | 1.3 | | | | | |
| Type of drive | ATV 71H | 075N4… U22N4 | U30N4, U40N4 | U55N4 | U75N4 | D11N4 | D15N4, D18N4 | D22N4, D30N4 | D37N4 | D45N4, D55N4 | D75N4 |
| Minimum value | Ω | 56 | 34 | 23 | 19 | 12 | 7 | 13.3 | 6.7 | 5 | 3.3 |
| Type of drive | ATV 71H | D90N4 | C11N4… C16N4 | C20N4… C28N4 | C31N4… C50N4 | | | | | | |
| Minimum value | Ω | 2.5 | 1.9 | 1.05 | 0.7 | | | | | | |
| Type of drive | ATV 71H | U22Y… D37Y | D45Y, D55Y | D75Y, D90Y | | | | | | | |
| Minimum value | Ω | 12 | 8 | 5 | | | | | | | |

### ATV 71W●●●N4 drives

| Type of drive | ATV 71W | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Minimum value | Ω | 075N4… U22N4 | U30N4, U40N4 | U55N4 | U75N4 | D11N4 | D15N4, D18N4 | D22N4, D30N4 | D37N4 | D45N4, D55N4 | D75N4 |
| | | 56 | 34 | 23 | 19 | 12 | 7 | 13.3 | 6.7 | 5 | 3.3 |

### ATV 71P●●●N4Z drives

| Type of drive | ATV 71P | | | | | |
|---|---|---|---|---|---|---|
| Minimum value | Ω | 075N4Z… U22N4Z | U30N4Z… U40N4Z | U55N4Z | U75N4Z | D11N4Z |
| | | 56 | 34 | 23 | 19 | 12 |

*(1) The switch should be connected in the sequence (use for signalling, or in the line contactor control).*
*(2) The minimum ohmic value is determined at a temperature of 20°C. In an environment where the temperature is below 20°C, make sure that the minimum ohmic value recommended in the table is observed.*

# Variable speed drives
## Altivar 71
## Option: braking resistors

### Braking resistors

| For drives | Ohmic value at 20°C | Average power available at 50°C *(1)* | Reference | Weight |
|---|---|---|---|---|
| | Ω | kW | | kg |
| **Supply voltage: 200…240 V 50/60 Hz** | | | | |
| ATV 71H037M3, H075M3 | 100 | 0.05 | **VW3 A7 701** | 1.900 |
| ATV 71HU15M3, HU22M3 | 60 | 0.1 | **VW3 A7 702** | 2.400 |
| ATV 71HU30M3, HU40M3 | 28 | 0.2 | **VW3 A7 703** | 3.500 |
| ATV 71HU55M3, HU75M3 | 15 | 1 | **VW3 A7 704** | 11.000 |
| ATV 71HD11M3X | 10 | 1 | **VW3 A7 705** | 11.000 |
| ATV 71HD15M3X | 8 | 1 | **VW3 A7 706** | 11.000 |
| ATV 71HD18M3X, HD22M3X | 5 | 1.3 | **VW3 A7 707** | 11.000 |
| ATV 71HD30M3X | 4 | 1 | **VW3 A7 708** | 11.000 |
| ATV 71HD37M3X, HD45M3X | 2.5 | 1 | **VW3 A7 709** | 11.000 |
| ATV 71HD55M3X | 1.8 | 15.3 | **VW3 A7 713** | 50.000 |
| ATV 71HD75M3X | 1.4 | 20.9 | **VW3 A7 714** | 63.000 |
| **Supply voltage: 380…480 V 50/60 Hz** | | | | |
| ATV 71H075N4…HU40N4<br>ATV 71W075N4, WU40N4<br>ATV 71P075N4Z, PU40N4Z | 100 | 0.05 | **VW3 A7 701** | 1.900 |
| ATV 71HU55N4, HU75N4<br>ATV 71WU55N4, WU75N4<br>ATV 71PU55N4Z, PU75N4Z | 60 | 0.1 | **VW3 A7 702** | 2.400 |
| ATV 71HD11N4, HD15N4<br>ATV 71WD11N4, WD15N4<br>ATV 71PD11N4Z | 28 | 0.2 | **VW3 A7 703** | 3.500 |
| ATV 71HD18N4…HD30N4<br>ATV 71WD18N4…WD30N4 | 15 | 1 | **VW3 A7 704** | 11.000 |
| ATV 71HD37N4<br>ATV 71WD37N4 | 10 | 1 | **VW3 A7 705** | 11.000 |
| ATV 71HD45N4…HD75N4<br>ATV 71WD45N4…WD75N4 | 5 | 1.3 | **VW3 A7 707** | 11.000 |
| ATV 71HD90N4 | 2.75 | 25 | **VW3 A7 710** | 80.000 |
| ATV 71HC11N4, HC13N4 | 2.1 | 37 | **VW3 A7 711** | 86.000 |
| ATV 71HC16N4 | 2.1 | 44 | **VW3 A7 712** | 104.000 |
| ATV 71HC20N4 | 1.05 | 56 | **VW3 A7 715** | 136.000 |
| ATV 71HC25N4, HC28N4 | 1.05 | 75 | **VW3 A7 716** | 172.000 |
| ATV 71HC31N4, HC40N4 | 0.7 | 112 | **VW3 A7 717** | 266.000 |
| ATV 71HC50N4 | 0.7 | 150 | **VW3 A7 718** | 350.000 |
| **Supply voltage: 500…690 V 50/60 Hz** | | | | |
| ATV 71HU22Y…HU55Y | 100 | 0.05 | **VW3 A7 701** | 1.900 |
| ATV 71HU75Y, HD11Y | 60 | 0.1 | **VW3 A7 702** | 2.400 |
| ATV 71HD15Y, HD18Y | 28 | 0.2 | **VW3 A7 703** | 3.500 |
| ATV 71HD22Y…HD37Y | 15 | 1 | **VW3 A7 704** | 11.000 |
| ATV 71HD45Y, HD55Y | 10 | 1 | **VW3 A7 705** | 11.000 |
| ATV 71HD75Y, HD90Y | 5 | 1.3 | **VW3 A7 707** | 11.000 |

*(1) Load factor for resistors: the value of the average power that can be dissipated at 50°C from the resistor into the casing is determined for a load factor during braking that corresponds to the majority of normal applications.*
*For VW3 A7 701…709:*
*- 2 s braking with a 0.6 Tn braking torque for a 40 s cycle*
*- 0.8 s braking with a 1.5 Tn braking torque for a 40 s cycle*
*For VW3 A7 710…718:*
*- 10 s braking with a 2 Tn braking torque for a 30 s cycle*

# Variable speed drives
Altivar 71
Option: hoist resistors

## Presentation

The hoist resistor is a braking resistor which enables the Altivar 71 drive to operate while braking to a standstill or during slowdown braking, by dissipating the braking energy.
It enables maximum transient braking torque.
The resistors are designed to be mounted on the outside of the enclosure, but should not inhibit natural cooling. Air inlets and outlets must not be obstructed in any way. The air must be free of dust, corrosive gas and condensation.

### Applications

Machines performing vertical movements, machines with fast cycles, high-inertia machines.

## General characteristics

| Type of hoist resistor | | | VW3 A7 801 | VW3 A7 802…A7 808 | VW3 A7 809…A7 818 |
|---|---|---|---|---|---|
| **Ambient air temperature** around the device | Operation | °C | 0…+ 50 | | |
| | Storage | °C | - 25…+ 75 | | - 25…+ 65 |
| **Degree of protection of the casing** | | | IP 23 if horizontal mounting<br>IP 20 in other cases | IP 23 | |
| **Thermal protection** | | | Via thermal overload relay | | |
| **Load factor for the dynamic brake transistors** | | | The internal circuits of Altivar 71 drives rated 160 kW or less have a built-in dynamic brake transistor | | |
| | ATV 71H●●●M3<br>ATV 71H●●●M3X,<br>ATV 71H075N4…HD75N4<br>ATV 71HU22Y…HD90Y<br>ATV 71W●●●N4<br>ATV 71P●●●N4Z | | The dynamic brake transistor is sized so that it can tolerate:<br>■ The nominal motor power continuously<br>■ 150% of the nominal motor power for 60 s | | |
| | ATV 71HD90N4…HC50N4 *(1)*<br>ATV 71HC11Y…HC63Y *(1)* | | The dynamic brake transistor is sized so that it can operate on a 240 s cycle at:<br>■ 88% of the nominal motor power for 50% of the cycle time<br>■ 150% of the nominal motor power for 5% of the cycle | | |

## Connection characteristics

| | | | |
|---|---|---|---|
| **Maximum wire size** | VW3 A7 801 | | Connected on a bar, M6 |
| | VW3 A7 802…818 | | Connected on a bar, M10 |

## Minimum ohmic value of the resistors to be associated with the Altivar 71 drive, at 20°C *(2)*

### ATV 71H●●●M3, ATV 71H●●●M3X ATV 71H●●●N4 and ATV 71H●●●Y drives

| Type of drive | ATV 71H | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Minimum value | Ω | 037M3, 075M3 | U15M3 | U22M3, U30M3 | U40M3 | U55M3 | U75M3 | | | | | |
| | | 44 | 33 | 22 | 16 | 11 | 8 | | | | | |
| Type of drive | ATV 71H | D11M3X, D15M3X | D18M3X | D22M3X, D30M3X | D37M3X… D55M3X | D75M3X | | | | | | |
| Minimum value | Ω | 3 | 4 | 3.3 | 1.7 | 1.3 | | | | | | |
| Type of drive | ATV 71H | 075N4… U22N4 | U30N4, U40N4 | U55N4 | U75N4 | D11N4 | D15N4, D18N4 | D22N4, D30N4 | D37N4 | D45N4, D55N4 | D75N4 | |
| Minimum value | Ω | 56 | 34 | 23 | 19 | 12 | 7 | 13.3 | 6.7 | 5 | 3.3 | |
| Type of drive | ATV 71H | D90N4 | C11N4… C16N4 | C20N4… C28N4 | C31N4… C50N4 | | | | | | | |
| Minimum value | Ω | 2.5 | 1.9 | 1.05 | 0.7 | | | | | | | |
| Type of drive | ATV 71H | U22Y… D37Y | D45Y, D55Y | D75Y, D90Y | C11Y… C16Y | C20Y… C31Y | C40Y… C63Y | | | | | |
| Minimum value | Ω | 12 | 8 | 5 | 4 | 2 | 1 | | | | | |

### ATV 71W●●●N4 drives

| Type of drive | ATV 71W | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Minimum value | Ω | 075N4… U22N4 | U30N4, U40N4 | U55N4 | U75N4 | D11N4 | D15N4, D18N4 | D22N4, D30N4 | D37N4 | D45N4, D55N4 | D75N4 | |
| | | 56 | 34 | 23 | 19 | 12 | 7 | 13.3 | 6.7 | 5 | 3.3 | |

### ATV 71P●●●N4Z drives

| Type of drive | ATV 71P | | | | | |
|---|---|---|---|---|---|---|
| Minimum value | Ω | 075N4Z… U22N4Z | U30N4Z… U40N4Z | U55N4Z | U75N4Z | D11N4Z |
| | | 56 | 34 | 23 | 19 | 12 |

*(1) For ATV 71HC20N4…HC50N4 and ATV 71HC20Y…HC63Y, a braking unit must be used, see page 134.*
*(2) The minimum ohmic value is determined at a temperature of 20°C. In an environment where the temperature is below 20°C, make sure that the minimum ohmic value recommended in the table is observed.*

References: page 139 | Selection: pages 140 to 147 | Dimensions: page 206 | Schemes: page 226

# Variable speed drives
## Altivar 71
## Option: hoist resistors

### Hoist resistors

| For drives | Ohmic value at 20°C | Average power available at 50°C *(1)* | Quantity per drive | Reference | Weight |
|---|---|---|---|---|---|
| | Ω | kW | | | kg |
| **Supply voltage: 200…240 V 50/60 Hz** | | | | | |
| ATV 71H037M3, H075M3 | 100 | 1.6 | 1 | **VW3 A7 801** | 6.000 |
| ATV 71HU15M3 | 60 | 5.6 | 1 | **VW3 A7 802** | 21.000 |
| ATV 71HU22M3…HU40M3 | 24.5 | 9.8 | 1 | **VW3 A7 803** | 28.000 |
| ATV 71HU55M3, HU75M3 | 14 | 22.4 | 1 | **VW3 A7 804** | 54.000 |
| ATV 71HD11M3X, HD15M3X | 8.1 | 44 | 1 | **VW3 A7 805** | 92.000 |
| ATV 71HD18M3X | 4.2 | 62 | 1 | **VW3 A7 806** | 126.000 |
| ATV 71HD22M3X, HD30M3X | 3.5 | 19.5 | 1 | **VW3 A7 807** | 51.000 |
| ATV 71HD37M3X, HD45M3X | 1.85 | 27.4 | 1 | **VW3 A7 808** | 94.000 |
| ATV 71HD55M3X | 1.8 | 30.6 | 1 | **VW3 A7 809** | 103.000 |
| ATV 71HD75M3X | 1.4 | 44 | 1 | **VW3 A7 810** | 119.000 |
| **Supply voltage: 380…480 V 50/60 Hz** | | | | | |
| ATV 71H075N4…HU22N4ATV 71W075N4…WU22N4ATV 71P075N4Z…PU22N4Z | 100 | 1.6 | 1 | **VW3 A7 801** | 6.000 |
| ATV 71HU30N4…HU55N4ATV 71WU30N4…WU55N4ATV 71PU30N4Z…PU55N4Z | 60 | 5.6 | 1 | **VW3 A7 802** | 21.000 |
| ATV 71HU75N4, HD11N4ATV 71WU75N4, WD11N4ATV 71PD11N4Z | 24.5 | 9.8 | 1 | **VW3 A7 803** | 28.000 |
| ATV 71HD15N4…HD30N4ATV 71WD15N4…WD30N4 | 14 | 22.4 | 1 | **VW3 A7 804** | 54.000 |
| ATV 71HD37N4…HD55N4ATV 71W37N4…WD55N4 | 8.1 | 44 | 1 | **VW3 A7 805** | 92.000 |
| ATV 71HD75N4<br>ATV 71WD75N4 | 4.2 | 62 | 1 | **VW3 A7 806** | 126.000 |
| ATV 71HD90N4 | 2.75 | 56 | 1 | **VW3 A7 811** | 130.000 |
| ATV 71HC11N4, HC13N4 | 2.1 | 75 | 1 | **VW3 A7 812** | 181.000 |
| ATV 71HC16N4 | 2.1 | 112 | 1 | **VW3 A7 813** | 250.000 |
| ATV 71HC20N4 | 1.05 | 112 | 1 | **VW3 A7 814** | 280.000 |
| ATV 71HC25N4, HC28N4 | 1.05 | 150 | 1 | **VW3 A7 815** | 362.000 |
| ATV 71HC31N4, HC40N4 | 0.7 | 225 | 1 | **VW3 A7 816** | 543.000 |
| ATV 71HC50N4 | 0.7 | 330 | 1 | **VW3 A7 817** | 642.000 |
| **Supply voltage: 500…690 V 50/60 Hz** | | | | | |
| ATV 71HU22Y | 100 | 1.6 | 1 | **VW3 A7 801** | 6.000 |
| ATV 71HU30Y…HU55Y | 60 | 5.6 | 1 | **VW3 A7 802** | 21.000 |
| ATV 71HU75Y, HD11Y | 24.5 | 9.8 | 1 | **VW3 A7 803** | 28.000 |
| ATV 71HD15Y…HD30Y | 14 | 22.4 | 1 | **VW3 A7 804** | 54.000 |
| ATV 71HD37Y…HD55Y | 8.1 | 44 | 1 | **VW3 A7 805** | 92.000 |
| ATV 71HD75Y, HD90Y | 5 | 70 | 1 | **VW3 A7 818** | 159.000 |
| ATV 71HC11Y | 4.2 | 62 | 1 | **VW3 A7 806** | 126.000 |
| ATV 71HC13Y, HC16Y | 8.1 | 44 | 2 | **VW3 A7 805** *(2)* | 92.000 |
| ATV 71HC20Y | 4.2 | 62 | 2 | **VW3 A7 806** *(2)* | 126.000 |
| ATV 71HC25Y | 1.05 | 75 | 2 | **VW3 A7 716** *(3) (4)* | 172.000 |
| ATV 71HC31Y | 1.05 | 112 | 2 | **VW3 A7 814** *(3)* | 280.000 |
| ATV 71HC40Y | 0.7 | 112 | 2 | **VW3 A7 717** *(3) (4)* | 266.000 |
| ATV 71HC50Y | 0.7 | 150 | 2 | **VW3 A7 718** *(3) (4)* | 350.000 |
| ATV 71HC63Y | 0.7 | 225 | 2 | **VW3 A7 816** *(3)* | 543.000 |

*(1) Operating factor for hoist resistors: the value of the average power that can be dissipated at 50°C from the resistor is determined by an operating factor during braking.*
*For VW3 A7 801…808 and VW3 A7 818:*
*- 100 s braking with 1 Tn braking torque for a 200 s cycle.*
*- 20 s braking with 1.6 Tn braking torque for a 200 s cycle.*
*For VW3 A7 809…817:*
*- 10 s braking with 2 Tn braking torque for a 240 s cycle.*
*- 110 s braking with 1.25 Tn braking torque for a 240 s cycle.*
*(2) To connect in parallel, add the necessary space, see page 206.*
*(3) To connect in series, add the necessary space, see page 206.*
*(4) Characteristics, see page 136.*

# Variable speed drives
Altivar 71
Option: braking units and resistors

## Determining the braking unit and resistor

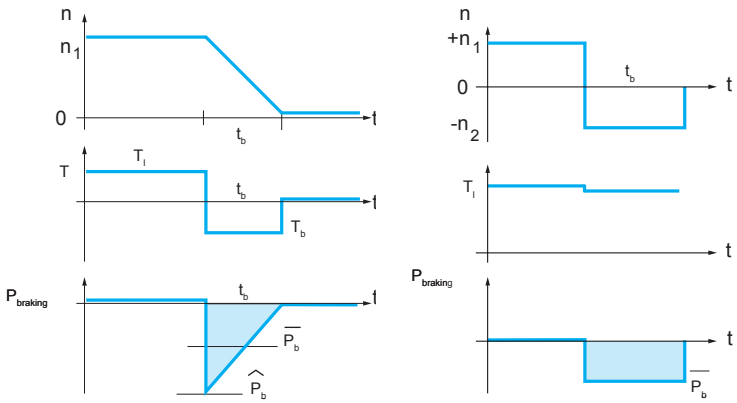
Calculating the various braking powers makes it possible to determine the braking unit and the braking resistor.

### Presentation of the two main types of operation: A and B

**A** The braking power during deceleration is characterized by a peak power $\hat{P}_b$ obtained at the start of deceleration, which decreases to 0 in proportion with the speed.
**Example:** Stopping centrifuges, translational movement, change of direction, etc

**B** Braking power at constant speed $n_2$.
**Example:** Vertical downward movement, motor/generator test bench, gravity conveyors, etc.

| | | |
|---|---|---|
| $n_1$ | Motor speed | [rpm] |
| $n_2$ | Motor speed during deceleration | [rpm] |
| $T_l$ | Load torque | [Nm] |
| $T_b$ | Braking torque | [Nm] |
| $\hat{P}_b$ | Maximum braking power | [W] |
| $\bar{P}_b$ | Average braking power during time $t_b$ | [W] |
| $t_b$ | Braking time | [s] |



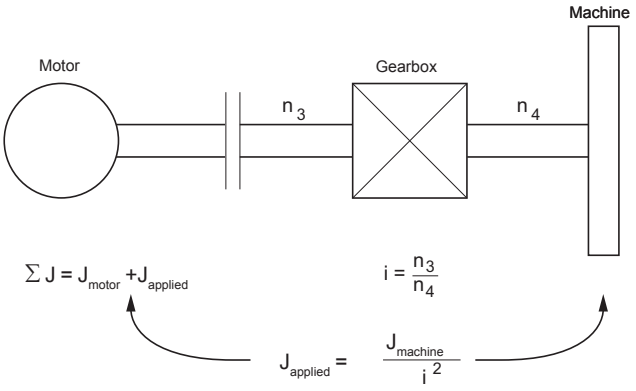

Note: These two types of operation can be combined.

### Type A operation

Calculating the braking time from the inertia.

$$t_b = \frac{J \cdot \omega}{T_b + T_r} \qquad \omega = \frac{2\pi \cdot n}{60} \qquad T_b = \frac{\Sigma J \cdot (n_3 - n_4)}{9.55 \cdot t_b} \qquad \hat{P}_b = \frac{T_b \cdot n_3}{9.55} \qquad \bar{P}_b = \frac{\hat{P}_b}{2}$$

| | | |
|---|---|---|
| $T_b$ | Motor braking torque | [Nm] |
| $\Sigma J$ | Total inertia applied to the motor | [kgm²] |
| $n$ | Motor speed | [rpm] |
| $n_3$ | Motor speed ahead of gearbox | [rpm] |
| $n_4$ | Motor speed after gearbox | [rpm] |
| $t_b$ | Braking time | [s] |
| $\hat{P}_b$ | Peak braking power | [W] |
| $\bar{P}_b$ | Average braking power during time $t_b$ | [W] |
| $T_r$ | Resistive torque | [Nm] |



# Variable speed drives
## Altivar 71
## Option: braking units and resistors

### Type B operation

*1 Braking power of a load moving horizontally with constant deceleration (e.g.: carriage)*

| | | |
|---|---|---|
| W | Kinetic energy | [Joule] |
| m | Weight | [kg] |
| v | Speed | [m/s] |
| $t_b$ | Braking time | [s] |
| $\hat{P}_b$ | Peak braking power | [W] |
| $\bar{P}_b$ | Average braking power during time $t_b$ | [W] |
| $T_b$ | Braking torque | [Nm] |
| n | Motor speed | [rpm] |

$$W = \frac{m \cdot v^2}{2} \qquad \bar{P}_b = \frac{W}{t_b} \qquad \hat{P}_b = \bar{P}_b \cdot 2$$

*2 Braking power for an active load (e.g.: test bench)*

$$\bar{P}_b = \frac{T_b \cdot n}{9.95}$$

*3 Braking power for a downward vertical movement*

| | | |
|---|---|---|
| g | Acceleration | 9.81 m/s² |
| a | Deceleration | [m/s²] |
| v | Linear downward speed | [m/s] |
| J | Moment of inertia | [kgms²] |
| ω | Angular speed | [rad/s] |
| $t_b$ | Downward stopping time | [s] |

$$\bar{P}_b = m \cdot g \cdot v \qquad \hat{P}_b = m \cdot (g + a) \cdot v + \frac{J \cdot \omega^2}{t_f} \qquad \omega = \frac{2\pi \cdot n}{60}$$

All the braking power calculations are only true if it is assumed that there are no losses ($\eta = 1$) and that there is no resistive torque.
To be even more precise, the following must be considered:
- the losses and the resistive torque of the system, which reduce the necessary braking power
- the driving torque (the wind, for example) which increases the braking power

**The required braking power is calculated as follows:**

| | | |
|---|---|---|
| $\hat{P}_{bR}$ | Maximum actual braking power | [W] |
| $\bar{P}_{bR}$ | Continuous actual braking power | [W] |
| $\eta_{total}$ | Total efficiency | |
| $P_{load}$ | Braking power connected with the resistive or driving torque (not taken into account in the calculation). $P_{load}$ can be positive or negative. | [W] |
| $\eta_{drive}$ | Drive efficiency = 0.98 | |
| $\eta_{mec}$ | Mechanical efficiency | |
| $\eta_{mot}$ | Motor efficiency | |

$$\hat{P}_{bR} = (\hat{P}_b - P_{load}) \times \eta total \qquad \bar{P}_{bR} = (\bar{P}_b - P_{load}) \times \eta total$$

$$\eta_{total} = \eta_{mec} \times \eta_{mot} \times 0.98$$

**For braking, the value of the braking resistor is selected to match the required power and the braking cycle.**

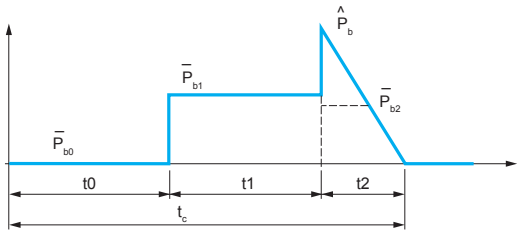
| | | |
|---|---|---|
| $U_{dc}$ | Braking unit engage threshold | [V] |

In general:

$$\hat{P}_{bR} = \frac{U^2 dc}{R} \Rightarrow R = \frac{U^2 dc}{\hat{P}_{bR}}$$

| | | |
|---|---|---|
| $t_c$ | Cycle time | [s] |
| $\bar{P}_{b0}$ | Upward braking power, therefore zero | [W] |
| $t_0$ | Rise time | [s] |
| $\bar{P}_{b1}$ | Average braking power during downward movement | [W] |
| $t_1$ | Downward movement time | [1] |
| $\hat{P}_b$ | Peak braking power | [W] |
| $\bar{P}_{b2}$ | Average power during braking to a standstill | [W] |
| $t_2$ | Standstill braking time | [s] |
| $P_{continuous}$ | $= \frac{\bar{P}_{b0} \times t_0 + \bar{P}_{b1} \times t_1 + \bar{P}_{b2} \times t_2}{t_c}$ | [W] |

Continuous power is obtained by taking the operating cycle into account.




The braking unit is selected taking the following into account:
- the continuous power $\bar{P}_{b1}$
- the average braking power during downward movement $\bar{P}_{b2}$
- the peak power $\hat{P}_b$ .

Depending on these elements, select the braking unit according to the characteristics on page 134.
The braking resistor is selected taking account of the same elements listed above, but with the addition of a check to ensure that the resistance value will allow the peak power to be exceeded. $\left(R = \frac{U^2 dc}{\hat{P}_f}\right)$

**Note**: The resistance value must always be greater than or equal to the values given in the tables on pages 136 and 138.

# Variable speed drives
## Altivar 71
### Characteristic curves for resistors

## Example of using characteristic curves

**VW3 A7 710 (P continuous = 25 kW) for 2.75 Ω at 20°C**

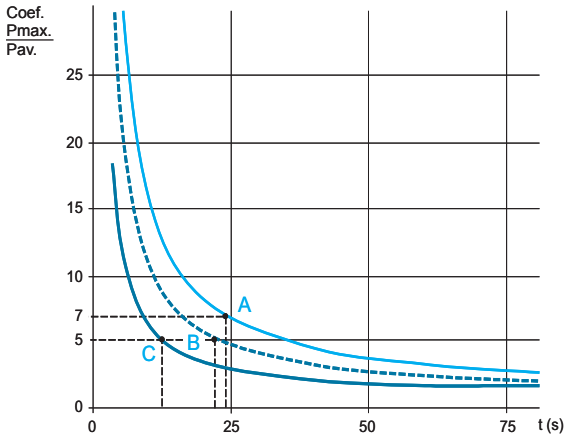
*Example of using the curves:*

*Point A For a 200 s cycle, the resistance of 2.75 Ω accepts an overload of 7 x 25 kW (continuous power) for 24 s, i.e. braking 175 kW every 200 s.*

*Point B For a 120 s cycle, the resistance of 2.75 Ω accepts an overload of 5 x 25 kW (continuous power) for 20 s, i.e. braking 125 kW every 120 s.*

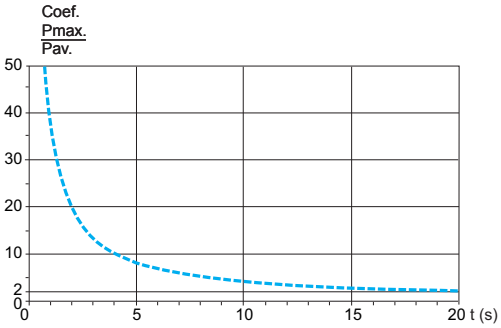
*Point C For a 60 s cycle, the resistance of 2.75 Ω accepts an overload of 5 x 25 kW (continuous power) for 10 s, i.e. braking 125 kW every 60 s.*

*P max./P av. (60 s cycle)*
*P max./P av. (120 s cycle)*
*P max./P av. (200 s cycle)*

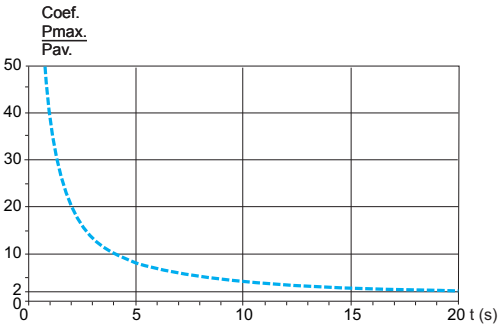



## Braking resistors

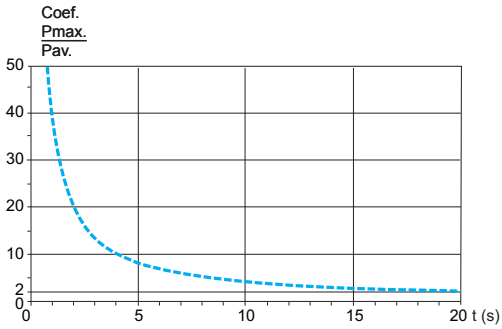
**VW3 A7 701 (P continuous = 0.05 kW)**



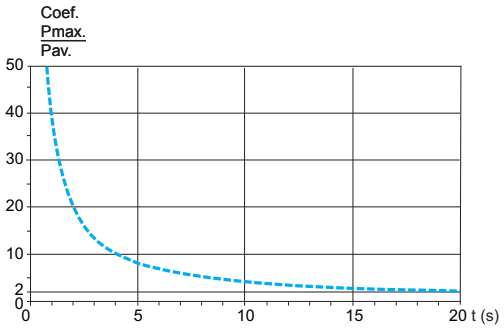

**VW3 A7 702 (P continuous = 0.1 kW)**



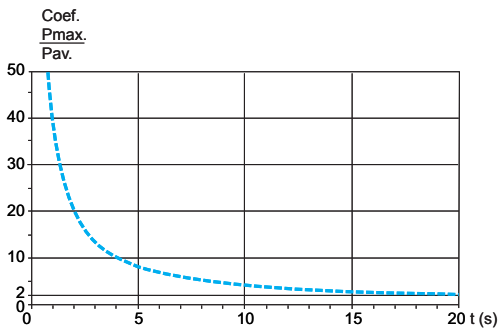

**VW3 A7 703 (P continuous = 0.2 kW)**



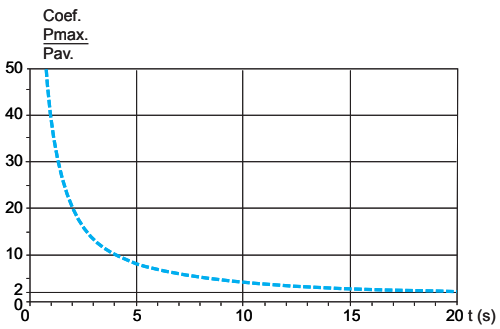

**VW3 A7 704…706 (P continuous = 1 kW)**




**VW3 A7 707 (P continuous = 1.3 kW)**




**VW3 A7 708, 709 (P continuous = 1 kW)**

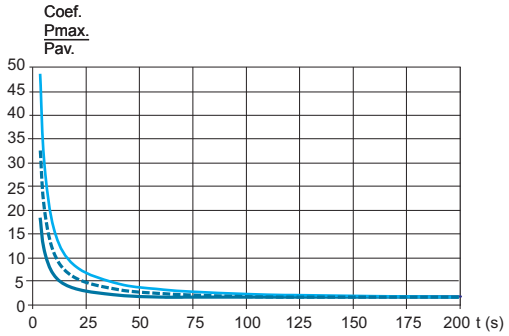



Presentation: page 136 | Characteristics: page 136 | References: page 137 | Dimensions: pages 204 and 205 | Schemes: page 226

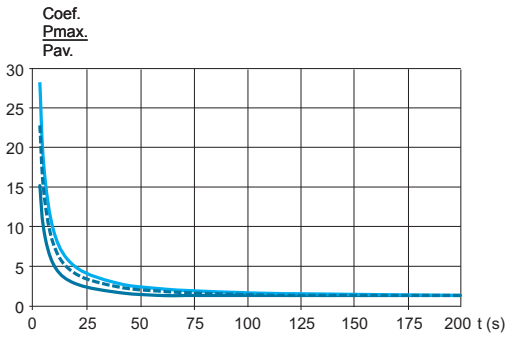
# Variable speed drives
## Altivar 71
### Characteristic curves for resistors

## Braking resistors (continued)

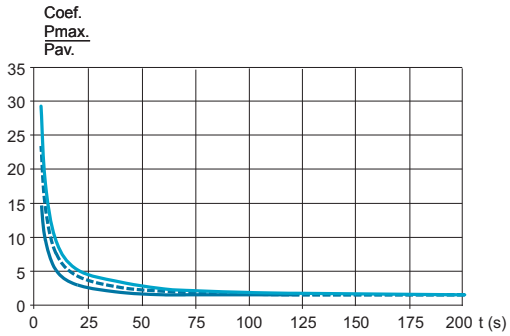
### VW3 A7 710 (P continuous = 25 kW)



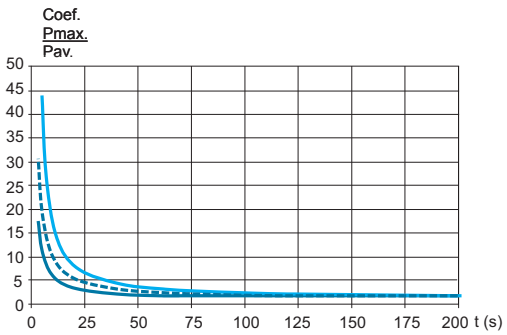

### VW3 A7 711 (P continuous = 37 kW)



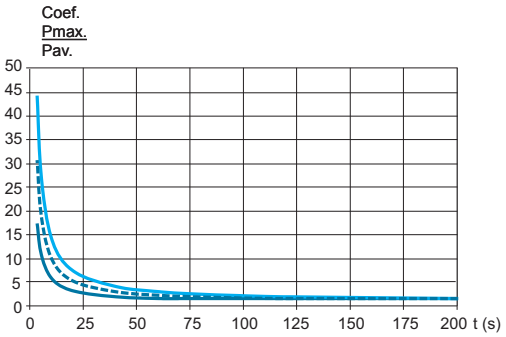

### VW3 A7 712 (P continuous = 44 kW)



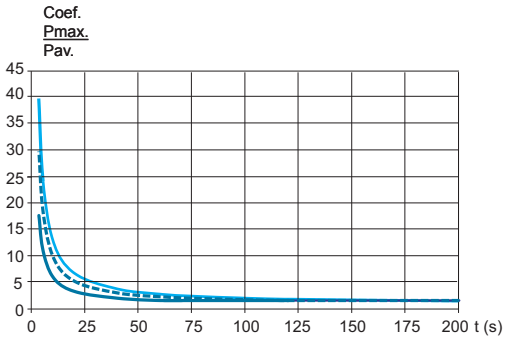

### VW3 A7 713 (P continuous = 15.3 kW)




### VW3 A7 714 (P continuous = 20.9 kW)




### VW3 A7 715 (P continuous = 56 kW)

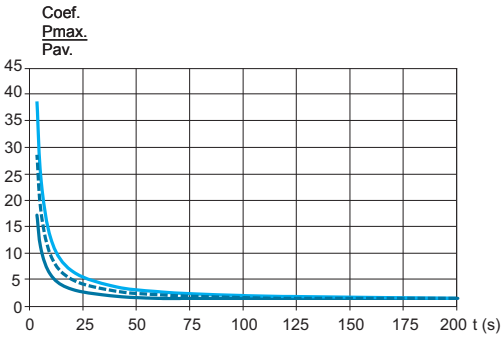



*P max./P av. (60 s cycle)*
*P max./P av. (120 s cycle)*
*P max./P av. (200 s cycle)*

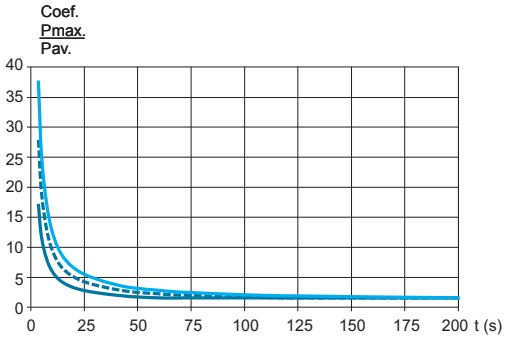
# Variable speed drives
## Altivar 71
### Characteristic curves for resistors

## Braking resistors (continued)

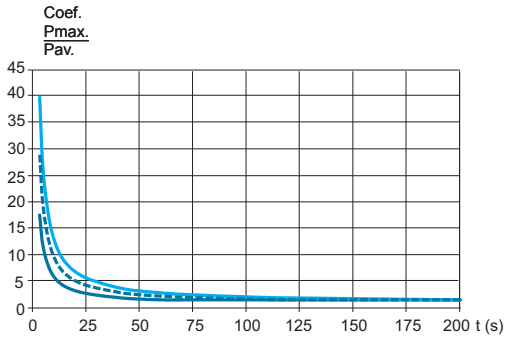
### VW3 A7 716 (P continuous = 75 kW)




### VW3 A7 717 (P continuous = 112 kW)




### VW3 A7 718 (P continuous = 150 kW)

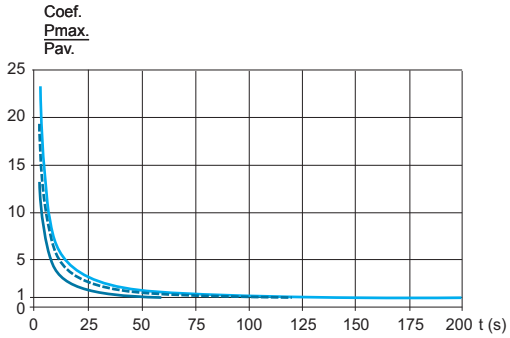



*P max./P av. (60 s cycle)*
*P max./P av. (120 s cycle)*
*P max./P av. (200 s cycle)*

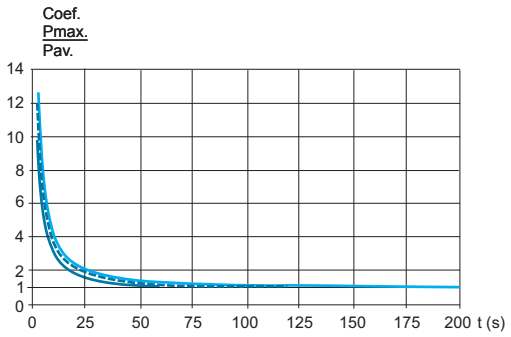
# Variable speed drives
## Altivar 71
## Characteristic curves for resistors

### Hoist resistors

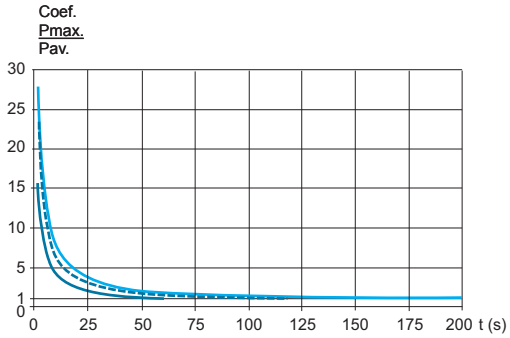
**VW3 A7 801** (P continuous = 1.6 kW)



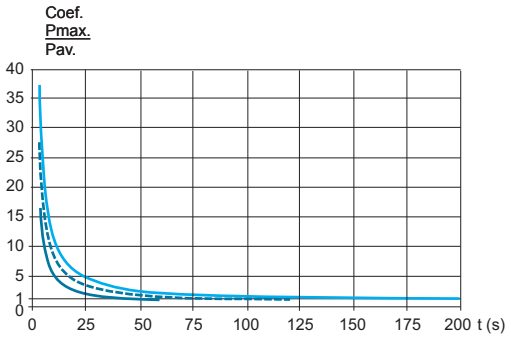

**VW3 A7 802** (P continuous = 5.6 kW)



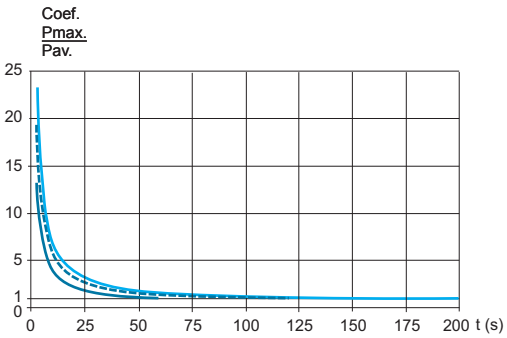

**VW3 A7 803** (P continuous = 9.8 kW)



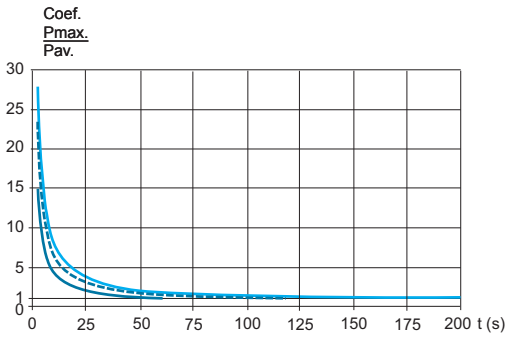

**VW3 A7 804** (P continuous = 22.4 kW)




**VW3 A7 805** (P continuous = 44 kW)




**VW3 A7 806** (P continuous = 62 kW)

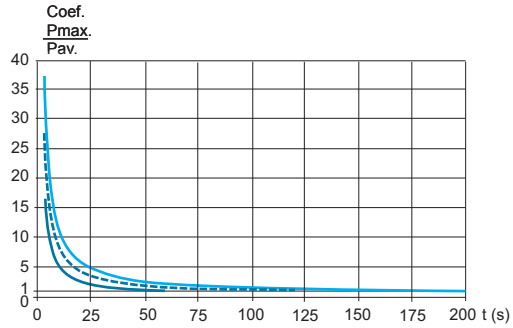



*P max./P av. (60 s cycle)*
*P max./P av. (120 s cycle)*
*P max./P av. (200 s cycle)*

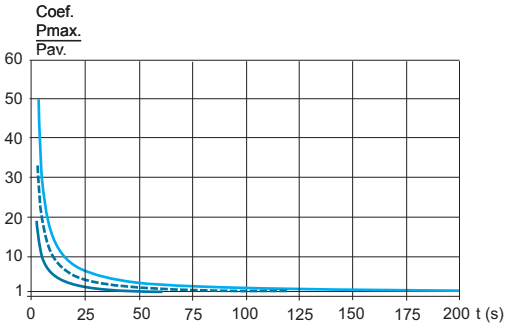
# Variable speed drives
## Altivar 71
## Characteristic curves for resistors

### Hoist resistors (continued)

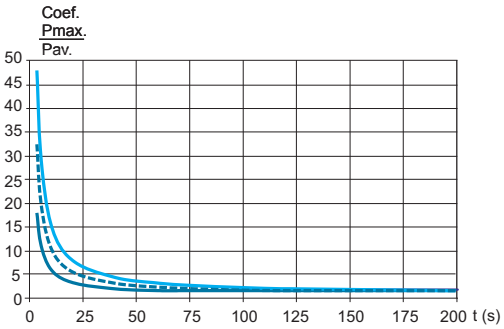
**VW3 A7 807** (P continuous = 19.5 kW)



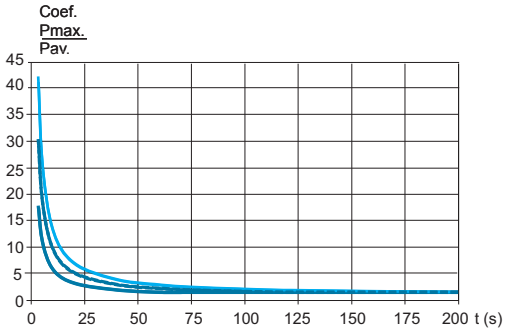

**VW3 A7 808** (P continuous = 27.4 kW)



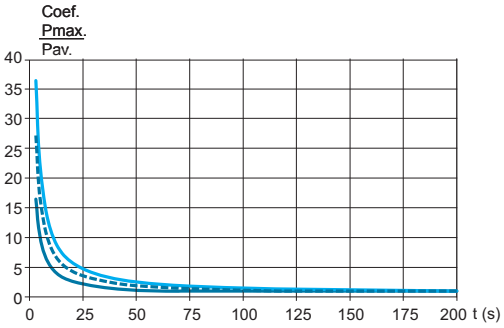

**VW3 A7 809** (P continuous = 30.6 kW)



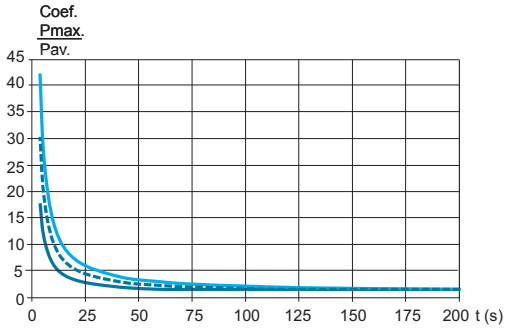

**VW3 A7 810** (P continuous = 44 kW)




**VW3 A7 811** (P continuous = 56 kW)




**VW3 A7 812** (P continuous = 75 kW)



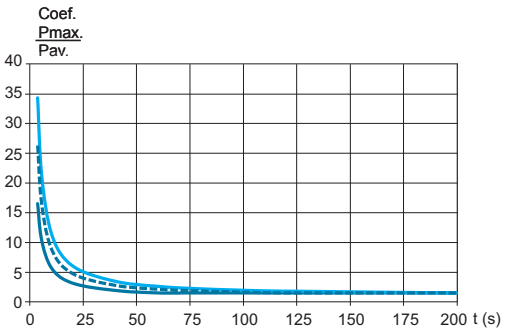

*P max./P av. (60 s cycle)*
*P max./P av. (120 s cycle)*
*P max./P av. (200 s cycle)*

Presentation: page 138 | Characteristics: page 138 | References: page 139 | Dimensions: page 206 | Schemes: page 226

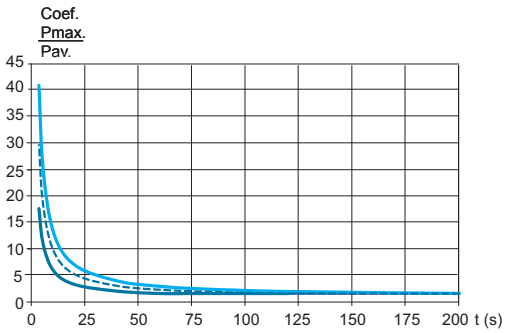
# Variable speed drives
## Altivar 71
## Characteristic curves for resistors

### Hoist resistors (continued)

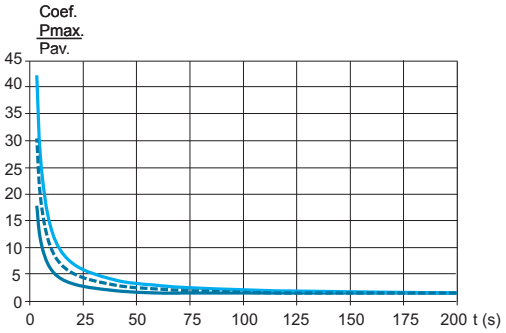
**VW3 A7 813** (P continuous = 112 kW)



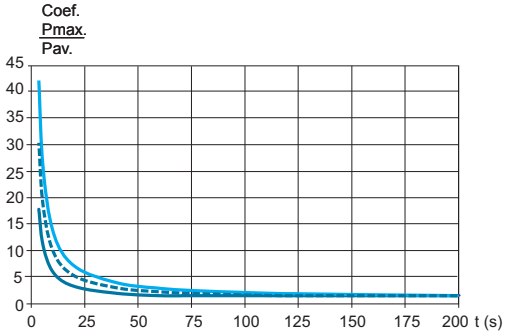

**VW3 A7 814** (P continuous = 112 kW)



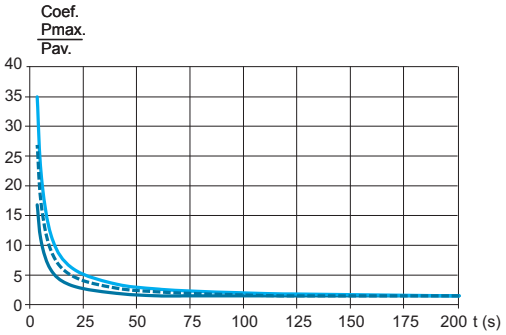

**VW3 A7 815** (P continuous = 150 kW)



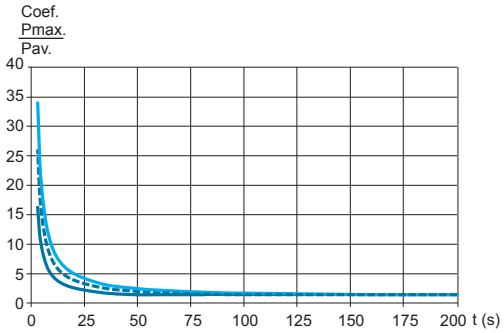

**VW3 A7 816** (P continuous = 225 kW)




**VW3 A7 817** (P continuous = 330 kW)



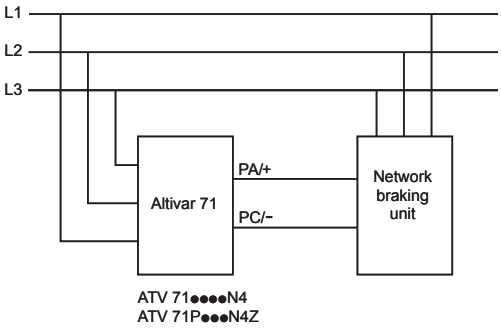

**VW3 A7 818** (P continuous = 70 kW)




*P max./P av. (60 s cycle)*
*P max./P av. (120 s cycle)*
*P max./P av. (200 s cycle)*

# Variable speed drives
## Altivar 71
## Option: network braking units

## Presentation




The network braking unit can be used to restore the following to the line supply:
- The energy from the motor
- The energy from motors controlled by several drives connected on the same DC bus.

It is available for **ATV 71●●●●N4** and **ATV 71P●●●N4Z** drives.

### Applications

Braking on a driving load:
- Vertical movements
- Escalators
- Etc.

## General characteristics

| | | | |
|---|---|---|---|
| **Degree of protection** | | | IP 20 |
| **Maximum relative humidity** | | | Class F humidity without condensation 5…85% |
| **Ambient air temperature** around the device | Operation | °C | 5…+ 40 without derating<br>Up to 55°C with output current derating of 3% per °C above 40°C |
| | Storage | °C | - 25…+ 55 |
| **Maximum operating altitude** | | m | 1000 without derating<br>1000…4000 derating the output current by 5% per additional 1000 m |

## Electrical characteristics

| **Module type** | | **VW3 A7 201…212** | **VW3 A7 231…241** |
|---|---|---|---|
| **Supply voltage** | V | 400 ∼ | 460 ∼ |
| **Nominal voltage ± 10%** | V | 380…415 ∼ | 440…480 ∼ |
| **Operating frequency** | Hz | 40…60 ± 10 % | |
| **Overload capacity** | A | 1.2 x maximum current (Irms) | |
| **Efficiency** | | 97% (3% thermal losses) | |
| **Power factor** | | 1 | |
| **Fundamental frequency component** | | 0.7…0.95 | |

## Connection characteristics

| | | | |
|---|---|---|---|
| **Maximum wire size** | VW3 A7 201 | | 25 mm², connected on a bar, M5 |
| | VW3 A7 202…205,<br>VW3 A7 231, 232 | | 35 mm², connected on a bar, M6 |
| | VW3 A7 206…209,<br>VW3 A7 233…238 | | 95 mm², connected on a bar, M8 |
| | VW3 A7 210…212,<br>VW3 A7 239…241 | | 150 mm², connected on a bar, M10 |

References: page 149 | Selection: pages 150 and 151 | Dimensions: pages 207 and 208 | Schemes: page 234

# Variable speed drives
## Altivar 71
## Option: network braking units

### Line voltage: 400 V ~

| Maximum current Irms ~ | Maximum current Irms ⎓ | Continuous braking power | Maximum braking power | Fuses Fast-acting semi-conductor ~ | Fuses Fast-acting semi-conductor ~ | Reference | Weight |
|---|---|---|---|---|---|---|---|
| A | A | kW | kW | A | V | | kg |
| 11 | 13 | 7 | 7 | 20 | 660 | **VW3 A7 201** | 20.000 |
| 20 | 24 | 13 | 13 | 30 | 690 | **VW3 A7 202** | 25.000 |
| 32 | 38 | 11 | 22 | 50 | 690 | **VW3 A7 203** | 26.000 |
| 48 | 58 | 21.5 | 33 | 80 | 690 | **VW3 A7 204** | 30.000 |
| 65 | 78 | 26 | 45 | 100 | 690 | **VW3 A7 205** | 32.000 |
| 102 | 123 | 32 | 70 | 160 | 660 | **VW3 A7 206** | 43.000 |
| 130 | 157 | 38 | 90 | 200 | 660 | **VW3 A7 207** | 48.000 |
| 195 | 236 | 38 | 135 | 315 | 660 | **VW3 A7 208** | 52.000 |
| 231 | 279 | 86 | 160 | 350 | 660 | **VW3 A7 209** | 90.000 |
| 289 | 350 | 120 | 200 | 400 | 1000 | **VW3 A7 210** | 100.000 |
| 360 | 433 | 135 | 250 | 500 | 1000 | **VW3 A7 211** | 115.000 |
| 500 | 600 | 200 | 345 | 630 | 1000 | **VW3 A7 212** | 125.000 |

### Line voltage: 460 V ~

| Maximum current Irms ~ | Maximum current Irms ⎓ | Continuous braking power | Maximum braking power | Fuses Fast-acting semi-conductor ~ | Fuses Fast-acting semi-conductor ~ | Reference | Weight |
|---|---|---|---|---|---|---|---|
| A | A | kW | kW | A | V | | kg |
| 28 | 33 | 11 | 22 | 50 | 690 | **VW3 A7 231** | 26.000 |
| 41 | 50 | 21.5 | 33 | 80 | 690 | **VW3 A7 232** | 30.000 |
| 57 | 69 | 26 | 45 | 100 | 690 | **VW3 A7 233** | 36.000 |
| 88 | 107 | 32 | 70 | 160 | 660 | **VW3 A7 234** | 43.000 |
| 113 | 137 | 38 | 90 | 200 | 660 | **VW3 A7 235** | 48.000 |
| 138 | 166 | 38 | 110 | 250 | 660 | **VW3 A7 236** | 48.000 |
| 157 | 189 | 38 | 125 | 250 | 660 | **VW3 A7 237** | 50.000 |
| 176 | 212 | 38 | 140 | 315 | 660 | **VW3 A7 238** | 90.000 |
| 201 | 243 | 86 | 160 | 315 | 660 | **VW3 A7 239** | 100.000 |
| 289 | 346 | 120 | 230 | 500 | 1000 | **VW3 A7 240** | 105.000 |
| 500 | 600 | 240 | 375 | 630 | 1000 | **VW3 A7 241** | 125.000 |

Presentation: page 148
Selection: pages 150 and 151
Dimensions: pages 207 and 208
Schemes: page 234

# Variable speed drives
Altivar 71
Characteristic curves

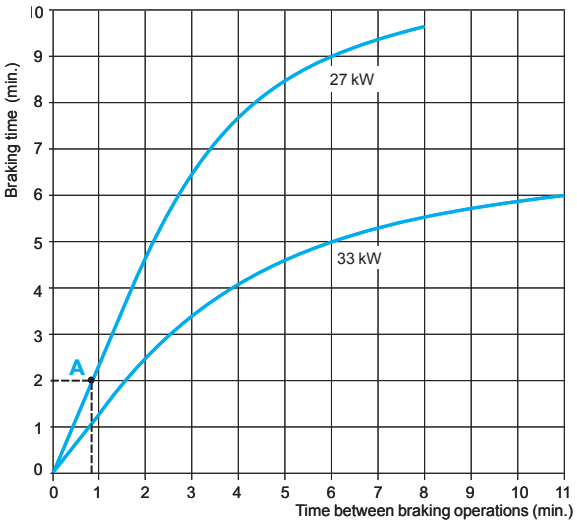
## Example of using characteristic curves

**VW3 A7 204, A7 232 (Continuous braking power = 21.5 kW)** *(1)*

***Example of using the curves:***

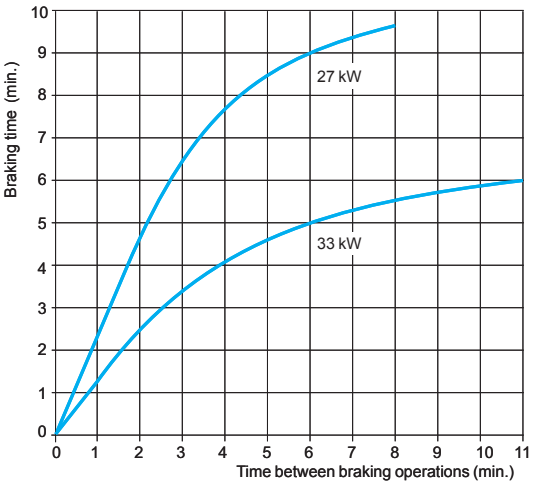
*Required braking power of 27 kW.*
*The intersection point between the braking time and the time between 2 braking operations must be on or below the relevant curve.*

*Point* ***A*** *For a braking time of 2 minutes, there must be at least 50 seconds between 2 braking operations.*

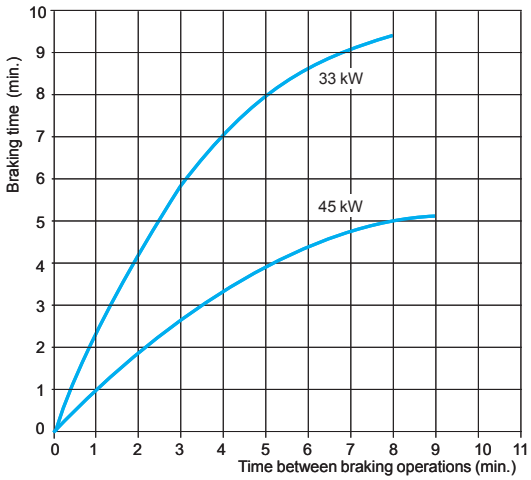



## Network braking units

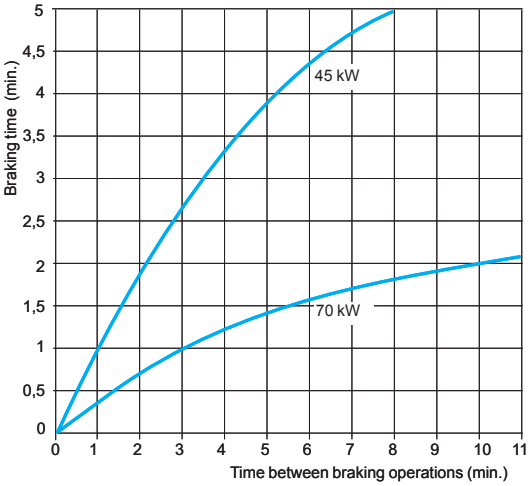
**VW3 A7 204, A7 232 (Continuous braking power = 21.5 kW)** *(1)*



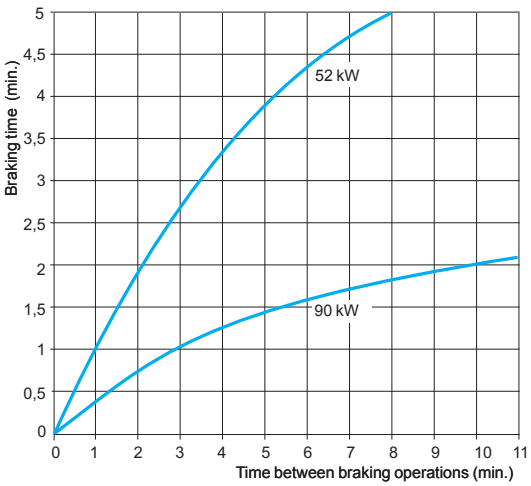

**VW3 A7 205, A7 233 (Continuous braking power = 26 kW)** *(1)*




**VW3 A7 206, A7 234 (Continuous braking power = 32 kW)** *(1)*




**VW3 A7 207, A7 235 (Continuous braking power = 38 kW)** *(1)*

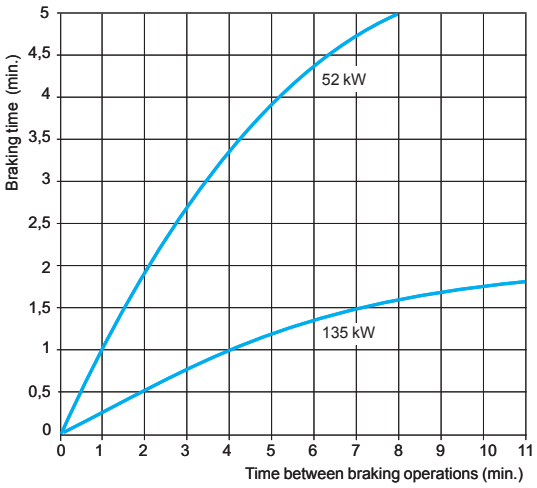



*(1) Power indicated for a temperature of 35°C.*

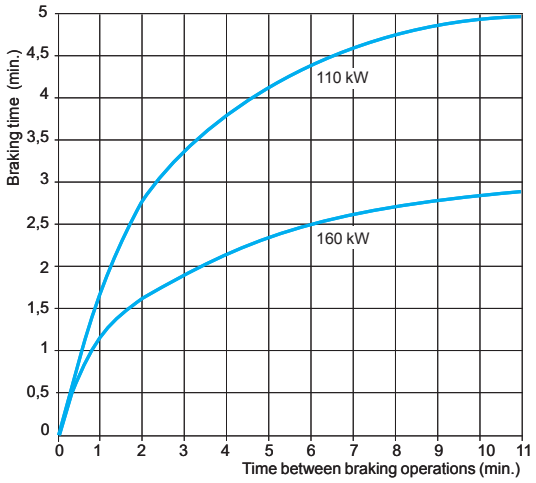
Presentation: page 148 | References: page 149 | Dimensions: pages 207 and 208 | Schemes: page 234

# Variable speed drives
## Altivar 71
## Characteristic curves

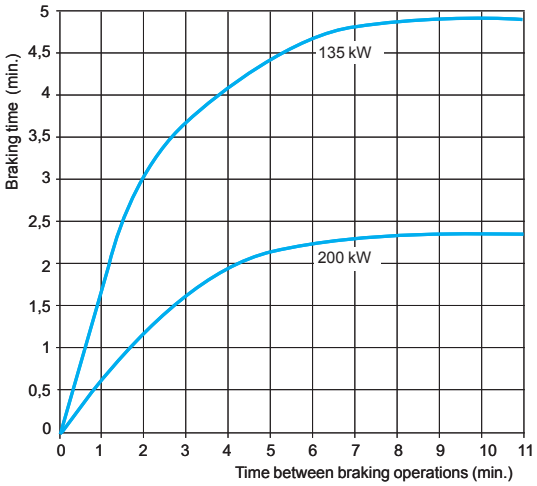
**VW3 A7 208 (Continuous braking power = 38 kW)** *(1)*



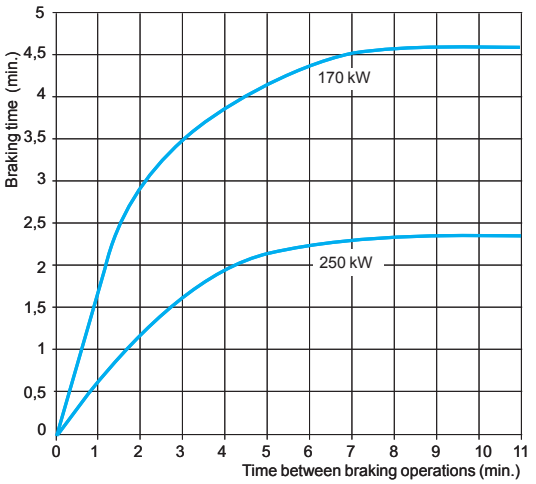

**VW3 A7 209, A7 239 (Continuous braking power = 86 kW)** *(1)*



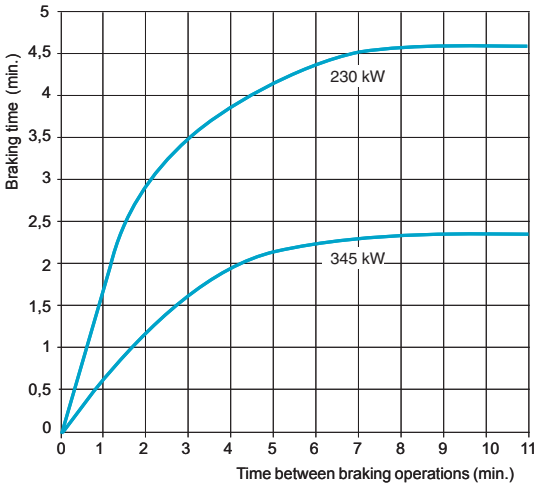

**VW3 A7 210, A7 240 (Continuous braking power = 120 kW)** *(1)*



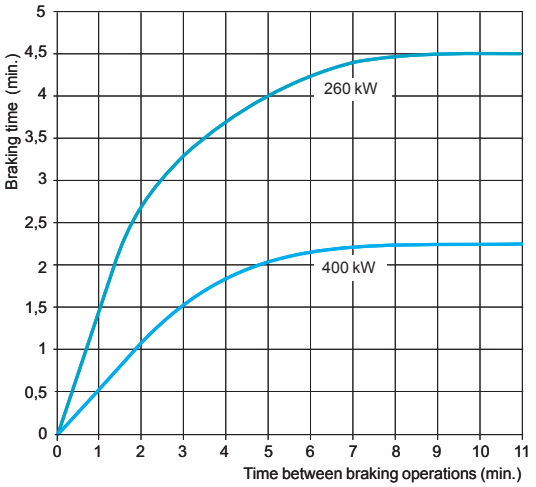

**VW3 A7 211 (Continuous braking power = 135 kW)** *(1)*




**VW3 A7 212 (Continuous braking power = 200 kW)** *(1)*



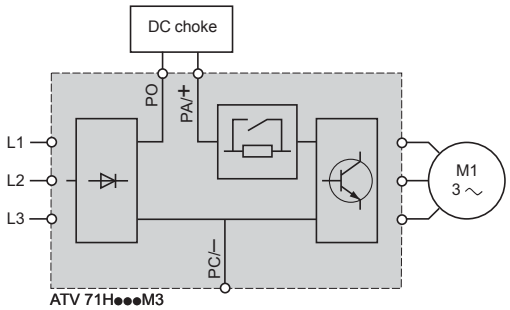

**VW3 A7 241 (Continuous braking power = 240 kW)** *(1)*




*(1) Power indicated for a temperature of 35°C.*

Presentation: page 148
References: page 149
Dimensions: pages 207 and 208
Schemes: page 234

# Variable speed drives
## Altivar 71: reduction of current harmonics
## Option: DC chokes




ATV 71H●●●M3
ATV 71H●●●M3X
ATV 71●●●●N4
ATV 71P●●●N4Z

Depending on the line supply, the main solutions for reducing current harmonics are as follows:
- DC chokes, see below
- Line chokes *(1)*, see page 156
- 16% and 10% passive filters, see page 161
- Use of passive filters with a DC choke, see page 161

These 4 solutions can be used on the same installation *(1)*.
It is always easier and less expensive to deal with current harmonics at installation level as a whole rather than at the level of each individual unit, particularly when using passive filters and active compensators.

### DC chokes

DC chokes are used to reduce current harmonics in order to comply with standard IEC 61000-3-12 for drives in which the line current is more than 16 A and less than 75 A.
Using a DC choke with the drive complies with standard IEC 61000-3-12 provided that the RSCE ⩾ 120 *(2)* at the point of connection to the public network.
120 represents the minimum value of RSCE *(2)* for which the values in table 4 of standard IEC 61000-3-12 are not exceeded.
It is the responsibility of the installer or the user to ensure that the device is connected correctly to a connection point with an RSCE ⩾ 120.
The choke is connected to the drive power terminals.

The DC choke is supplied as standard with ATV71HD55M3X, HD75M3X and ATV 71HD90N4…HC50N4 drives.
It is compulsory for ATV 71P●●●N4Z drives if they do not have a fan (see page 31).

#### Applications

Reduction of current harmonics.
Reduction of the THD to 5% or 10% when used with passive filters, see pages 161 to 165.
Maintaining the motor torque in relation to the line choke.

*(1) For ATV 71HU22Y…HD90Y drives, only line chokes are recommended.*
*For ATV 71HC11Y…HC63Y drives, a line choke is mandatory, see page 156.*
*(2) Short-circuit ratio.*

# Variable speed drives
## Altivar 71: reduction of current harmonics
## Option: DC chokes

### Example of current harmonic levels for ATV 71H●●●M3 and ATV 71H●●●M3X drives *(1)*

| Motor power | | For ATV 71 drives | Network | | Current harmonic levels | | | | | | | | | | | | | | | | | THD *(3)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Line current | Line Isc *(2)* | H1 | H5 | H7 | H11 | H13 | H17 | H19 | H23 | H25 | H29 | H31 | H35 | H37 | H41 | H43 | H47 | H49 | |
| kW | *HP* | | A | kA | A | % | % | % | % | % | % | % | % | % | % | % | % | % | % | % | % | |
| **Three-phase supply voltage: 230 V 50 Hz, with optional DC choke** | | | | | | | | | | | | | | | | | | | | | | |
| 0.37 | *0.5* | H037M3 | 1.5 | 5 | 1.4 | 26.7 | 18.4 | 9.1 | 7.7 | 5.8 | 5.1 | 4.3 | 3.8 | 3.4 | 3 | 2.8 | 2.5 | 2.4 | 2.2 | 2.1 | 1.9 | 36.3 |
| 0.75 | *1* | H075M3 | 3.05 | 5 | 2.81 | 31.99 | 20.91 | 8.88 | 7.36 | 5.6 | 4.63 | 4.07 | 3.42 | 3.18 | 2.71 | 2.59 | 2.24 | 2.17 | 1.91 | 1.86 | 1.66 | 41.27 |
| 1.5 | *2* | HU15M3 | 6.04 | 5 | 5.55 | 33.65 | 21.59 | 8.14 | 6.84 | 4.97 | 4.19 | 3.54 | 3.08 | 2.71 | 2.43 | 2.17 | 2.01 | 1.78 | 1.7 | 1.5 | 1.47 | 42.4 |
| 2.2 | *3* | HU22M3 | 8.33 | 5 | 7.64 | 34.89 | 21.11 | 8.78 | 6.72 | 5.36 | 4.1 | 3.8 | 3 | 2.9 | 2.37 | 2.29 | 1.95 | 1.85 | 1.66 | 1.52 | 1.44 | 43.33 |
| 3 | – | HU30M3 | 11.12 | 5 | 10.19 | 35.17 | 20.68 | 8.71 | 6.48 | 5.24 | 3.94 | 3.67 | 2.88 | 2.76 | 2.27 | 2.15 | 1.87 | 1.71 | 1.58 | 1.37 | 1.37 | 43.22 |
| 4 | *5* | HU40M3 | 14.53 | 5 | 13.29 | 36.23 | 20.51 | 8.73 | 6.2 | 5.2 | 3.73 | 3.61 | 2.71 | 2.68 | 2.14 | 2.06 | 1.76 | 1.61 | 1.49 | 1.27 | 1.28 | 43.91 |
| 5.5 | *7.5* | HU55M3 | 19.2 | 8 | 17.9 | 30.68 | 17.26 | 8.75 | 6.31 | 5.3 | 4.03 | 3.72 | 2.98 | 2.79 | 2.36 | 2.17 | 1.94 | 1.71 | 1.63 | 1.36 | 1.4 | 38 |
| 7.5 | *10* | HU75M3 | 26.1 | 15 | 23.9 | 35.23 | 21.09 | 8.82 | 6.71 | 5.38 | 4.09 | 3.82 | 2.98 | 2.91 | 2.35 | 2.31 | 1.92 | 1.87 | 1.63 | 1.54 | 1.4 | 43.96 |
| 11 | *15* | HD11M3X | 36.6 | 15 | 34.2 | 30.91 | 17.12 | 8.86 | 6.36 | 5.37 | 4.08 | 3.77 | 3.01 | 2.82 | 2.37 | 2.19 | 1.94 | 1.73 | 1.62 | 1.37 | 1.38 | 38.14 |
| 15 | *20* | HD15M3X | 48.6 | 15 | 55.8 | 25.51 | 13.46 | 8.73 | 6.32 | 5.25 | 4.21 | 3.6 | 3.11 | 2.62 | 2.42 | 1.95 | 1.93 | 1.47 | 1.56 | 1.12 | 1.26 | 35.34 |
| 18.5 | *25* | HD18M3X | 58.7 | 22 | 55.8 | 25.51 | 13.46 | 8.73 | 6.32 | 5.25 | 4.21 | 3.6 | 3.11 | 2.62 | 2.42 | 1.95 | 1.93 | 1.47 | 1.56 | 1.12 | 1.26 | 32.31 |
| 22 | *30* | HD22M3X | 70.28 | 22 | 65.92 | 29.81 | 15.91 | 8.7 | 6.15 | 5.23 | 3.99 | 3.63 | 2.95 | 2.68 | 2.32 | 2.04 | 1.89 | 1.57 | 1.57 | 1.22 | 1.32 | 36.62 |
| 30 | *40* | HD30M3X | 96.9 | 22 | 88.78 | 36.68 | 19.42 | 8.38 | 5.67 | 4.86 | 3.44 | 3.29 | 2.52 | 2.38 | 1.98 | 1.77 | 1.62 | 1.34 | 1.34 | 1.02 | 1.12 | 43.51 |
| 37 | *50* | HD37M3X | 116.1 | 22 | 107.9 | 33.09 | 16.4 | 8.59 | 5.59 | 4.97 | 3.54 | 3.33 | 2.6 | 2.36 | 2.03 | 1.72 | 1.63 | 1.26 | 1.32 | 0.94 | 1.06 | 39.24 |
| 45 | *60* | HD45M3X | 138.7 | 22 | 130.5 | 30.15 | 13.86 | 8.65 | 5.38 | 5.01 | 3.49 | 3.33 | 2.55 | 2.33 | 1.96 | 1.66 | 1.53 | 1.2 | 1.19 | 0.9 | 0.9 | 35.7 |
| **Three-phase supply voltage: 230 V 50 Hz, with DC choke supplied as standard with the drive** | | | | | | | | | | | | | | | | | | | | | | |
| 55 | *75* | HD55M3X | 163.5 | 35 | 175.8 | 46.43 | 27.19 | 8.18 | 6.32 | 4.57 | 3.27 | 3.06 | 2.23 | 2.23 | 1.69 | 1.70 | 1.35 | 1.33 | 1.10 | 1.07 | 0.90 | 55.32 |
| 75 | *100* | HD75M3X | 215.7 | 35 | 236.8 | 45.17 | 25.21 | 8.08 | 5.85 | 4.40 | 3.02 | 2.89 | 2.06 | 2.06 | 1.55 | 1.54 | 1.23 | 1.18 | 0.99 | 0.92 | 0.80 | 53.17 |

### Example of current harmonic levels for ATV 71H●●●N4 drives *(1)*

| Motor power | | For ATV 71 drives | Network | | Current harmonic levels | | | | | | | | | | | | | | | | | THD *(3)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Line current | Line Isc *(2)* | H1 | H5 | H7 | H11 | H13 | H17 | H19 | H23 | H25 | H29 | H31 | H35 | H37 | H41 | H43 | H47 | H49 | |
| kW | *HP* | | A | kA | A | % | % | % | % | % | % | % | % | % | % | % | % | % | % | % | % | |
| **Three-phase supply voltage: 400 V 50 Hz, with optional DC choke** | | | | | | | | | | | | | | | | | | | | | | |
| 0.75 | *1* | H075N4 | 1.77 | 5 | 1.61 | 34.6 | 23.7 | 8.9 | 7.8 | 5.6 | 4.8 | 4.1 | 3.5 | 3.2 | 2.8 | 2.6 | 2.3 | 2.2 | 1.9 | 1.9 | 1.7 | 44.95 |
| 1.5 | *2* | HU15N4 | 3.34 | 5 | 3.03 | 35.55 | 23.53 | 8.95 | 7.65 | 5.61 | 4.74 | 4.06 | 3.49 | 3.16 | 2.76 | 2.57 | 2.28 | 2.15 | 1.94 | 1.83 | 1.68 | 45.48 |
| 2.2 | *3* | HU22N4 | 4.83 | 5 | 4.4 | 35.79 | 22.77 | 8.7 | 7.11 | 5.41 | 4.36 | 3.89 | 3.2 | 3.01 | 2.53 | 2.43 | 2.09 | 2.01 | 1.77 | 1.7 | 1.53 | 45 |
| 3 | – | HU30N4 | 6.13 | 5 | 5.67 | 31.61 | 18.82 | 9.41 | 6.82 | 5.88 | 4.57 | 4.24 | 3.38 | 3.28 | 2.67 | 2.63 | 2.19 | 2.16 | 1.86 | 1.8 | 1.6 | 40.08 |
| 4 | *5* | HU40N4 | 8.24 | 5 | 7.51 | 36.16 | 21.63 | 9 | 8.17 | 5.52 | 4.17 | 3.93 | 3.05 | 3 | 2.4 | 2.38 | 1.98 | 1.93 | 1.68 | 1.58 | 1.45 | 44.72 |
| 5.5 | *7.5* | HU55N4 | 10.81 | 22 | 9.83 | 34.85 | 23.08 | 9.68 | 4.05 | 6.12 | 5.18 | 4.45 | 3.83 | 3.48 | 3.04 | 2.85 | 2.52 | 2.4 | 2.14 | 2.06 | 1.85 | 45.19 |
| 7.5 | *10* | HU75N4 | 15.01 | 10 | 13.8 | 34.09 | 20.49 | 8.57 | 6.43 | 5.28 | 3.95 | 3.78 | 2.89 | 2.9 | 2.28 | 2.32 | 1.88 | 1.9 | 1.59 | 1.58 | 1.37 | 42.25 |
| 11 | *15* | HD11N4 | 21.1 | 9 | 19.3 | 35.22 | 20.11 | 8.95 | 6.5 | 5.41 | 4.02 | 3.8 | 2.95 | 2.86 | 2.32 | 2.23 | 1.9 | 1.77 | 1.6 | 1.42 | 1.37 | 43.1 |
| 15 | *20* | HD15N4 | 28.2 | 12 | 25.8 | 35.22 | 20.01 | 8.98 | 6.49 | 5.43 | 4.02 | 3.82 | 2.94 | 2.88 | 2.32 | 2.24 | 1.9 | 1.78 | 1.6 | 1.43 | 1.37 | 43.06 |
| 18.5 | *25* | HD18N4 | 33.9 | 12 | 31.9 | 28.36 | 15.16 | 8.85 | 6.18 | 5.39 | 4.04 | 3.78 | 2.98 | 2.83 | 2.34 | 2.18 | 1.9 | 1.7 | 1.58 | 1.33 | 1.33 | 35.23 |
| 22 | *30* | HD22N4 | 40.87 | 22 | 37.85 | 32.79 | 18.73 | 8.6 | 6.42 | 5.28 | 4.09 | 3.75 | 3.03 | 2.85 | 2.4 | 2.25 | 1.97 | 1.81 | 1.67 | 1.48 | 1.44 | 40.4 |
| 30 | *40* | HD30N4 | 54.1 | 20 | 50.6 | 29.97 | 16.26 | 8.75 | 6.27 | 5.32 | 4.07 | 3.73 | 3.01 | 2.79 | 2.37 | 2.15 | 1.94 | 1.69 | 1.62 | 1.33 | 1.38 | 36.99 |
| 37 | *50* | HD37N4 | 66.43 | 22 | 62.6 | 28.49 | 15.01 | 8.63 | 6.08 | 5.23 | 4 | 3.65 | 2.97 | 2.71 | 2.34 | 2.07 | 1.9 | 1.61 | 1.58 | 1.26 | 1.32 | 35.13 |
| 45 | *60* | HD45N4 | 83.11 | 22 | 75.56 | 38.31 | 20.96 | 8.24 | 5.81 | 4.85 | 3.48 | 3.33 | 2.54 | 2.44 | 2 | 1.85 | 1.64 | 1.42 | 1.38 | 1.1 | 1.17 | 45.59 |
| 55 | *75* | HD55N4 | 98.6 | 22 | 91.69 | 32.94 | 16.76 | 8.5 | 5.68 | 4.98 | 3.62 | 3.38 | 2.67 | 2.44 | 2.09 | 1.81 | 1.69 | 1.37 | 1.39 | 1.04 | 1.14 | 39.29 |
| 75 | *100* | HD75N4 | 134 | 22 | 125.9 | 30.65 | 14.43 | 8.4 | 5.4 | 4.84 | 3.52 | 3.21 | 2.59 | 2.25 | 2 | 1.61 | 1.58 | 1.17 | 1.25 | 0.88 | 0.96 | 36.2 |
| **Three-phase supply voltage: 400 V 50 Hz, with DC choke supplied as standard with the drive** | | | | | | | | | | | | | | | | | | | | | | |
| 90 | *125* | HD90N4 | 158.81 | 35 | 145.1 | 36.72 | 20.66 | 8.33 | 6.19 | 4.93 | 3.78 | 3.43 | 2.75 | 2.56 | 2.13 | 1.99 | 1.72 | 1.59 | 1.4 | 1.29 | 1.16 | 44.26 |
| 110 | *150* | HC11N4 | 193.81 | 35 | 175.7 | 38.91 | 21.7 | 8.24 | 6.03 | 4.78 | 3.56 | 3.28 | 2.56 | 2.42 | 1.98 | 1.87 | 1.58 | 1.47 | 1.28 | 1.19 | 1.06 | 46.45 |
| 132 | *200* | HC13N4 | 228.92 | 35 | 209.3 | 37.23 | 20.02 | 8.26 | 5.8 | 4.76 | 3.51 | 3.26 | 2.52 | 2.38 | 1.94 | 1.82 | 1.55 | 1.42 | 1.24 | 1.12 | 1 | 44.23 |
| 160 | *250* | HC16N4 | 276.22 | 50 | 251.7 | 38.29 | 20.22 | 8.19 | 5.59 | 4.66 | 3.32 | 3.13 | 2.37 | 2.26 | 1.82 | 1.7 | 1.43 | 1.31 | 1.14 | 1.02 | 0.91 | 45.11 |
| 200 | *300* | HC20N4 | 340.29 | 50 | 313.6 | 36.03 | 17.85 | 8.16 | 5.3 | 4.59 | 3.25 | 3.05 | 2.32 | 2.17 | 1.76 | 1.6 | 1.37 | 1.2 | 1.05 | 0.91 | 0.82 | 42.07 |
| 220 | *350* | HC25N4 | 378.67 | 50 | 344.9 | 38.91 | 19.7 | 8.11 | 5.22 | 4.47 | 3.04 | 2.93 | 2.15 | 2.07 | 1.63 | 1.52 | 1.27 | 1.14 | 0.99 | 0.85 | 0.78 | 45.26 |
| 250 | *400* | HC25N4 | 423.72 | 50 | 390.1 | 36.61 | 17.59 | 8.11 | 5.04 | 4.46 | 3.04 | 2.9 | 2.16 | 2.02 | 1.62 | 1.46 | 1.24 | 1.07 | 0.95 | 0.78 | 0.73 | 42.35 |
| 280 | *450* | HC28N4 | 471.17 | 50 | 437.3 | 34.78 | 15.9 | 8.1 | 4.92 | 4.44 | 3.04 | 2.86 | 2.16 | 1.97 | 1.6 | 1.4 | 1.21 | 1 | 0.9 | 0.72 | 0.67 | 40.05 |
| 315 | *500* | HC31N4 | 528.66 | 50 | 492.2 | 34.19 | 15.08 | 8.03 | 4.79 | 4.36 | 2.98 | 2.78 | 2.1 | 1.88 | 1.54 | 1.31 | 1.14 | 0.92 | 0.84 | 0.65 | 0.61 | 39.15 |
| 355 | – | HC40N4 | 607.3 | 50 | 555.5 | 38.78 | 17.83 | 7.88 | 4.59 | 4.14 | 2.64 | 2.58 | 1.84 | 1.74 | 1.37 | 1.21 | 1.04 | 0.85 | 0.78 | 0.6 | 0.58 | 44.12 |
| 400 | *600* | HC40N4 | 675.3 | 50 | 623.4 | 36.78 | 15.99 | 7.86 | 4.43 | 4.1 | 2.64 | 2.53 | 1.85 | 1.67 | 1.35 | 1.13 | 0.99 | 0.78 | 0.73 | 0.54 | 0.53 | 41.6 |
| 500 | *700* | HC50N4 | 833.84 | 50 | 779.9 | 33.73 | 13.22 | 7.82 | 4.26 | 3.99 | 2.63 | 2.38 | 1.81 | 1.5 | 1.26 | 0.95 | 0.88 | 0.63 | 0.61 | 0.44 | 0.43 | 37.8 |

*(1) Example of current harmonic levels up to harmonic order 49 for a 230 V 50 Hz line supply for ATV 71H●●●M3 and ATV 71H●●●M3X drives or a 400 V 50 Hz line supply for ATV 71H●●●N4 drives, with the chokes connected between the PO and PA/+ terminals on the Altivar 71.*
*(2) The line Isc values are given for the current harmonic levels stated in the table.*
*(3) Total harmonic distortion in accordance with IEC 61000-3-12.*

Characteristics: page 155 | References: page 155 | Dimensions: page 209 | Schemes: pages 222 to 225

# Variable speed drives
## Altivar 71: reduction of current harmonics
## Option: DC chokes

### Example of current harmonic levels for ATV 71W●●●N4 drives *(1)*

**Three-phase supply voltage: 400 V 50 Hz, with optional DC choke**

| Motor power | | For ATV 71 drives | Network | | Current harmonic levels | | | | | | | | | | | | | | | | THD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Line current | Line Isc *(2)* | H1 | H5 | H7 | H11 | H13 | H17 | H19 | H23 | H25 | H29 | H31 | H35 | H37 | H41 | H43 | H47 | H49 | *(3)* |
| kW | *HP* | | A | kA | A | % | % | % | % | % | % | % | % | % | % | % | % | % | % | % | % | |
| 0.75 | *1* | W075N4 | 1.77 | 5 | 1.61 | 34.6 | 23.7 | 8.9 | 7.8 | 5.6 | 4.8 | 4.1 | 3.5 | 3.2 | 2.8 | 2.6 | 2.3 | 2.2 | 1.9 | 1.9 | 1.7 | 44.95 |
| 1.5 | *2* | WU15N4 | 3.34 | 5 | 3.03 | 35.55 | 23.53 | 8.95 | 7.65 | 5.61 | 4.74 | 4.06 | 3.49 | 3.16 | 2.76 | 2.57 | 2.28 | 2.15 | 1.94 | 1.83 | 1.68 | 45.48 |
| 2.2 | *3* | WU22N4 | 4.83 | 5 | 4.4 | 35.79 | 22.77 | 8.7 | 7.11 | 5.41 | 4.36 | 3.89 | 3.2 | 3.01 | 2.53 | 2.43 | 2.09 | 2.01 | 1.77 | 1.7 | 1.53 | 45 |
| 3 | – | WU30N4 | 6.13 | 5 | 5.67 | 31.61 | 18.82 | 9.41 | 6.82 | 5.88 | 4.57 | 4.24 | 3.38 | 3.28 | 2.67 | 2.63 | 2.19 | 2.16 | 1.86 | 1.8 | 1.6 | 40.08 |
| 4 | *5* | WU40N4 | 8.24 | 5 | 7.51 | 36.16 | 21.63 | 9 | 8.17 | 5.52 | 4.17 | 3.93 | 3.05 | 3 | 2.4 | 2.38 | 1.98 | 1.93 | 1.68 | 1.58 | 1.45 | 44.72 |
| 5.5 | *7.5* | WU55N4 | 10.81 | 22 | 9.83 | 34.85 | 23.08 | 9.68 | 4.05 | 6.12 | 5.18 | 4.45 | 3.83 | 3.48 | 3.04 | 2.85 | 2.52 | 2.4 | 2.14 | 2.06 | 1.85 | 45.19 |
| 7.5 | *10* | WU75N4 | 15.01 | 10 | 13.8 | 34.09 | 20.49 | 8.57 | 6.43 | 5.28 | 3.95 | 3.78 | 2.89 | 2.9 | 2.28 | 2.32 | 1.88 | 1.9 | 1.59 | 1.58 | 1.37 | 42.25 |
| 11 | *15* | WD11N4 | 21.1 | 9 | 19.3 | 35.22 | 20.11 | 8.95 | 6.5 | 5.41 | 4.02 | 3.8 | 2.95 | 2.86 | 2.32 | 2.23 | 1.9 | 1.77 | 1.6 | 1.42 | 1.37 | 43.1 |
| 15 | *20* | WD15N4 | 28.2 | 12 | 25.8 | 35.22 | 20.01 | 8.98 | 6.49 | 5.43 | 4.02 | 3.82 | 2.94 | 2.88 | 2.32 | 2.24 | 1.9 | 1.78 | 1.6 | 1.43 | 1.37 | 43.06 |
| 18.5 | *25* | WD18N4 | 33.9 | 12 | 31.9 | 28.36 | 15.16 | 8.85 | 6.18 | 5.39 | 4.04 | 3.78 | 2.98 | 2.83 | 2.34 | 2.18 | 1.9 | 1.7 | 1.58 | 1.33 | 1.33 | 35.23 |
| 22 | *30* | WD22N4 | 40.87 | 22 | 37.85 | 32.79 | 18.73 | 8.6 | 6.42 | 5.28 | 4.09 | 3.75 | 3.03 | 2.85 | 2.4 | 2.25 | 1.97 | 1.81 | 1.67 | 1.48 | 1.44 | 40.4 |
| 30 | *40* | WD30N4 | 54.1 | 20 | 50.6 | 29.97 | 16.26 | 8.75 | 6.27 | 5.32 | 4.07 | 3.73 | 3.01 | 2.79 | 2.37 | 2.15 | 1.94 | 1.69 | 1.62 | 1.33 | 1.38 | 36.99 |
| 37 | *50* | WD37N4 | 66.43 | 22 | 62.6 | 28.49 | 15.01 | 8.63 | 6.08 | 5.23 | 4 | 3.65 | 2.97 | 2.71 | 2.34 | 2.07 | 1.9 | 1.61 | 1.58 | 1.26 | 1.32 | 35.13 |
| 45 | *60* | WD45N4 | 83.11 | 22 | 75.56 | 38.31 | 20.96 | 8.24 | 5.81 | 4.85 | 3.48 | 3.33 | 2.54 | 2.44 | 2 | 1.85 | 1.64 | 1.42 | 1.38 | 1.1 | 1.17 | 45.59 |
| 55 | *75* | WD55N4 | 98.6 | 22 | 91.69 | 32.94 | 16.76 | 8.5 | 5.68 | 4.98 | 3.62 | 3.38 | 2.67 | 2.44 | 2,09 | 1.81 | 1.69 | 1.37 | 1.39 | 1.04 | 1.14 | 39.29 |
| 75 | *100* | WD75N4 | 134 | 22 | 125.9 | 30.65 | 14.43 | 8.4 | 5.4 | 4.84 | 3.52 | 3.21 | 2.59 | 2.25 | 2 | 1.61 | 1.58 | 1.17 | 1.25 | 0.88 | 0.96 | 36.2 |

### Example of current harmonic levels for ATV 71P●●●N4Z drives *(1)*

**Three-phase supply voltage: 400 V 50 Hz, with optional DC choke**

| Motor power | | For ATV 71 drives | Network | | Current harmonic levels | | | | | | | | | | | | | | | | THD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Line current | Line Isc *(2)* | H1 | H5 | H7 | H11 | H13 | H17 | H19 | H23 | H25 | H29 | H31 | H35 | H37 | H41 | H43 | H47 | H49 | *(3)* |
| kW | *HP* | | A | kA | A | % | % | % | % | % | % | % | % | % | % | % | % | % | % | % | % | |
| 0.75 | *1* | P075N4Z | 1.77 | 5 | 1.61 | 34.6 | 23.7 | 8.9 | 7.8 | 5.6 | 4.8 | 4.1 | 3.5 | 3.2 | 2.8 | 2.6 | 2.3 | 2.2 | 1.9 | 1.9 | 1.7 | 44.95 |
| 1.5 | *2* | PU15N4Z | 3.34 | 5 | 3.03 | 35.55 | 23.53 | 8.95 | 7.65 | 5.61 | 4.74 | 4.06 | 3.49 | 3.16 | 2.76 | 2.57 | 2.28 | 2.15 | 1.94 | 1.83 | 1.68 | 45.48 |
| 2.2 | *3* | PU22N4Z | 4.83 | 5 | 4.4 | 35.79 | 22.77 | 8.7 | 7.11 | 5.41 | 4.36 | 3.89 | 3.2 | 3.01 | 2.53 | 2.43 | 2.09 | 2.01 | 1.77 | 1.7 | 1.53 | 45 |
| 3 | – | PU30N4Z | 6.13 | 5 | 5.67 | 31.61 | 18.82 | 9.41 | 6.82 | 5.88 | 4.57 | 4.24 | 3.38 | 3.28 | 2.67 | 2.63 | 2.19 | 2.16 | 1.86 | 1.8 | 1.6 | 40.08 |
| 4 | *5* | PU40N4Z | 8.24 | 5 | 7.51 | 36.16 | 21.63 | 9 | 8.17 | 5.52 | 4.17 | 3.93 | 3.05 | 3 | 2.4 | 2.38 | 1.98 | 1.93 | 1.68 | 1.58 | 1.45 | 44.72 |
| 5.5 | *7,5* | PU55N4Z | 10.81 | 22 | 9.83 | 34.85 | 23.08 | 9.68 | 4.05 | 6.12 | 5.18 | 4.45 | 3.83 | 3.48 | 3.04 | 2.85 | 2.52 | 2.4 | 2.14 | 2.06 | 1.85 | 45.19 |
| 7.5 | *10* | PU75N4Z | 15.01 | 10 | 13.8 | 34.09 | 20.49 | 8.57 | 6.43 | 5.28 | 3.95 | 3.78 | 2.89 | 2.9 | 2.28 | 2.32 | 1.88 | 1.9 | 1.59 | 1.58 | 1.37 | 42.25 |
| 11 | *15* | PD11N4Z | 21.1 | 9 | 19.3 | 35.22 | 20.11 | 8.95 | 6.5 | 5.41 | 4.02 | 3.8 | 2.95 | 2.86 | 2.32 | 2.23 | 1.9 | 1.77 | 1.6 | 1.42 | 1.37 | 43.1 |

*(1) Example of current harmonic levels up to harmonic order 49 for a 400 V 50 Hz line supply with chokes connected between the PO and PA/+ terminals on the Altivar 71.*
*(2) The line Isc values are given for the current harmonic levels stated in the table.*
*(3) Total harmonic distortion in accordance with IEC 61000-3-12.*

Characteristics: page 155 | References: page 155 | Dimensions: page 209 | Schemes: pages 222 to 225

# Variable speed drives
## Altivar 71: reduction of current harmonics
## Option: DC chokes

## General characteristics

| | | | |
|---|---|---|---|
| **Degree of protection** | | | IP 20 |
| **Maximum relative humidity** | | | 95 % |
| **Ambient air temperature** around the device | Operation | **°C** | - 10…+ 50 without derating<br>Up to 60°C with current derating of 2.2% per °C above 50°C |
| | Storage | **°C** | - 40…+ 65 |
| **Maximum operating altitude** | | **m** | 1000 without derating<br>1000…3000 with current derating of 1% per additional 100 m |
| **Voltage drop** | | | 4 to 6% |
| **Maximum current** | | | 1.65 x nominal current for 60 seconds |

## Connection characteristics

| **Type of terminal** | | **Earth** | **Power Supply** |
|---|---|---|---|
| **Maximum wire size and tightening torque** | VW3 A4 501…505 | 10 mm² (AWG 6)<br>1.2…1.4 Nm | 2.5 mm² (AWG 12)<br>0.4…0.6 Nm |
| | VW3 A4 506 | 10 mm² (AWG 6)<br>1.2…1.4 Nm | 4 mm² (AWG 10)<br>0.5…0.8 Nm |
| | VW3 A4 507 | 10 mm² (AWG 6)<br>1.2…1.4 Nm | 6 mm² (AWG 8)<br>0.8…1 Nm |
| | VW3 A4 508, 509 | 10 mm² (AWG 6)<br>1.2…1.4 Nm | 10 mm² (AWG 6)<br>1.2…1.4 Nm |
| | VW3 A4 510 | 10 mm² (AWG 6)<br>1.2…1.4 Nm | 35 mm² (AWG 0)<br>2.5…3 Nm |
| | VW3 A4 511 | – | Connected on a bar, Ø 9<br>– |
| | VW3 A4 512 | – | Connected on a bar, Ø 9<br>– |

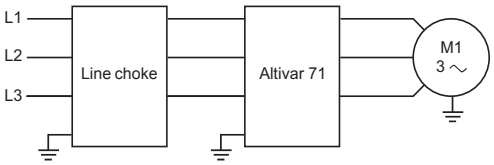
## DC chokes *(1)*

| For drives | Value of the inductance | Nominal current | Loss | Reference | Weight |
|---|---|---|---|---|---|
| | mH | A | W | | kg |
| **Three-phase supply voltage: 200…240 V 50/60 Hz** | | | | | |
| ATV 71H037M3 | 18 | 2.25 | 7.7 | **VW3 A4 501** | 0.650 |
| ATV 71H075M3 | 6.8 | 8 | 22.5 | **VW3 A4 503** | 1.700 |
| ATV 71HU15M3 | 3.2 | 14.3 | 32 | **VW3 A4 505** | 2.200 |
| ATV 71HU22M3 | 2.2 | 19.2 | 33 | **VW3 A4 506** | 2.500 |
| ATV 71HU30M3 | 1.6 | 27.4 | 43 | **VW3 A4 507** | 3.000 |
| ATV 71HU40M3, HU55M3 | 1.2 | 44 | 61 | **VW3 A4 508** | 4.300 |
| ATV 71HU75M3 | 0.7 | 36 | 30.5 | **VW3 A4 509** | 2.500 |
| ATV 71HD11M3X, HD15M3X | 0.52 | 84.5 | 77 | **VW3 A4 510** | 6.400 |
| ATV 71HD18M3X, HD22M3X | 0.22 | 171.2 | 86 | **VW3 A4 511** | 17.850 |
| ATV 71HD30M3X…HD45M3X | 0.09 | 195 | 73 | **VW3 A4 512** | 10.000 |
| **Three-phase supply voltage: 380…480 V 50/60 Hz** | | | | | |
| ATV 71H075N4<br>ATV 71W075N4<br>ATV 71P075N4Z | 18 | 2.25 | 7.7 | **VW3 A4 501** | 0.650 |
| ATV 71HU15N4<br>ATV 71WU15N4<br>ATV 71PU15N4Z | 10 | 4.3 | 11 | **VW3 A4 502** | 1.000 |
| ATV 71HU22N4, HU30N4<br>ATV 71WU22N4, WU30N4<br>ATV 71PU22N4Z, PU30N4Z | 6.8 | 8 | 22.5 | **VW3 A4 503** | 1.700 |
| ATV 71HU40N4<br>ATV 71WU40N4<br>ATV 71PU40N4Z | 3.9 | 10.7 | 27 | **VW3 A4 504** | 1.650 |
| ATV 71HU55N4<br>ATV 71WU55N4<br>ATV 71PU55N4Z | 3.2 | 14.3 | 32 | **VW3 A4 505** | 2.200 |
| ATV 71HU75N4<br>ATV 71WU75N4<br>ATV 71PU75N4Z | 2.2 | 19.2 | 33 | **VW3 A4 506** | 2.500 |
| ATV 71HD11N4<br>ATV 71WD11N4<br>ATV 71PD11N4Z | 1.6 | 27.4 | 43 | **VW3 A4 507** | 3.000 |
| ATV 71HD15N4, HD18N4<br>ATV 71WD15N4, WD18N4 | 1.2 | 44 | 57.5 | **VW3 A4 508** | 4.300 |
| ATV 71HD22N4…HD37N4<br>ATV 71WD22N4…WD37N4 | 0.52 | 84.5 | 98.3 | **VW3 A4 510** | 6.400 |
| ATV 71HD45N4…HD75N4<br>ATV 71WD45N4…WD75N4 | 0.22 | 171.2 | 128 | **VW3 A4 511** | 17.850 |

*(1) For ATV 71HD55M3X, HD75M3X and ATV 71HD90N4…HC50N4 drives, the DC choke is supplied with the drive.*

Presentation: pages 152 to 154
Dimensions: page 209
Schemes: pages 222 to 225

# Variable speed drives
## Altivar 71: reduction of current harmonics
## Option: line chokes




### Line chokes

A line choke can be used to provide improved protection against overvoltages on the line supply and to reduce harmonic distortion of the current produced by the drive.

They are recommended for ATV 71HU22Y…HD90Y drives.Line chokes are mandatory for:
- ATV 71HU40M3…HU75M3 drives powered by a 200…240 V 50/60 Hz single-phase supply voltage
- ATV 71HC11Y…HC63Y drives

For ATV 71H●●●M3 drives powered by a 200…240 V 50/60 Hz three-phase supply voltage, ATV 71H●●●M3X, ATV 71●●●●N4 and ATV 71P●●●N4Z, line chokes can be used instead of a DC choke.
In this case, to obtain an ATV 71HD55M3X, HD75M3X or ATV 71HD90N4…HC50N4 drive without a DC choke, add the letter D at the end of the drive reference,
see pages 22 and 23.

The recommended chokes limit the line current.
They have been developed in line with standard EN 50178 (VDE 0160 level 1 high energy overvoltages on the line supply).

The choke values are defined for a voltage drop between phases of between 3% and 5% of the nominal supply voltage. Values higher than this will cause loss of torque.

These chokes should be installed upstream of the drive.

#### Applications

The use of line chokes is recommended in particular under the following circumstances:
- Close connection of several drives in parallel
- Line supply with significant disturbance from other equipment (interference, overvoltages)
- Line supply with voltage imbalance between phases above 1.8% of the nominal voltage
- Drive supplied by a line with very low impedance (in the vicinity of a power transformer 10 times more powerful than the drive rating)
- Installation of a large number of frequency inverters on the same line
- Reducing overloads on the cosφ correction capacitors, if the installation includes a power factor correction unit.

Characteristics: page 159
References: page 160
Dimensions: page 209
Schemes: pages 222 to 225

# Variable speed drives
## Altivar 71: reduction of current harmonics
## Option: line chokes

### Example of current harmonic levels for ATV 71H●●●Y drives *(1)*

**Three-phase supply voltage: 500 V 50 Hz, with optional line choke**

| Motor power | For ATV 71 drives | Network | | Current harmonic levels | | | | | | | | | | | | | | | | | THD *(3)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Line current | Line Isc *(2)* | H1 | H5 | H7 | H11 | H13 | H17 | H19 | H23 | H25 | H29 | H31 | H35 | H37 | H41 | H43 | H47 | H49 | |
| kW | | A | kA | A | % | % | % | % | % | % | % | % | % | % | % | % | % | % | % | % | |
| 1.5 | HU22Y *(4)* | 2.7 | 22 | 2.5 | 38 | 14 | 7.6 | 3.7 | 3.4 | 2.1 | 1.8 | 1.4 | 1 | 0.9 | 0.6 | 0.6 | 0.4 | 0.4 | 0.4 | 0.3 | 41.3 |
| 2.2 | HU30Y *(4)* | 3.8 | 22 | 3.6 | 32.7 | 10.1 | 6.9 | 3.4 | 2.8 | 2 | 1.3 | 1.2 | 0.7 | 0.7 | 0.5 | 0.5 | 0.4 | 0.4 | 0.3 | 0.3 | 35.3 |
| 3 | HU40Y *(4)* | 5 | 22 | 4.8 | 29.3 | 8.4 | 6.1 | 3.4 | 2.2 | 1.9 | 1 | 1 | 0.7 | 0.6 | 0.5 | 0.4 | 0.4 | 0.3 | 0.3 | 0.2 | 31.47 |
| 4 | HU55Y *(4)* | 6.7 | 22 | 6.2 | 36.2 | 13 | 7.5 | 3.6 | 3.4 | 2.1 | 1.8 | 1.4 | 1 | 0.9 | 0.6 | 0.6 | 0.4 | 0.4 | 0.4 | 0.3 | 39.63 |
| 5.5 | HU75Y *(4)* | 8.9 | 22 | 8.4 | 32.3 | 10 | 6.9 | 3.5 | 2.9 | 2.1 | 1.4 | 1.3 | 0.8 | 0.7 | 0.5 | 0.5 | 0.4 | 0.4 | 0.3 | 0.3 | 34.93 |
| 7.5 | HD11Y *(4)* | 12 | 22 | 11.2 | 35.5 | 12.9 | 7.5 | 3.7 | 3.5 | 2.2 | 1.9 | 1.5 | 1.1 | 1 | 0.7 | 0.7 | 0.5 | 0.4 | 0.4 | 0.3 | 39.05 |
| 11 | HD15Y *(4)* | 16.9 | 22 | 16 | 31.1 | 9.6 | 6.9 | 3.6 | 2.9 | 2.1 | 1.4 | 1.3 | 0.8 | 0.7 | 0.5 | 0.5 | 0.4 | 0.4 | 0.3 | 0.3 | 33.76 |
| 15 | HD18Y *(4)* | 22.1 | 22 | 20.8 | 33.1 | 11.6 | 7.4 | 3.9 | 3.5 | 2.4 | 1.9 | 1.6 | 1.1 | 1.0 | 0.7 | 0.7 | 0.5 | 0.4 | 0.4 | 0.3 | 36.48 |
| 18.5 | HD22Y *(4)* | 27.1 | 22 | 25.7 | 30.8 | 9.9 | 7.2 | 3.9 | 3.3 | 2.3 | 1.7 | 1.4 | 0.9 | 0.9 | 0.6 | 0.5 | 0.4 | 0.4 | 0.4 | 0.3 | 33.72 |
| 22 | HD30Y *(4)* | 32 | 22 | 30.1 | 32.4 | 12.1 | 7.6 | 4.3 | 3.9 | 2.7 | 2.3 | 1.8 | 1.4 | 1.2 | 0.9 | 0.8 | 0.6 | 0.5 | 0.4 | 0.4 | 36.16 |
| 30 | HD37Y *(4)* | 43.9 | 22 | 41.2 | 34 | 11.5 | 7.5 | 3.7 | 3.5 | 2.3 | 1.9 | 1.5 | 1.1 | 1 | 0.7 | 0.7 | 0.5 | 0.4 | 0.4 | 0.3 | 36.97 |
| 37 | HD45Y *(4)* | 53.8 | 22 | 51 | 31.3 | 9.8 | 7.2 | 3.7 | 3.2 | 2.3 | 1.6 | 1.4 | 0.9 | 0.9 | 0.6 | 0.5 | 0.4 | 0.4 | 0.4 | 0.3 | 34.1 |
| 45 | HD55Y *(4)* | 64.1 | 22 | 60.4 | 32.2 | 10.9 | 7.5 | 3.9 | 3.6 | 2.4 | 2 | 1.6 | 1.2 | 1.1 | 0.7 | 0.7 | 0.5 | 0.5 | 0.4 | 0.3 | 35.42 |
| 55 | HD75Y *(4)* | 78.6 | 22 | 74.1 | 32.7 | 10.4 | 7.2 | 3.7 | 3.3 | 2.3 | 1.8 | 1.5 | 1 | 0.9 | 0.6 | 0.6 | 0.4 | 0.4 | 0.4 | 0.3 | 35.56 |
| 75 | HD90Y *(4)* | 106.5 | 22 | 101.5 | 29.4 | 8.5 | 6.7 | 3.7 | 2.9 | 2.2 | 1.4 | 1.2 | 0.7 | 0.7 | 0.5 | 0.4 | 0.4 | 0.4 | 0.3 | 0.3 | 31.83 |
| 90 | HC11Y *(5)* | 127.2 | 22 | 117.3 | 38.7 | 13.93 | 7.12 | 3.2 | 3.02 | 1.87 | 1.57 | 1.15 | 0.84 | 0.78 | 0.52 | 0.49 | 0.36 | 0.33 | 0.29 | 0.22 | 42.11 |
| 110 | HC13Y *(5)* | 153 | 28 | 142.9 | 35.5 | 11.18 | 6.68 | 3.17 | 2.67 | 1.83 | 1.24 | 1.14 | 0.69 | 0.69 | 0.47 | 0.42 | 0.36 | 0.29 | 0.27 | 0.23 | 38.17 |
| 132 | HC16Y *(5)* | 181.4 | 28 | 171.1 | 33.1 | 9.38 | 6.2 | 3.14 | 2.36 | 1.78 | 1.03 | 0.99 | 0.62 | 0.54 | 0.45 | 0.36 | 0.33 | 0.28 | 0.22 | 0.2 | 35.28 |
| 160 | HC20Y *(5)* | 226.5 | 35 | 205.7 | 42 | 16.92 | 7.22 | 3.54 | 3.23 | 1.82 | 1.72 | 1.17 | 1 | 0.83 | 0.58 | 0.58 | 0.41 | 0.38 | 0.27 | 0.27 | 46.24 |
| 200 | HC25Y *(5)* | 276.9 | 35 | 256.1 | 37.9 | 13.25 | 6.93 | 3.15 | 2.87 | 1.85 | 1.41 | 1.19 | 0.75 | 0.75 | 0.47 | 0.47 | 0.33 | 0.3 | 0.26 | 0.24 | 41.05 |
| 250 | HC31Y *(5)* | 341.7 | 35 | 320.4 | 34.7 | 10.26 | 6.42 | 3.07 | 2.52 | 1.79 | 1.17 | 1.04 | 0.64 | 0.6 | 0.44 | 0.35 | 0.33 | 0.26 | 0.24 | 0.2 | 37.05 |
| 315 | HC40Y *(5)* | 438.9 | 35 | 401.8 | 40.2 | 15.44 | 7.22 | 3.29 | 3.1 | 1.87 | 1.64 | 1.16 | 0.9 | 0.83 | 0.56 | 0.53 | 0.37 | 0.37 | 0.3 | 0.25 | 44.05 |
| 400 | HC50Y *(5)* | 543.5 | 35 | 509.5 | 34.6 | 10.56 | 6.59 | 3.14 | 2.6 | 1.83 | 1.18 | 1.12 | 0.65 | 0.65 | 0.4 | 0.4 | 0.36 | 0.29 | 0.25 | 0.24 | 37.14 |
| 500 | HC63Y *(5)* | 672.3 | 42 | 637.1 | 31.8 | 8.62 | 5.98 | 3.14 | 2.15 | 1.74 | 0.95 | 0.93 | 0.62 | 0.51 | 0.46 | 0.34 | 0.31 | 0.28 | 0.2 | 0.2 | 33.75 |

**Three-phase supply voltage: 600 V 60 Hz, with optional line choke**

| Motor power | For ATV 71 drives | Network | | Current harmonic levels | | | | | | | | | | | | | | | | | THD *(3)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Line current | Line Isc *(2)* | H1 | H5 | H7 | H11 | H13 | H17 | H19 | H23 | H25 | H29 | H31 | H35 | H37 | H41 | H43 | H47 | H49 | |
| *HP* | | A | kA | A | % | % | % | % | % | % | % | % | % | % | % | % | % | % | % | % | |
| *2* | HU22Y *(4)* | 2.3 | 22 | 2.1 | 40.5 | 16.7 | 7.9 | 4 | 3.6 | 2.1 | 2 | 1.4 | 1.2 | 1 | 0.8 | 0.7 | 0.5 | 0.5 | 0.4 | 0.4 | 45.01 |
| *3* | HU30Y *(4)* | 3.2 | 22 | 3 | 34.9 | 11.8 | 7.3 | 3.5 | 3.1 | 2.1 | 1.6 | 1.3 | 0.9 | 0.8 | 0.6 | 0.5 | 0.4 | 0.4 | 0.3 | 0.3 | 38.03 |
| – | HU40Y *(4)* | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – |
| *5* | HU55Y *(4)* | 5.6 | 22 | 5.2 | 38.6 | 15.3 | 7.8 | 3.9 | 3.6 | 2.1 | 2 | 1.5 | 1.2 | 1 | 0.7 | 0.7 | 0.5 | 0.5 | 0.4 | 0.4 | 42.79 |
| *7.5* | HU75Y *(4)* | 7.4 | 22 | 7 | 34.3 | 11.5 | 7.3 | 3.6 | 3.2 | 2.1 | 1.6 | 1.4 | 0.9 | 0.9 | 0.6 | 0.5 | 0.4 | 0.4 | 0.3 | 0.3 | 37.36 |
| *10* | HD11Y *(4)* | 10.1 | 22 | 9.3 | 37.7 | 15 | 7.8 | 3.9 | 3.7 | 2.2 | 2.1 | 1.5 | 1.2 | 1.1 | 0.8 | 0.8 | 0.5 | 0.5 | 0.4 | 0.4 | 41.81 |
| *15* | HD15Y *(4)* | 14.1 | 22 | 13.3 | 32.7 | 10.8 | 7.3 | 3.7 | 3.2 | 2.2 | 1.6 | 1.4 | 0.9 | 0.9 | 0.6 | 0.5 | 0.4 | 0.4 | 0.3 | 0.3 | 35.75 |
| *20* | HD18Y *(4)* | 18.5 | 22 | 17.3 | 34.6 | 13.1 | 7.7 | 4 | 3.8 | 2.4 | 2.1 | 1.7 | 1.3 | 1.1 | 0.8 | 0.8 | 0.5 | 0.5 | 0.4 | 0.4 | 38.44 |
| *25* | HD22Y *(4)* | 22.7 | 22 | 21.4 | 32.1 | 11 | 7.5 | 3.9 | 3.5 | 2.4 | 1.9 | 1.6 | 1.1 | 1 | 0.7 | 0.6 | 0.5 | 0.4 | 0.4 | 0.3 | 35.31 |
| *30* | HD30Y *(4)* | 26.7 | 22 | 25 | 33.4 | 13.3 | 7.9 | 4.4 | 4.1 | 2.7 | 2.4 | 1.9 | 1.5 | 1.3 | 1 | 0.9 | 0.7 | 0.6 | 0.5 | 0.4 | 37.61 |
| *40* | HD37Y *(4)* | 36.8 | 22 | 34.2 | 36 | 13.4 | 7.7 | 3.9 | 3.7 | 2.3 | 2.1 | 1.6 | 1.3 | 1.1 | 0.8 | 0.8 | 0.5 | 0.5 | 0.4 | 0.4 | 39.39 |
| *50* | HD45Y *(4)* | 45 | 22 | 42.3 | 32.9 | 11.1 | 7.5 | 3.8 | 3.5 | 2.3 | 1.9 | 1.5 | 1.1 | 1 | 0.7 | 0.6 | 0.5 | 0.4 | 0.4 | 0.3 | 36.07 |
| *60* | HD55Y *(4)* | 53.6 | 22 | 50.2 | 33.7 | 12.4 | 7.7 | 4 | 3.8 | 2.5 | 2.2 | 1.7 | 1.3 | 1.2 | 0.8 | 0.8 | 0.6 | 0.5 | 0.4 | 0.4 | 37.38 |
| *75* | HD75Y *(4)* | 65.7 | 22 | 61.5 | 34 | 11.9 | 7.5 | 3.8 | 3.6 | 2.3 | 2 | 1.6 | 1.2 | 1.1 | 0.7 | 0.7 | 0.5 | 0.4 | 0.4 | 0.3 | 37.39 |
| *100* | HD90Y *(4)* | 88.7 | 22 | 84.2 | 30.5 | 9.4 | 7.1 | 3.8 | 3.2 | 2.3 | 1.6 | 1.4 | 0.9 | 0.8 | 0.6 | 0.5 | 0.4 | 0.4 | 0.3 | 0.3 | 33.24 |
| *125* | HC11Y *(5)* | 112.4 | 22 | 103.1 | 39.6 | 14.95 | 7.34 | 3.5 | 3.16 | 1.85 | 1.65 | 1.23 | 0.89 | 0.82 | 0.53 | 0.53 | 0.34 | 0.35 | 0.26 | 0.23 | 43.31 |
| *150* | HC13Y *(5)* | 132.8 | 28 | 123.4 | 36.7 | 12.32 | 6.99 | 3.27 | 2.92 | 1.89 | 1.43 | 1.2 | 0.74 | 0.74 | 0.48 | 0.45 | 0.35 | 0.28 | 0.27 | 0.2 | 39.73 |
| *180* | HC16Y *(5)* | 158.9 | 28 | 149.3 | 34.1 | 10.23 | 6.58 | 3.17 | 2.61 | 1.85 | 1.18 | 1.09 | 0.66 | 0.62 | 0.46 | 0.37 | 0.35 | 0.27 | 0.25 | 0.2 | 36.5 |
| *200* | HC20Y *(5)* | 203.9 | 35 | 184.5 | 42.6 | 17.75 | 7.47 | 3.87 | 3.26 | 1.88 | 1.76 | 1.23 | 1.07 | 0.84 | 0.61 | 0.57 | 0.38 | 0.42 | 0.29 | 0.27 | 47.13 |
| *250* | HC25Y *(5)* | 249.2 | 35 | 229.8 | 38.5 | 13.82 | 7.17 | 3.35 | 3.08 | 1.85 | 1.57 | 1.2 | 0.86 | 0.8 | 0.52 | 0.49 | 0.34 | 0.31 | 0.28 | 0.22 | 41.91 |
| *350* | HC31Y *(5)* | 310.6 | 35 | 290.8 | 35 | 10.87 | 6.71 | 3.16 | 2.7 | 1.85 | 1.26 | 1.12 | 0.68 | 0.66 | 0.46 | 0.39 | 0.34 | 0.27 | 0.27 | 0.2 | 37.61 |
| *450* | HC40Y *(5)* | 400.3 | 35 | 365.4 | 40.8 | 15.83 | 7.34 | 3.56 | 3.25 | 1.76 | 1.7 | 1.14 | 0.93 | 0.79 | 0.56 | 0.54 | 0.37 | 0.33 | 0.25 | 0.23 | 44.78 |
| *550* | HC50Y *(5)* | 490.9 | 35 | 458.8 | 35.4 | 11.21 | 6.84 | 3.21 | 2.77 | 1.85 | 1.31 | 1.14 | 0.69 | 0.69 | 0.46 | 0.42 | 0.35 | 0.28 | 0.26 | 0.2 | 38.08 |
| *700* | HC63Y *(5)* | 612.5 | 42 | 577.4 | 33.1 | 9.68 | 6.44 | 3.2 | 2.45 | 1.84 | 1.08 | 1.05 | 0.61 | 0.6 | 0.45 | 0.37 | 0.34 | 0.27 | 0.23 | 0.21 | 35.42 |

*(1) Example of current harmonic levels up to harmonic order 49 for a 500 V 50 Hz or 600 V 60 Hz line supply for ATV 71H●●●Y drives, with line chokes.*
*(2) The line Isc values are given for the current harmonic levels stated in the table.*
*(3) Total harmonic distortion in accordance with IEC 61000-3-12.*
*(4) Use of a line choke is recommended.*
*(5) Use of a line choke is mandatory.*

Characteristics: page 159
References: page 160
Dimensions: page 209
Schemes: pages 222 to 225

# Variable speed drives
## Altivar 71: reduction of current harmonics
## Option: line chokes

### Example of current harmonic levels for ATV 71H●●●Y drives *(1)* (continued)

**Three-phase supply voltage: 690 V 50 Hz, with optional line choke**

| Motor power | For ATV 71 drives | Network | | Current harmonic levels | | | | | | | | | | | | | | | | THD *(3)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Line current | Line Isc *(2)* | H1 | H5 | H7 | H11 | H13 | H17 | H19 | H23 | H25 | H29 | H31 | H35 | H37 | H41 | H43 | H47 | H49 | |
| kW | | A | kA | A | % | % | % | % | % | % | % | % | % | % | % | % | % | % | % | % | |
| 2.2 | HU22Y *(4)* | 2.8 | 22 | 2.6 | 43 | 19 | 8 | 4.4 | 3.7 | 2.1 | 2.1 | 1.4 | 1.3 | 1 | 0.8 | 0.8 | 0.6 | 0.6 | 0.4 | 0.4 | 47.81 |
| 3 | HU30Y *(4)* | 3.7 | 22 | 3.4 | 37.6 | 14 | 7.6 | 3.7 | 3.4 | 2.1 | 1.8 | 1.4 | 1 | 0.9 | 0.6 | 0.6 | 0.4 | 0.4 | 0.4 | 0.3 | 41.33 |
| 4 | HU40Y *(4)* | 4.8 | 22 | 4.5 | 33.8 | 10.9 | 7.1 | 3.5 | 3 | 2 | 1.4 | 1.3 | 0.8 | 0.8 | 0.5 | 0.5 | 0.4 | 0.4 | 0.3 | 0.3 | 36.65 |
| 5.5 | HU55Y *(4)* | 6.7 | 22 | 6.05 | 41.9 | 18.4 | 7.94 | 4.27 | 3.72 | 2.13 | 2.13 | 1.42 | 1.33 | 1.04 | 0.86 | 0.77 | 0.58 | 0.57 | 0.41 | 0.43 | 47.01 |
| 7.5 | HU75Y *(4)* | 8.7 | 22 | 8.1 | 37 | 13.8 | 7.6 | 3.7 | 3.4 | 2.1 | 1.8 | 1.4 | 1.1 | 1 | 0.6 | 0.7 | 0.4 | 0.4 | 0.4 | 0.3 | 40.67 |
| 11 | HD11Y *(4)* | 12.7 | 22 | 11.6 | 40 | 17 | 7.8 | 4.1 | 3.7 | 2.2 | 2.2 | 1.5 | 1.3 | 1.1 | 0.9 | 0.8 | 0.6 | 0.6 | 0.4 | 0.4 | 44.70 |
| 15 | HD15Y *(4)* | 16.6 | 22 | 15.5 | 35.4 | 12.8 | 7.5 | 3.7 | 3.5 | 2.2 | 1.9 | 1.5 | 1.1 | 1 | 0.7 | 0.7 | 0.5 | 0.4 | 0.4 | 0.3 | 38.89 |
| 18.5 | HD18Y *(4)* | 20.3 | 22 | 18.5 | 39.5 | 17.3 | 7.7 | 4.2 | 3.9 | 2.4 | 2.3 | 1.6 | 1.5 | 1.2 | 1 | 0.9 | 0.7 | 0.6 | 0.5 | 0.5 | 44.38 |
| 22 | HD22Y *(4)* | 23.8 | 22 | 22.1 | 36.6 | 14.6 | 7.6 | 4 | 3.8 | 2.4 | 2.2 | 1.6 | 1.4 | 1.1 | 0.9 | 0.8 | 0.6 | 0.6 | 0.4 | 0.4 | 40.74 |
| 30 | HD30Y *(4)* | 32.1 | 22 | 29.7 | 36.9 | 16 | 7.7 | 4.4 | 4.1 | 2.6 | 2.5 | 1.8 | 1.7 | 1.3 | 1.1 | 1 | 0.8 | 0.7 | 0.5 | 0.5 | 41.65 |
| 37 | HD37Y *(4)* | 40.3 | 22 | 36.7 | 40 | 17.4 | 7.8 | 4.2 | 3.8 | 2.3 | 2.3 | 1.6 | 1.5 | 1.1 | 1 | 0.9 | 0.7 | 0.6 | 0.5 | 0.5 | 44.97 |
| 45 | HD45Y *(4)* | 48.3 | 22 | 44.7 | 36.9 | 14.2 | 7.7 | 3.9 | 3.7 | 2.3 | 2.1 | 1.6 | 1.3 | 1.1 | 0.8 | 0.8 | 0.5 | 0.5 | 0.4 | 0.4 | 40.81 |
| 55 | HD55Y *(4)* | 58 | 22 | 53.4 | 38.1 | 15.9 | 7.7 | 4.1 | 3.9 | 2.4 | 2.4 | 1.7 | 1.5 | 1.2 | 1 | 0.9 | 0.7 | 0.7 | 0.5 | 0.5 | 42.62 |
| 75 | HD75Y *(4)* | 78.8 | 22 | 73 | 36.8 | 13.9 | 7.5 | 3.8 | 3.6 | 2.2 | 2.1 | 1.5 | 1.3 | 1.1 | 0.8 | 0.8 | 0.5 | 0.5 | 0.4 | 0.4 | 40.58 |
| 90 | HD90Y *(4)* | 93.7 | 22 | 87.7 | 34.3 | 11.6 | 7.3 | 3.7 | 3.5 | 2.3 | 1.9 | 1.5 | 1.1 | 1 | 0.7 | 0.7 | 0.5 | 0.4 | 0.4 | 0.3 | 37.45 |
| 110 | HC11Y *(5)* | 116.8 | 28 | 103.4 | 46.8 | 21.75 | 7.52 | 4.45 | 3.35 | 2.05 | 1.92 | 1.16 | 1.16 | 0.89 | 0.75 | 0.6 | 0.49 | 0.46 | 0.33 | 0.32 | 52.56 |
| 132 | HC13Y *(5)* | 136.5 | 28 | 123.8 | 42.2 | 17.31 | 7.37 | 3.66 | 3.26 | 1.89 | 1.77 | 1.2 | 1.03 | 0.86 | 0.63 | 0.57 | 0.4 | 0.41 | 0.27 | 0.27 | 49.61 |
| 160 | HC16Y *(5)* | 162.8 | 35 | 149.4 | 39.7 | 14.86 | 7.24 | 3.31 | 3.08 | 1.89 | 1.61 | 1.18 | 0.85 | 0.85 | 0.52 | 0.52 | 0.35 | 0.35 | 0.28 | 0.24 | 43.32 |
| 200 | HC20Y *(5)* | 211.7 | 35 | 185.1 | 49 | 23.99 | 7.56 | 4.85 | 3.36 | 2.14 | 1.99 | 1.15 | 1.22 | 0.84 | 0.8 | 0.57 | 0.53 | 0.46 | 0.38 | 0.34 | 55.52 |
| 250 | HC25Y *(5)* | 256 | 35 | 230.2 | 43.9 | 18.86 | 7.4 | 3.9 | 3.32 | 1.9 | 1.81 | 1.17 | 1.11 | 0.86 | 0.68 | 0.61 | 0.43 | 0.46 | 0.3 | 0.31 | 48.72 |
| 315 | HC31Y *(5)* | 316.9 | 35 | 290.8 | 39.7 | 14.86 | 7.2 | 3.28 | 3.11 | 1.9 | 1.63 | 1.19 | 0.9 | 0.85 | 0.56 | 0.56 | 0.39 | 0.39 | 0.29 | 0.27 | 43.34 |
| 400 | HC40Y *(5)* | 409.2 | 35 | 365.6 | 45 | 20.1 | 7.56 | 4.26 | 3.37 | 1.97 | 1.93 | 1.24 | 1.16 | 0.89 | 0.75 | 0.68 | 0.5 | 0.48 | 0.35 | 0.39 | 50.31 |
| 500 | HC50Y *(5)* | 497.9 | 35 | 457.9 | 39.3 | 14.21 | 7.24 | 3.27 | 3.14 | 1.84 | 1.58 | 1.17 | 0.86 | 0.79 | 0.53 | 0.49 | 0.36 | 0.32 | 0.26 | 0.22 | 42.73 |
| 630 | HC63Y *(5)* | 615.9 | 42 | 572.2 | 37 | 12.12 | 7.01 | 3.15 | 2.94 | 1.82 | 1.43 | 1.16 | 0.77 | 0.73 | 0.49 | 0.44 | 0.37 | 0.28 | 0.3 | 0.22 | 39.87 |

*(1) Example of current harmonic levels up to harmonic order 49 for a 690 V 50 Hz line supply for ATV 71H●●●Y drives, with line chokes.*
*(2) The line Isc values are given for the current harmonic levels stated in the table.*
*(3) Total harmonic distortion in accordance with IEC 61000-3-12.*
*(4) Use of a line choke is recommended.*
*(5) Use of a line choke is mandatory.*

# Variable speed drives
## Altivar 71: reduction of current harmonics
## Option: line chokes

### General characteristics

| Type of choke | | | VW3 A58501, A58502 | VW3 A4 551... A4 553 | VW3 A4 554, A4 555 | VW3 A4 556... A4 560 | VW3 A4 561... A4 565, A4 568...572 |
|---|---|---|---|---|---|---|---|
| **Conformity to standards** | | | EN 50178 (VDE 0160 level 1 high energy overvoltages on the line supply), IEC 60076 (with HD 398) | | | | |
| **Degree of protection** | Choke | | IP 00 | | | | |
| | Terminals | | IP 20 | | IP 10 | IP 00 | |
| **Atmospheric pollution** | | | 3 C2, 3B1, 3S1 conforming to IEC 721.3.3 | | | | |
| **Degree of pollution** | | | 2 conforming to EN 50178 | | | | |
| **Vibration resistance** | | | 1.5 mm from 3…13 Hz, 1 gn from 13…200 Hz, conforming to IEC 60068-2 | | | | |
| **Shock resistance** | | | 15 gn for 11 ms conforming to IEC 60068-2-27 | | | | |
| **Maximum relative humidity** | | | 95 % | | | | |
| **Ambient air temperature** around the device | Operation | **°C** | 0…+ 45 without derating<br>Up to + 55°C with current derating of 2% per °C above 45°C | | | | |
| | Storage | **°C** | - 25…+ 70 | | | | |
| **Isolation class** | | | F | | | | |
| **Clearance distance in air** | | **mm** | 5.5 conforming to IEC 60664 | | | | |
| **Leakage distance in air** | | **mm** | 11.5 conforming to IEC 60664 | | | | |
| **Maximum operating altitude** | | **m** | 1000 without derating<br>1000…3000 with current derating of 1% per additional 100 m | | | | |
| **Voltage drop** | | | Between 3% and 5% of the nominal supply voltage. Values higher than this will cause loss of torque. | | | | |
| **Maximum current** | | | 1.65 x nominal current for 60 seconds | | | | |

### Connection characteristics

| | | | |
|---|---|---|---|
| **Maximum wire size and tightening torque** | VW3 A58501 | | 16 mm², (AWG 4)<br>1.2…1.4 Nm |
| | VW3 A58502 | | 6 mm², (AWG 8)<br>0.8…1 Nm |
| | VW3 A4 551, 552 | | 2.5 mm², (AWG 12)<br>0.4…0.6 Nm |
| | VW3 A4 553 | | 6 mm², (AWG 8)<br>0.8…1 Nm |
| | VW3 A4 554 | | 16 mm², (AWG 4)<br>1.2…1.4 Nm |
| | VW3 A4 555 | | 35 mm², (AWG 0)<br>2.5…3 Nm |
| | VW3 A4 556 | | Connected on a bar, Ø 6.5 mm<br>– |
| | VW3 A4 557, 558, 570 | | Connected on a bar, Ø 9 mm<br>– |
| | VW3 A4 559…561, 568 | | Connected on a bar, Ø 11 mm<br>– |
| | VW3 A4 562…565, 569, 571, 572 | | Connected on a bar, Ø 13 mm<br>– |

Presentation: pages 156 to 158
References: page 160
Dimensions: page 209
Schemes: pages 222 to 225

# Variable speed drives
## Altivar 71: reduction of current harmonics
## Option: line chokes

PF107532



*VW3 A4 572*

## Line chokes

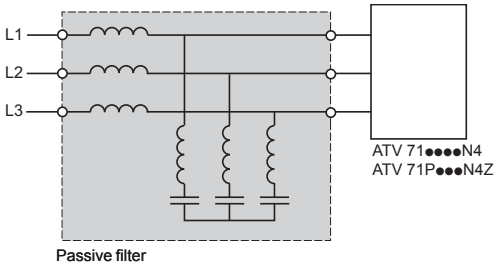
| For drives | Network Line Isc | Line choke | | | | Quantity per drive | Reference | Weight |
|---|---|---|---|---|---|---|---|---|
| | | Inductance value | Nominal current | Current of saturation | Loss | | | |
| | kA | mH | A | A | W | | | kg |
| **Single-phase supply voltage: 200…240 V 50/60 Hz** | | | | | | | | |
| ATV 71HU40M3 *(1)* | 5 | 2 | 25 | – | 45 | 1 | **VW3 A58501** | 3.500 |
| ATV 71HU55M3 *(1)* | 5 | 1 | 45 | – | 50 | 1 | **VW3 A58502** | 3.500 |
| ATV 71HU75M3 *(1)* | 22 | 1 | 45 | – | 50 | 1 | **VW3 A58502** | 3.500 |
| **Three-phase supply voltage: 200…240 V 50/60 Hz** | | | | | | | | |
| ATV 71H037M3, H075M3 | 5 | 10 | 4 | – | 45 | 1 | **VW3 A4 551** | 1.500 |
| ATV 71HU15M3, HU22M3 | 5 | 4 | 10 | – | 65 | 1 | **VW3 A4 552** | 3.000 |
| ATV 71HU30M3 | 5 | 2 | 16 | – | 75 | 1 | **VW3 A4 553** | 3.500 |
| ATV 71HU40M3 | 5 | 1 | 30 | – | 90 | 1 | **VW3 A4 554** | 6.000 |
| ATV 71HU55M3 | 22 | 1 | 30 | – | 90 | 1 | **VW3 A4 554** | 6.000 |
| ATV 71HU75M3, HD11M3X | 22 | 0.5 | 60 | – | 94 | 1 | **VW3 A4 555** | 11.000 |
| ATV 71HD15M3X | 22 | 0.3 | 100 | – | 260 | 1 | **VW3 A4 556** | 16.000 |
| ATV 71HD18M3X…HD45M3X | 22 | 0.15 | 230 | – | 400 | 1 | **VW3 A4 557** | 45.000 |
| ATV 71HD55M3X | 35 | 0.049 | 429 | 855 | 278 | 1 | **VW3 A4 562** | 50.000 |
| ATV 71HD75M3X | 35 | 0.038 | 509 | 1025 | 280 | 1 | **VW3 A4 563** | 59.000 |
| **Three-phase supply voltage: 380…480 V 50/60 Hz** | | | | | | | | |
| ATV 71H075N4, HU15N4<br>ATV 71W075N4, WU15N4<br>ATV 71P075N4Z, PU15N4Z | 5 | 10 | 4 | – | 45 | 1 | **VW3 A4 551** | 1.500 |
| ATV 71HU22N4…HU40N4<br>ATV 71WU22N4…WU40N4<br>ATV 71PU22N4Z…PU40N4Z | 5 | 4 | 10 | – | 65 | 1 | **VW3 A4 552** | 3.000 |
| ATV 71HU55N4, HU75N4<br>ATV 71WU55N4, WU75N4<br>ATV 71PU55N4Z, PU75N4Z | 22 | 2 | 16 | – | 75 | 1 | **VW3 A4 553** | 3.500 |
| ATV 71HD11N4, HD15N4<br>ATV 71WD11N4, WD15N4<br>ATV 71PD11N4Z | 22 | 1 | 30 | – | 90 | 1 | **VW3 A4 554** | 6.000 |
| ATV 71HD18N4, HD22N4<br>ATV 71WD18N4, WD22N4 | 22 | 0.5 | 60 | – | 94 | 1 | **VW3 A4 555** | 11.000 |
| ATV 71HD30N4…HD55N4<br>ATV 71WD30N4…WD55N4 | 22 | 0.3 | 100 | – | 260 | 1 | **VW3 A4 556** | 16.000 |
| ATV 71HD75N4<br>ATV 71WD75N4 | 22 | 0.155 | 184 | 370 | 220 | 1 | **VW3 A4 558** | 31.000 |
| ATV 71HD90N4, HC11N4 | 35 | 0.12 | 222 | 346 | 278 | 1 | **VW3 A4 559** | 35.000 |
| ATV 71HC13N4 | 35 | 0.098 | 264 | 530 | 245 | 1 | **VW3 A4 560** | 43.000 |
| ATV 71HC16N4 | 50 | 0.066 | 344 | 685 | 258 | 1 | **VW3 A4 561** | 47.000 |
| ATV 71HC20N4 | 50 | 0.060 | 450 | 574 | 335 | 1 | **VW3 A4 569** | 70.000 |
| ATV 71HC25N4, HC28N4 | 50 | 0.038 | 613 | 1150 | 307 | 1 | **VW3 A4 564** | 73.000 |
| ATV 71HC31N4 | 50 | 0.032 | 720 | 1352 | 428 | 1 | **VW3 A4 565** | 82.000 |
| ATV 71HC40N4 | 50 | 0.060 | 450 | 849 | 335 | 2 | **VW3 A4 569** | 70.000 |
| ATV 71HC50N4 | 50 | 0.038 | 613 | 1150 | 307 | 2 | **VW3 A4 564** | 73.000 |
| **Three-phase supply voltage: 500…690 V 50/60 Hz** | | | | | | | | |
| ATV 71HU22Y…HU40Y *(2)* | 22 | 10 | 4 | – | 45 | 1 | **VW3 A4 551** | 1.500 |
| ATV 71HD55Y, HU75Y *(2)* | 22 | 4 | 10 | – | 65 | 1 | **VW3 A4 552** | 3.000 |
| ATV 71HD11Y, HD15Y *(2)* | 22 | 2 | 16 | – | 75 | 1 | **VW3 A4 553** | 3.500 |
| ATV 71HD18Y, HD22Y *(2)* | 22 | 1 | 30 | – | 90 | 1 | **VW3 A4 554** | 6.000 |
| ATV 71HD30Y…HD45Y *(2)* | 22 | 0.5 | 60 | – | 94 | 1 | **VW3 A4 555** | 11.000 |
| ATV 71HD55Y…HD90Y *(2)* | 22 | 0.3 | 100 | – | 260 | 1 | **VW3 A4 556** | 16.000 |
| ATV 71HC11Y *(1)* | 28 | 0.22 | 160 | 320 | 220 | 1 | **VW3 A4 570** | 28.000 |
| ATV 71HC13Y *(1)* | 28 | 0.23 | 230 | 405 | 330 | 1 | **VW3 A4 571** | 79.000 |
| ATV 71HC16Y *(1)* | 35 | 0.23 | 230 | 405 | 330 | 1 | **VW3 A4 571** | 79.000 |
| ATV 71HC20Y *(1)* | 35 | 0.098 | 264 | 530 | 245 | 1 | **VW3 A4 560** | 35.000 |
| ATV 71HC25Y, HC31Y *(1)* | 35 | 0.1 | 450 | 770 | 495 | 1 | **VW3 A4 572** | 90.000 |
| ATV 71HC40Y *(1)* | 35 | 0.085 | 300 | 474 | 315 | 2 | **VW3 A4 568** | 46.000 |
| ATV 71HC50Y *(1)* | 35 | 0.1 | 450 | 770 | 495 | 2 | **VW3 A4 572** | 90.000 |
| ATV 71HC63Y *(1)* | 42 | 0.1 | 450 | 770 | 495 | 2 | **VW3 A4 572** | 90.000 |

*(1) Use of a line choke is mandatory, to be ordered separately.*
*(2) Use of a line choke is recommended, to be ordered separately.*

Presentation: pages 156 to 158
Characteristics: page 159
Dimensions: page 209
Schemes: pages 222 to 225

# Variable speed drives
## Altivar 71: reduction of current harmonics
## Option: passive filters

## Passive filters




A passive filter is used to reduce current harmonics with total harmonic distortion factors of less than 16% or 10%. These ratios may be reduced to 10% or 5% if the filter is used with a DC choke, see pages 152 to 155.

The reactive power increases at no load or low load. To eliminate this reactive power, the filter capacitors can be disconnected via the drive, see page 233. To do this, the contactor must be controlled by one of the relay outputs on the drive, at a value lower than 10% of the nominal drive current (In) (please refer to the programming manual).

For ATV 71H●●●Y drives, use of a line choke is recommended or mandatory, depending on the rating.

### Application

Reduction of current harmonics in order to use drives in the first environment.

## General characteristics

| | | | |
|---|---|---|---|
| **Degree of protection** | | | IP 20 |
| **Maximum relative humidity** | | | Class F humidity without condensation 5%…85% |
| **Ambient air temperature** around the device | Operation | **°C** | 5…+ 40 without derating |
| | Storage | **°C** | - 25…+ 55 |
| **Maximum operating altitude** | | **m** | 1000 without derating |

## Electrical characteristics

| **Range** | | **400 V** | **460 V** |
|---|---|---|---|
| **Nominal voltage ± 10%** | **V** | 380…415 ∿ | 440…480 ∿ |
| **Operating frequency** | | 50 ± 5 % | 60 ± 5 % |
| **Overload capacity** | | 1.5 x In (A) | |
| **Efficiency** | | 98% (2% thermal losses) | |
| **THDI** *(1)* | **%** | ≤ 16 | |
| **Cos** φ | | At 75 % of the line current: 0.85<br>At 100 % of the line current: 0.99<br>At 150% of the line current: 1 | |

## Connection characteristics

| | | | |
|---|---|---|---|
| **Maximum wire size** | VW3 A4 601…604 | | 16 mm² |
| | VW3 A4 605…609 | | 50 mm² |
| | VW3 A4 610, 611 | | Connected on a bar, Ø 12.5 |
| | VW3 A4 612, 613, 619 | | Connected on a bar, Ø 16.5 |
| | VW3 A4 621, 622 | | 16 mm² |
| | VW3 A4 623…627 | | 50 mm² |
| | VW3 A4 628, 629 | | Connected on a bar, Ø 12.5 |
| | VW3 A4 630…633, 639 | | Connected on a bar, Ø 16.5 |
| | VW3 A4 641…644 | | 16 mm² |
| | VW3 A4 645…648 | | 50 mm² |
| | VW3 A4 649 | | Connected on a bar, Ø 12.5 |
| | VW3 A4 650, 651, 656, 657 | | Connected on a bar, Ø 16.5 |
| | VW3 A4 661…663 | | 16 mm² |
| | VW3 A4 664…666 | | 50 mm² |
| | VW3 A4 667, 668 | | Connected on a bar, Ø 12.5 |
| | VW3 A4 669…671, 676, 677 | | Connected on a bar, Ø 16.5 |

*(1) The total current harmonic distortion (THDI) is indicated for a total voltage harmonic distortion (THDU) < 2% and a short-circuit ratio (RSCE) > 66%, and only for the nominal current of the passive filter. If these conditions are not adhered to, the total current harmonics will be reduced without any guarantee of level.*

References: pages 162 to 165
Dimensions: pages 210 and 211
Schemes: pages 232 and 233

# Variable speed drives
## Altivar 71: reduction of current harmonics
## Option: passive filters

### Passive filters: three-phase power supply 400 V 50 Hz

| Motor rating | | For drives | Network Line current | Filter In (2) | Quantity per drive | Reference | Weight |
|---|---|---|---|---|---|---|---|
| kW | HP | | A | A | | | kg |
| **THDI 16%** (1) | | | | | | | |
| 0.75 | 1 | ATV 71H075N4<br>ATV 71W075N4<br>ATV 71P075N4Z | 2.5 | 6 | 1 | **VW3 A4 601** | 15.000 |
| 1.5 | 2 | ATV 71HU15N4<br>ATV 71WU15N4<br>ATV 71PU15N4Z | 3.6 | 6 | 1 | **VW3 A4 601** | 15.000 |
| 2.2 | 3 | ATV 71HU22N4<br>ATV 71WU22N4<br>ATV 71PU22N4Z | 5 | 6 | 1 | **VW3 A4 601** | 15.000 |
| 3 | – | ATV 71HU30N4<br>ATV 71WU30N4<br>ATV 71PU30N4Z | 6 | 6 | 1 | **VW3 A4 601** | 15.000 |
| 4 | 5 | ATV 71HU40N4<br>ATV 71WU40N4<br>ATV 71PU40N4Z | 7.8 | 10 | 1 | **VW3 A4 602** | 19.000 |
| 5.5 | 7.5 | ATV 71HU55N4<br>ATV 71WU55N4<br>ATV 71PU55N4Z | 10 | 10 | 1 | **VW3 A4 602** | 19.000 |
| 7.5 | 10 | ATV 71HU75N4<br>ATV 71WU75N4<br>ATV 71PU75N4Z | 14 | 19 | 1 | **VW3 A4 603** | 21.000 |
| 11 | 15 | ATV 71HD11N4<br>ATV 71WD11N4<br>ATV 71PD11N4Z | 19 | 19 | 1 | **VW3 A4 603** | 21.000 |
| 15 | 20 | ATV 71HD15N4<br>ATV 71WD15N4 | 26 | 26 | 1 | **VW3 A4 604** | 22.000 |
| 18.5 | 25 | ATV 71HD18N4<br>ATV 71WD18N4 | 32 | 35 | 1 | **VW3 A4 605** | 34.000 |
| 22 | 30 | ATV 71HD22N4<br>ATV 71WD22N4 | 38 | 43 | 1 | **VW3 A4 606** | 38.000 |
| 30 | 40 | ATV 71HD30N4<br>ATV 71WD30N4 | 52 | 72 | 1 | **VW3 A4 607** | 56.000 |
| 37 | 50 | ATV 71HD37N4<br>ATV 71WD37N4 | 63 | 72 | 1 | **VW3 A4 607** | 56.000 |
| 45 | 60 | ATV 71HD45N4<br>ATV 71WD45N4 | 77 | 101 | 1 | **VW3 A4 608** | 69.000 |
| 55 | 75 | ATV 71HD55N4<br>ATV 71WD55N4 | 91 | 101 | 1 | **VW3 A4 608** | 69.000 |
| 75 | 100 | ATV 71HD75N4<br>ATV 71WD75N4 | 126 | 144 | 1 | **VW3 A4 609** | 97.000 |
| **THDI 10%** | | | | | | | |
| 90 | 125 | ATV 71HD90N4 | 149 | 144 | 1 | **VW3 A4 609** | 97.000 |
| 110 | 150 | ATV 71HC11N4 | 182 | 180 | 1 | **VW3 A4 610** | 103.000 |
| 132 | 200 | ATV 71HC13N4 | 218 | 216 | 1 | **VW3 A4 611** | 112.000 |
| 160 | 250 | ATV 71HC16N4 | 287 | 289 | 1 | **VW3 A4 612** | 135.000 |
| 200 | 300 | ATV 71HC20N4 | 353.5 | 370 | 1 | **VW3 A4 613** | 155.000 |
| 220 | 350 | ATV 71HC25N4 | 364 | 370 | 1 | **VW3 A4 613** | 155.000 |
| 250 | 400 | ATV 71HC25N4 | 415 | 216 | 2 | **VW3 A4 611** | 112.000 |
| 280 | 450 | ATV 71HC28N4 | 485 | 289 | 2 | **VW3 A4 612** | 135.000 |
| 315 | 500 | ATV 71HC31N4 | 543 | 289 | 2 | **VW3 A4 612** | 135.000 |
| 355 | – | ATV 71HC40N4 | 588 | 289 | 2 | **VW3 A4 612** | 135.000 |
| 400 | 600 | ATV 71HC40N4 | 664 | 325 | 2 | **VW3 A4 619** | 155.000 |
| 500 | 700 | ATV 71HC50N4 | 840 | 289 | 3 | **VW3 A4 612** | 135.000 |

*(1) By adding a DC choke (see page 152) to **ATV 71●075N4…●D75N4** and **ATV 71P●●●N4Z** drives, a THD ≤ 10% is obtained.*
*This DC choke is supplied as standard with **ATV 71HD90N4…HC50N4** drives.*
*These reduced current harmonics are obtained, only for the nominal filter current, on condition that the THDU is < 2% and the RSCE > 66%.*
*(2) In: nominal filter current.*

# Variable speed drives
## Altivar 71: reduction of current harmonics
## Option: passive filters

**Passive filters: three-phase power supply 400 V 50 Hz**

| Motor rating | | For drives | Network Line current | Filter In (2) | Quantity per drive | Reference | Weight |
|---|---|---|---|---|---|---|---|
| kW | HP | | A | A | | | kg |
| **THDI 10 %** (1) | | | | | | | |
| 0.75 | 1 | ATV 71H075N4<br>ATV 71W075N4<br>ATV 71P075N4Z | 2.5 | 6 | 1 | **VW3 A4 621** | 21.000 |
| 1.5 | 2 | ATV 71HU15N4<br>ATV 71WU15N4<br>ATV 71PU15N4Z | 3.6 | 6 | 1 | **VW3 A4 621** | 21.000 |
| 2.2 | 3 | ATV 71HU22N4<br>ATV 71WU22N4<br>ATV 71PU22N4Z | 5 | 6 | 1 | **VW3 A4 621** | 21.000 |
| 3 | – | ATV 71HU30N4<br>ATV 71WU30N4<br>ATV 71PU30N4Z | 6 | 6 | 1 | **VW3 A4 621** | 21.000 |
| 4 | 5 | ATV 71HU40N4<br>ATV 71WU40N4<br>ATV 71PU40N4Z | 7.8 | 10 | 1 | **VW3 A4 622** | 27.000 |
| 5.5 | 7.5 | ATV 71HU55N4<br>ATV 71WU55N4<br>ATV 71PU55N4Z | 10 | 10 | 1 | **VW3 A4 622** | 27.000 |
| 7.5 | 10 | ATV 71HU75N4<br>ATV 71WU75N4<br>ATV 71PU75N4Z | 14 | 19 | 1 | **VW3 A4 623** | 28.000 |
| 11 | 15 | ATV 71HD11N4<br>ATV 71WD11N4<br>ATV 71PD11N4Z | 19 | 19 | 1 | **VW3 A4 623** | 28.000 |
| 15 | 20 | ATV 71HD15N4<br>ATV 71WD15N4 | 26 | 26 | 1 | **VW3 A4 624** | 40.000 |
| 18.5 | 25 | ATV 71HD18N4<br>ATV 71WD18N4 | 32 | 35 | 1 | **VW3 A4 625** | 49.000 |
| 22 | 30 | ATV 71HD22N4<br>ATV 71WD22N4 | 38 | 43 | 1 | **VW3 A4 626** | 52.000 |
| 30 | 40 | ATV 71HD30N4<br>ATV 71WD30N4 | 52 | 72 | 1 | **VW3 A4 627** | 88.000 |
| 37 | 50 | ATV 71HD37N4<br>ATV 71WD37N4 | 63 | 72 | 1 | **VW3 A4 627** | 88.000 |
| 45 | 60 | ATV 71HD45N4<br>ATV 71WD45N4 | 77 | 101 | 1 | **VW3 A4 628** | 150.000 |
| 55 | 75 | ATV 71HD55N4<br>ATV 71WD55N4 | 91 | 101 | 1 | **VW3 A4 628** | 150.000 |
| 75 | 100 | ATV 71HD75N4<br>ATV 71WD75N4 | 126 | 144 | 1 | **VW3 A4 629** | 167.000 |
| **THDI 5 %** | | | | | | | |
| 90 | 125 | ATV 71HD90N4 | 149 | 144 | 1 | **VW3 A4 629** | 167.000 |
| 110 | 150 | ATV 71HC11N4 | 182 | 180 | 1 | **VW3 A4 630** | 178.000 |
| 132 | 200 | ATV 71HC13N4 | 218 | 216 | 1 | **VW3 A4 631** | 224.000 |
| 160 | 250 | ATV 71HC16N4 | 287 | 289 | 1 | **VW3 A4 632** | 271.000 |
| 200 | 300 | ATV 71HC20N4 | 353.5 | 370 | 1 | **VW3 A4 633** | 320.000 |
| 220 | 350 | ATV 71HC25N4 | 364 | 370 | 1 | **VW3 A4 633** | 320.000 |
| 250 | 400 | ATV 71HC25N4 | 415 | 216 | 2 | **VW3 A4 631** | 224.000 |
| 280 | 450 | ATV 71HC28N4 | 485 | 289 | 2 | **VW3 A4 632** | 271.000 |
| 315 | 500 | ATV 71HC31N4 | 543 | 289 | 2 | **VW3 A4 632** | 271.000 |
| 355 | – | ATV 71HC40N4 | 588 | 289 | 2 | **VW3 A4 632** | 271.000 |
| 400 | 600 | ATV 71HC40N4 | 664 | 325 | 2 | **VW3 A4 639** | 284.000 |
| 500 | 700 | ATV 71HC50N4 | 840 | 289 | 3 | **VW3 A4 632** | 271.000 |

*(1) By adding a DC choke (see page 152) to **ATV 71●075N4…●D75N4** and **ATV 71P●●●N4Z** drives, a THD ≤ 5% is obtained. This DC choke is supplied as standard with **ATV 71HD90N4…HC50N4** drives.*
*These reduced current harmonics are obtained, only for the nominal filter current, on condition that the THDU is < 2% and the RSCE > 66%.*
*(2) In: nominal filter current.*

# Variable speed drives
## Altivar 71: reduction of current harmonics
## Option: passive filters

### Passive filters: three-phase power supply 460 V 60 Hz

| Motor rating | | For drives | Network Line current | Filter In (2) | Quantity per drive | Reference | Weight |
|---|---|---|---|---|---|---|---|
| kW | HP | | A | A | | | kg |
| **THDI 16%** (1) | | | | | | | |
| 0.75 | 1 | ATV 71H075N4<br>ATV 71W075N4<br>ATV 71P075N4Z | 2.5 | 6 | 1 | **VW3 A4 641** | 15.000 |
| 1.5 | 2 | ATV 71HU15N4<br>ATV 71WU15N4<br>ATV 71PU15N4Z | 3 | 6 | 1 | **VW3 A4 641** | 15.000 |
| 2.2 | 3 | ATV 71HU22N4<br>ATV 71WU22N4<br>ATV 71PU22N4Z | 5 | 6 | 1 | **VW3 A4 641** | 15.000 |
| 3 | – | ATV 71HU30N4<br>ATV 71WU30N4<br>ATV 71PU30N4Z | 6 | 6 | 1 | **VW3 A4 641** | 15.000 |
| 4 | 5 | ATV 71HU40N4<br>ATV 71WU40N4<br>ATV 71PU40N4Z | 7 | 10 | 1 | **VW3 A4 642** | 19.000 |
| 5.5 | 7.5 | ATV 71HU55N4<br>ATV 71WU55N4<br>ATV 71PU55N4Z | 10 | 10 | 1 | **VW3 A4 642** | 19.000 |
| 7.5 | 10 | ATV 71HU75N4<br>ATV 71WU75N4<br>ATV 71PU75N4Z | 13 | 19 | 1 | **VW3 A4 643** | 23.000 |
| 11 | 15 | ATV 71HD11N4<br>ATV 71WD11N4<br>ATV 71PD11N4Z | 19 | 19 | 1 | **VW3 A4 643** | 23.000 |
| 15 | 20 | ATV 71HD15N4<br>ATV 71WD15N4 | 24 | 26 | 1 | **VW3 A4 644** | 34.000 |
| 18.5 | 25 | ATV 71HD18N4<br>ATV 71WD18N4 | 32 | 35 | 1 | **VW3 A4 645** | 42.000 |
| 22 | 30 | ATV 71HD22N4<br>ATV 71WD22N4 | 35 | 35 | 1 | **VW3 A4 645** | 42.000 |
| 30 | 40 | ATV 71HD30N4<br>ATV 71WD30N4 | 44 | 43 | 1 | **VW3 A4 646** | 45.000 |
| 37 | 50 | ATV 71HD37N4<br>ATV 71WD37N4 | 58.7 | 72 | 1 | **VW3 A4 647** | 61.000 |
| 45 | 60 | ATV 71HD45N4<br>ATV 71WD45N4 | 68 | 72 | 1 | **VW3 A4 647** | 61.000 |
| 55 | 75 | ATV 71HD55N4<br>ATV 71WD55N4 | 82.6 | 101 | 1 | **VW3 A4 648** | 75.000 |
| 75 | 100 | ATV 71 HD75N4<br>ATV 71 WD75N4 | 108 | 101 | 1 | **VW3 A4 648** | 75.000 |
| **THDI 10%** | | | | | | | |
| 90 | 125 | ATV 71HD90N4 | 134 | 180 | 1 | **VW3 A4 649** | 107.000 |
| 110 | 150 | ATV 71HC11N4 | 163 | 180 | 1 | **VW3 A4 649** | 107.000 |
| 132 | 200 | ATV 71HC13N4 | 192 | 217 | 1 | **VW3 A4 656** | 119.000 |
| 160 | 250 | ATV 71HC16N4 | 235 | 289 | 1 | **VW3 A4 650** | 145.000 |
| 200 | 300 | ATV 71HC20N4 | 300 | 370 | 1 | **VW3 A4 651** | 185.000 |
| 220 | 350 | ATV 71HC25N4 | 330 | 370 | 1 | **VW3 A4 651** | 185.000 |
| 250 | 400 | ATV 71HC25N4 | 400 | 217 | 2 | **VW3 A4 656** | 119.000 |
| 280 | 450 | ATV 71HC28N4 | 440 | 289 | 2 | **VW3 A4 650** | 145.000 |
| 315 | 500 | ATV 71HC31N4 | 470 | 289 | 2 | **VW3 A4 650** | 145.000 |
| 355 | – | ATV 71HC40N4 | 530 | 289 | 2 | **VW3 A4 650** | 145.000 |
| 400 | 600 | ATV 71HC40N4 | 590 | 325 | 2 | **VW3 A4 657** | 165.000 |
| 500 | 700 | ATV 71HC50N4 | 730 | 370 | 2 | **VW3 A4 651** | 185.000 |

*(1) By adding a DC choke (see page 152) to **ATV 71●075N4…●D75N4** and **ATV 71P●●●N4Z**drives, a THD ≤ 10% is obtained.This DC choke is supplied as standard with **ATV 71HD90N4…HC50N4** drives.*
*These reduced current harmonics are obtained, only for the nominal filter current, on condition that the THDU is < 2% and the RSCE > 66%.*
*(2) In: nominal filter current.*

Presentation: page 161 | Characteristics: page 161 | Dimensions: pages 210 and 211 | Schemes: pages 232 and 233

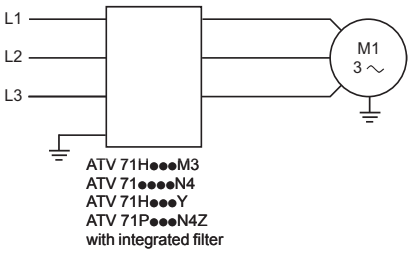
# Variable speed drives
## Altivar 71: reduction of current harmonics
## Option: passive filters

### Passive filters: three-phase power supply 460 V 60 Hz

| Motor rating | | For drives | Network Line current | Filter In (2) | Quantity per drive | Reference | Weight |
|---|---|---|---|---|---|---|---|
| kW | HP | | A | A | | | kg |
| **THDI 10%** (1) | | | | | | | |
| 0.75 | 1 | ATV 71H075N4<br>ATV 71W075N4<br>ATV 71P075N4Z | 2.5 | 6 | 1 | **VW3 A4 661** | 21.000 |
| 1.5 | 2 | ATV 71HU15N4<br>ATV 71WU15N4<br>ATV 71PU15N4Z | 3 | 6 | 1 | **VW3 A4 661** | 21.000 |
| 2.2 | 3 | ATV 71HU22N4<br>ATV 71WU22N4<br>ATV 71PU22N4Z | 4.2 | 6 | 1 | **VW3 A4 661** | 21.000 |
| 3 | – | ATV 71HU30N4<br>ATV 71WU30N4<br>ATV 71PU30N4Z | 6 | 6 | 1 | **VW3 A4 661** | 21.000 |
| 4 | 5 | ATV 71HU40N4<br>ATV 71WU40N4<br>ATV 71PU40N4Z | 7 | 10 | 1 | **VW3 A4 662** | 27.000 |
| 5.5 | 7.5 | ATV 71HU55N4<br>ATV 71HU55N4<br>ATV 71PU55N4Z | 10 | 10 | 1 | **VW3 A4 662** | 27.000 |
| 7.5 | 10 | ATV 71HU75N4<br>ATV 71WU75N4<br>ATV 71PU75N4Z | 13 | 19 | 1 | **VW3 A4 663** | 28.000 |
| 11 | 15 | ATV 71HD11N4<br>ATV 71WD11N4<br>ATV 71PD11N4Z | 19 | 19 | 1 | **VW3 A4 663** | 28.000 |
| 15 | 20 | ATV 71HD15N4<br>ATV 71WD15N4 | 24 | 26 | 1 | **VW3 A4 664** | 41.000 |
| 18.5 | 25 | ATV 71HD18N4<br>ATV 71WD18N4 | 32 | 35 | 1 | **VW3 A4 665** | 49.000 |
| 22 | 30 | ATV 71HD22N4<br>ATV 71WD22N4 | 35 | 35 | 1 | **VW3 A4 665** | 49.000 |
| 30 | 40 | ATV 71HD30N4<br>ATV 71WD30N4 | 44 | 43 | 1 | **VW3 A4 666** | 56.000 |
| 37 | 50 | ATV 71HD37N4<br>ATV 71WD37N4 | 58.7 | 72 | 1 | **VW3 A4 667** | 80.000 |
| 45 | 60 | ATV 71HD45N4<br>ATV 71WD45N4 | 68 | 72 | 1 | **VW3 A4 668** | 98.000 |
| 55 | 75 | ATV 71HD55N4<br>ATV 71WD55N4 | 82.6 | 101 | 1 | **VW3 A4 668** | 98.000 |
| 75 | 100 | ATV 71HD75N4<br>ATV 71WD75N4 | 108 | 101 | 1 | **VW3 A4 668** | 98.000 |
| **THDI 5 %** | | | | | | | |
| 90 | 125 | ATV 71HD90N4 | 134 | 180 | 1 | **VW3 A4 669** | 151.000 |
| 110 | 150 | ATV 71HC11N4 | 163 | 180 | 1 | **VW3 A4 669** | 151.000 |
| 132 | 200 | ATV 71HC13N4 | 192 | 217 | 1 | **VW3 A4 676** | 171.000 |
| 160 | 250 | ATV 71HC16N4 | 235 | 289 | 1 | **VW3 A4 670** | 215.000 |
| 200 | 300 | ATV 71HC20N4 | 300 | 370 | 1 | **VW3 A4 671** | 250.000 |
| 220 | 350 | ATV 71HC25N4 | 330 | 370 | 1 | **VW3 A4 671** | 250.000 |
| 250 | 400 | ATV 71HC25N4 | 400 | 217 | 2 | **VW3 A4 676** | 171.000 |
| 280 | 450 | ATV 71HC28N4 | 440 | 289 | 2 | **VW3 A4 670** | 215.000 |
| 315 | 500 | ATV 71HC31N4 | 470 | 289 | 2 | **VW3 A4 670** | 215.000 |
| 355 | – | ATV 71HC40N4 | 530 | 289 | 2 | **VW3 A4 670** | 215.000 |
| 400 | 600 | ATV 71HC40N4 | 590 | 325 | 2 | **VW3 A4 677** | 240.000 |
| 500 | 700 | ATV 71HC50N4 | 730 | 370 | 2 | **VW3 A4 671** | 250.000 |

*(1) By adding a DC choke (see page 152) to **ATV 71●075N4…●D75N4** and **ATV 71P●●●N4Z** drives, a THD ≤ 5% is obtained. This DC choke is supplied as standard with **ATV 71HD90N4…HC50N4** drives.*
*These reduced current harmonics are obtained, only for the nominal filter current, on condition that the THDU is < 2% and the RSCE > 66%.*
*(2) In: nominal filter current.*

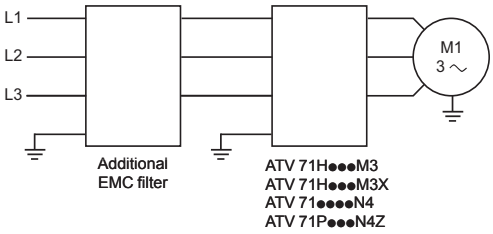
# Variable speed drives
## Altivar 71: EMC filters
### Integrated filters and optional additional filters




## Integrated EMC filters

Altivar 71 drives, except for the ATV 71H●●●M3X, have built-in radio interference input filters to meet the EMC standard for variable speed electrical power drive "products" IEC/EN 61800-3, edition 2, category C2 or C3 in environment 1 or 2 and to comply with the European directive on EMC (electromagnetic compatibility).

| Drives | Maximum length of shielded cable *(1)* according to | | | |
|---|---|---|---|---|
| | EN 55011 *(2)* class A Gr1 | | EN 55011 *(2)* class A Gr2 | |
| | IEC/EN 61800-3 category C2 *(2)* | | IEC/EN 61800-3 category C3 *(2)* | |
| | LF *(3)* | HF *(3)* | LF *(3)* | HF *(3)* |
| | m | m | m | m |
| ATV 71H037M3…HU22M3 | 10 | 5 | – | – |
| ATV 71HU30M3…HU75M3 | – | – | 10 | 5 |
| ATV 71H075N4…HU40N4<br>ATV 71W075N4…WU40N4<br>ATV 71P075N4Z…PU40N4Z | 10 | 5 | – | – |
| ATV 71HU55N4…HD15N4<br>ATV 71WU55N4…WD15N4<br>ATV 71PU55N4Z…PD11N4Z | – | – | 10 | 5 |
| ATV 71HD18N4…HC50N4<br>ATV 71WD18N4…WD75N4 | – | – | 50 | 25 |
| ATV 71HU22Y…HD90Y | – | – | 25 | 25 |
| ATV 71HC11Y…HC63Y | – | – | 50 | 25 |




## Additional EMC input filters

### Applications

When used with ATV 71H●●●M3, ATV 71H●●●M3X, ATV 71●●●●N4 and ATV 71P●●●N4Z drives, additional EMC input filters can be used to meet more stringent requirements and are designed to reduce conducted emissions on the line supply below the limits of standards EN 55011 group 1, class A or B and IEC/EN 61800/3 category C2 or C3 (see page 10).
For ATV 71H●●●M3, ATV 71HD11M3X…HD45M3X, ATV 71H075N4…HD75N4 and ATV 71P075N4Z…PD11N4Z drives, the additional EMC filters can be mounted beside or under the device. They act as a support for the drives and are attached to them via tapped holes.
For ATV 71HD55M3X, HD75M3X and ATV 71HD90N4…HC50N4 drives, the additional EMC filters can only be mounted beside the drive.

### Use according to the type of line supply

Use of these additional filters is only possible on TN (connected to neutral) and TT (neutral to earth) type networks.
Standard IEC/EN 61800-3, appendix D2.1, states that on IT networks (isolated or impedance earthed neutral), filters can cause permanent insulation monitors to operate in a random manner.
In addition, the effectiveness of additional filters on this type of network depends on the type of impedance between neutral and earth, and therefore cannot be predicted.
In the case of a machine which needs to be installed on an IT network, the solution would be to insert an isolation transformer and place the machine locally on a TN or TT network.

*(1) Maximum lengths for shielded cables connecting motors to drives, for a factory-set switching frequency of 2.5 or 4 kHz depending on the rating see page 12. If motors are connected in parallel, it is the sum of the cable lengths that should be taken into account.*
*(2) See page 10.*
*(3) LF: low switching frequency. HF: high switching frequency. These frequencies depend on the drive rating:*

| For drives | Switching frequency | |
|---|---|---|
| | LF | HF |
| | kHz | kHz |
| ATV 71H●●●M3<br>ATV 71H075N4…HD30N4<br>ATV 71W075N4…WD30N4<br>ATV 71P075N4Z…PD11N4Z | 4 | 4.1…16 |
| ATV 71HD37N4…HD75N4<br>ATV 71WD37N4…WD75N4 | 2…2.5 | 2.6…12 |
| ATV 71HD90N4…HC50N4 | 2…4 | 4.1… |
| ATV 71HU22Y…HD30Y | 2.5…4 | 4.1…6 |
| ATV 71HD37Y…HD63Y | 2.5 | 2.6…4.9 |

Characteristics: page 167
References: pages 168 and 169
Dimensions: pages 212 and 213
Schemes: page 231

# Variable speed drives
## Altivar 71: EMC filters
## Option: additional input filters

### General characteristics

| EMC filter type | | | VW3 A4 401…408 | VW3 A4 410…413 |
|---|---|---|---|---|
| **Conformity to standards** | | | EN 133200 | |
| **Degree of protection** | | | IP 20 and IP 41 on upper part | IP 00<br>IP 30 with kits VW3 A9 601, 602 |
| **Maximum relative humidity** | | | 93% without condensation or dripping water conforming to IEC 68-2-3 | |
| **Ambient air temperature** around the device | Operation | °C | - 10…+ 50 | - 25…+ 45 |
| | Storage | °C | - 40…+ 65 | - 25…+ 85 |
| **Maximum operating altitude** | | m | 1000 without derating<br>1000…3000 derating the current by 1% per additional 100 m.<br>Limited to 2000 m for the “Corner Grounded” distribution network. | |
| **Vibration resistance** | | | 1.5 mm peak to peak from 3…13 Hz, 1 gn peak from 13…150 Hz,<br>in accordance with IEC 60068-2-6 | |
| **Shock resistance** | | | 15 gn for 11 ms conforming to IEC 60068-2-27 | |
| **Maximum nominal voltage** | 50/60 Hz three-phase | V | 240 + 10 %<br>480 + 10 % | |

### Connection characteristics

| | | | |
|---|---|---|---|
| **Maximum wire size and tightening torque** | VW3 A4 401 | | 4 $mm^2$ (AWG 10)<br>0.6 Nm |
| | VW3 A4 402 | | 6 $mm^2$ (AWG 8)<br>1.5 Nm |
| | VW3 A4 403 | | 10 $mm^2$ (AWG 6)<br>1.5 Nm |
| | VW3 A4 404 | | 16 $mm^2$ (AWG 4)<br>2 Nm |
| | VW3 A4 405…407 | | 50 $mm^2$ (AWG 0)<br>6 Nm |
| | VW3 A4 408 | | 150 $mm^2$ (300 kcmil)<br>25 Nm |
| | VW3 A4 409 | | 25 $mm^2$ (AWG 2)<br>4 Nm |
| | VW3 A4 410…412 | | Connected on a bar, M10<br>– |
| | VW3 A4 413 | | Connected on a bar, 2 x M12<br>– |

Presentation: page 166 | References: pages 168 and 169 | Dimensions: pages 212 and 213 | Schemes: page 231

# Variable speed drives
## Altivar 71: EMC filters
## Option: additional input filters

### Additional EMC input filters

| Drives | Maximum length of shielded cable (1) | | | | In (2) | If (3) | Loss (4) | Reference | Weight |
|---|---|---|---|---|---|---|---|---|---|
| | EN 55011 (5) class A Gr1 IEC/EN 61800-3 category C2 (5) | | EN 55011 (5) class B Gr1 IEC/EN 61800-3 category C1 (5) | | | | | | |
| | LF (6) | HF (6) | LF (6) | HF (6) | | | | | |
| | m | m | m | m | A | mA | W | | kg |
| **Three-phase supply voltage: 200…240 V 50/60 Hz** | | | | | | | | | |
| ATV 71H037M3…HU15M3 | 100 | 50 | 50 | 20 | 12 | 4 | 10 | **VW3 A4 401** | 2.200 |
| ATV 71HU22M3…HU40M3 | 100 | 50 | 50 | 20 | 26 | 4.4 | 18 | **VW3 A4 402** | 4.000 |
| ATV 71HU55M3 | 100 | 50 | 50 | 20 | 35 | 3 | 24 | **VW3 A4 403** | 5.800 |
| ATV 71HU75M3 | 100 | 50 | 50 | 20 | 46 | 10 | 19 | **VW3 A4 404** | 7.000 |
| ATV 71HD11M3X, HD15M3X | 100 | 50 | 50 | 25 | 72 | 33 | 34 | **VW3 A4 405** | 12.000 |
| ATV 71HD18M3X, HD22M3X | 100 | 50 | 50 | 25 | 90 | 33 | 34 | **VW3 A4 406** | 15.000 |
| ATV 71HD30M3X...HD45M3X | 100 | 50 | 50 | 25 | 180 | 80 | 58 | **VW3 A4 408** | 40.000 |
| ATV 71HD55M3X, HD75M3X | 100 | 50 | 50 | 25 | 273 | 285 | 60 | **VW3 A4 410** | 22.000 |
| **Three-phase supply voltage: 380…480 V 50/60 Hz** | | | | | | | | | |
| ATV 71H075N4…HU22N4<br>ATV 71W075N4…WU22N4<br>ATV 71P075N4Z…PU22N4Z | 100 | 50 | 50 | 20 | 12 | 7 | 5 | **VW3 A4 401** | 2.200 |
| ATV 71HU30N4, HU40N4<br>ATV 71WU30N4, WU40N4<br>ATV 71PU30N4Z, PU40N4Z | 100 | 50 | 50 | 20 | 26 | 8 | 6 | **VW3 A4 402** | 4.000 |
| ATV 71HU55N4, HU75N4<br>ATV 71WU55N4,WU75N4<br>ATV 71PU55N4Z, PU75N4Z | 100 | 50 | 50 | 20 | 35 | 7 | 14 | **VW3 A4 403** | 5.800 |
| ATV 71HD11N4<br>ATV 71WD11N4<br>ATV 71PD11N4Z | 100 | 50 | 50 | 20 | 46 | 14 | 13 | **VW3 A4 404** | 7.000 |
| ATV 71HD15N4 (7), HD18N4<br>ATV 71WD15N4 (7), WD18N4 | 300 | 200 | 100 | 100 | 72 | 60 | 14 | **VW3 A4 405** | 12.000 |
| ATV 71HD22N4<br>ATV 71WD22N4 | 300 | 200 | 100 | 100 | 90 | 60 | 11 | **VW3 A4 406** | 15.000 |
| ATV 71HD30N4, HD37N4<br>ATV 71WD30N4, WD37N4 | 300 | 200 | 100 | 100 | 92 | 60 | 30 | **VW3 A4 407** | 17.000 |
| ATV 71HD45N4…HD75N4<br>ATV 71WD45N4…WD75N4 | 300 | 200 | 100 | 100 | 180 | 140 | 58 | **VW3 A4 408** | 40.000 |
| ATV 71HD90N4…HC13N4 | 300 | 150 | 50 | 25 | 273 | 500 | 60 | **VW3 A4 410** | 22.000 |
| ATV 71HC16N4…HC28N4 | 300 | 150 | 50 | 25 | 546 | 500 | 125 | **VW3 A4 411** | 25.000 |
| ATV 71HC31...HC40N4 | 300 | 150 | 50 | 25 | 728 | 500 | 210 | **VW3 A4 412** | 25.000 |
| ATV 71HC50N4 | 300 | 150 | 50 | 25 | 1456 | 200 | 380 | **VW3 A4 413** | 34.000 |

*(1) The filter selection tables give the maximum lengths for shielded cables connecting motors to drives for a switching frequency of 1 to 16 kHz (see page 12). These limits are given as examples only as they vary depending on the stray capacitance of the motors and the cables used. If motors are connected in parallel, it is the sum of the cable lengths that should be taken into account.*
*(2) Filter nominal current.*
*(3) Maximum earth leakage current at 230 V and at 400 V 50 Hz on a TT network.*
*(4) Via thermal dissipation.*
*(5) See page 10.*
*(6) LF: low switching frequency. HF: high switching frequency. These frequencies depend on the drive rating:*

| For drives | Switching frequency | |
|---|---|---|
| | LF | HF |
| | kHz | kHz |
| ATV 71H●●●M3<br>ATV 71H075N4…HD11N4<br>ATV 71W075N4…WD11N4<br>ATV 71P075N4Z…PD11N4Z | 4 | 4.1…16 |
| ATV 71HD11M3X, HD15M3X<br>ATV 71HD15N4…HD30N4<br>ATV 71WD15N4…WD30N4 | 3.5...4 | 4.1…12 |
| ATV 71HD18M3X...HD45M3X<br>ATV 71HD37N4...HD75N4<br>ATV 71WD37N4…WD75N4 | 2…2.5 | 2.6…12 |
| ATV 71HD55M3X, HD75M3X | 2…4 | 4.1…8 |
| ATV 71HD90N4...HC50N4 | 2…4 | 4.1…8 |

*(7) It is possible to use a special filter **VW3 A4 409** with a leakage current Il (3) of 14 mA which enables a maximum motor cable length of 100 m.*

Presentation: page 166 | Characteristics: page 167 | Dimensions: pages 212 and 213 | Schemes: page 231

# Variable speed drives
## Altivar 71: EMC filters
## Option: additional input filters

### IP 30 protection kits

| Description | For filters | Reference | Weight kg |
|---|---|---|---|
| **Mechanical device consisting of an IP 30 cover and cable clips** | VW3 A4 410, 411 | **VW3 A9 601** | – |
| | VW3 A4 412, 413 | **VW3 A9 602** | – |

# Variable speed drives
## Altivar 71: output filters

The Altivar 71 drive includes as standard a software function used to limit overvoltages at the motor terminals.
Depending on the cable lengths or the type of application, it may be necessary to use output filters:
- Motor chokes used to limit the dv/dt
- Sinus filters that are particularly effective for long cable runs

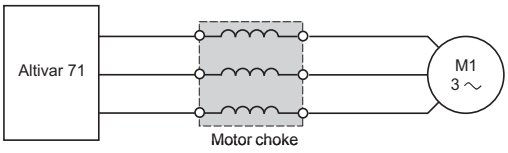
| Cable length *(2) (3)* | 10…50 m | 50…100 m | 100…150 m | 150…300 m | 300…600 m | 600…1000 m |
|---|---|---|---|---|---|---|
| **Shielded cable** | | | | | | |
| ATV 71H●●●M3<br>ATV 71H075N4…HD15N4<br>ATV 71W075N4…WD15N4<br>ATV 71P075N4Z…PD11N4Z | Software function *(1)* | Motor choke | | | – | |
| ATV 71H●●●M3X<br>ATV 71HD18N4…HC50N4<br>ATV 71WD18N4…WD75N4 | Software function *(1)* | | Motor choke | | – | |
| **Unshielded cable** | | | | | | |
| ATV 71H037M3...HU15M3<br>ATV 71H075N4...HU22N4<br>ATV 71W075N4…WU22N4<br>ATV 71P075N4Z…PU22N4Z | Software function *(1)* | | Motor choke or sinus filter | | – | |
| ATV 71HU22M3, HU30M3<br>ATV 71HU30N4…HU55N4<br>ATV 71PU30N4Z…PU55N4Z<br>ATV 71WU30N4…WU55N4 | Software function *(1)* | | Motor choke | | Sinus filter | – |
| ATV 71HU40M3…HU75M3<br>ATV 71HU75N4…HD15N4<br>ATV 71WU75N4…WD15N4<br>ATV 71PU75N4Z | Software function *(1)* | | Motor choke | | Sinus filter | |
| ATV 71HD11M3X…HD45M3X<br>ATV 71HD18N4…HD75N4<br>ATV 71WD18N4…WD75N4 | Software function *(1)* | | | Motor choke | Sinus filter | |
| ATV 71HD55M3X…HD75M3X<br>ATV 71HD90N4…HC50N4 | Software function *(1)* | | | Motor choke | 2 motor chokes in series | – |

*(1) The software function limits the overvoltage at the motor terminals to twice the DC bus voltage.*
*For any application with braking cycles, the DC bus voltage rises to more than the supply voltage multiplied by √2.*
*You must check the electrical characteristics of the motor before using this function.*
*(2) The cable length varies depending on the combination of variable speed drive/motor choke or sinus filter, see pages 172, 173 and 175.*
*For an application with several motors connected in parallel, the cable length must include all cabling.*
*Recommended cable types:*
*■ Shielded cables: "GORSE" cable, type GUOSTV-LS/LH; "PROTOFLEX" cable, type EMV2YSL CY,*
*■ Unshielded cables: "GORSE" cable, type H07 RN-F4GXX; "BELDEN" cable, type 2950X.*
*(3) ATV 71H●●●Y drives:*
*■ In combination with motor choke, see page 173,*
*■ In combination with sinus filter or if software function used, please consult your Regional Sales Office.*

Schemes :
page 231

# Variable speed drives
## Altivar 71: output filters
## Option: motor chokes

## Motor chokes




Altivar 71 drives have been developed to operate with the following maximum motor cable lengths:

| For drives | Maximum length of motor cable *(1)* | |
|---|---|---|
| | Shielded cable | Unshielded cable |
| | m | m |
| ATV 71H●●●M3<br>ATV 71HD11M3X, HD15M3X<br>ATV 71H075N4…HD18N4<br>ATV 71W075N4…WD18N4<br>ATV 71P075N4Z…PU75N4Z | 50 | 100 |
| ATV 71HD18M3X…HD75M3X<br>ATV 71HD22N4…HC50N4<br>ATV 71WD22N4…WD75N4 | 100 | 200 |
| ATV 71HU22Y…HD90Y | 10 | 10 |
| ATV 71HC11Y…HC63Y | 15 | 30 |

The motor choke enables operation with motor cables above these maximum lengths and/or limits the dv/dt at the motor terminals to:
- 500 V/µs, for three-phase line supplies of 200…400 V and 380…480 V,
- 1000 V/µs, for three-phase line supplies of 500…690 V.

It is also used to:
- Limit overvoltages on the motor terminals to:
  - 1000 V at 400 V ~ (rms value),
  - 1150 V at 460 V ~ (rms value),
  - 1800 V at 690 V ~ (rms value),
- Filter interference caused by opening a contactor placed between the filter and the motor,
- Reduce the motor earth leakage current.

## General characteristics *(2)*

| Type of choke | | | VW3 A5 101…103 | VW3 A5 104…108 |
|---|---|---|---|---|
| **Drive switching frequency** | ATV 71H●●●M3<br>ATV 71HD11M3X, HD15M3X<br>ATV 71H075N4…HD30N4<br>ATV 71HU22Y…HD30Y<br>ATV 71W075N4…WD30N4<br>ATV 71P075N4Z…PU75N4Z | **kHz** | 4 | |
| | ATV 71HD18M3X…HD75M3X<br>ATV 71HD37N4…HC50N4<br>ATV 71HD37Y…HC63Y<br>ATV 71WD37N4…WD75N4 | **kHz** | 2.5 | |
| **Maximum drive output frequency** | | **Hz** | 100 | |
| **Degree of protection** | | | IP 00 | IP 00<br>IP 20 with kits VW3 A9 612 and VW3 A9 613 |
| **Thermal protection** | | | By temperature controlled switch | – |
| **Temperature controlled switch** *(3)* | Activation temperature | **°C** | 125 | – |
| | Maximum voltage | **V** | 250~ | – |
| | Maximum current | **A** | 0.5 | – |
| **Ambient air temperature** around the device | Operation | **°C** | - 10…+ 50 | |
| | Storage | **°C** | - 25…+ 70 | |

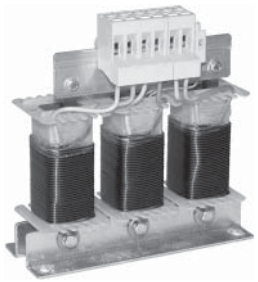
## Connection characteristics

| | | | |
|---|---|---|---|
| **Maximum wire size and tightening torque** | VW3 A5 101, 102 | | 10 mm² (AWG 6)<br>1.5 Nm |
| | VW3 A5 103 | | Connected on a bar, Ø 9 mm<br>– |
| | VW3 A5 104, 105 | | Connected on a tag connector, M10<br>– |
| | VW3 A5 106, 107 | | Connected on a tag connector, 2 x M12<br>– |
| | VW3 A5 108 | | Connected on a tag connector, 3 x M12<br>– |

*(1) These values are given for a switching frequency of 2.5 or 4 kHz depending on the rating.*
*(2) Choke performance is ensured by not exceeding the above cable lengths. For an application with several motors connected in parallel, the cable length must include all cabling. If a cable longer than that recommended is used, the motor chokes may overheat.*
*(3) The contact should be connected in the sequence (use for signalling or controlling the line contactor).*

References: pages 172 and 173
Dimensions: pages 214 to 216
Schemes: page 231

# Variable speed drives
## Altivar 71: output filters
## Option: motor chokes



*VW3 A5 101*

### Motor chokes

| For drives | | Maximum length of motor cable *(1)* | | Loss | Nominal current | Sold in lots of | Reference | Weight |
|---|---|---|---|---|---|---|---|---|
| | | Shielded | Un-shielded | | | | | |
| | | m | m | W | A | | | kg |
| **Three-phase supply voltage: 200…240 V 50/60 Hz** | | | | | | | | |
| ATV 71H037M3…HU22M3 | | 150 | 300 | 150 | 12 | – | **VW3 A5 101** | 5.500 |
| ATV 71HU30M3…HU75M3 | | 200 | 260 | 250 | 48 | – | **VW3 A5 102** | 8.000 |
| | | 300 | 300 | 350 | 90 | – | **VW3 A5 103** | 10.000 |
| ATV 71HD11M3X…HD22M3X | | 150 | 300 | 350 | 90 | – | **VW3 A5 103** | 10.000 |
| ATV 71HD30M3X…HD45M3X | | 150 | 300 | 430 | 215 | 3 | **VW3 A5 104** | 15.500 |
| ATV 71HD55M3X, HD75M3X | | 150 | 300 | 475 | 314 | 3 | **VW3 A5 105** | 32.000 |
| **Three-phase supply voltage: 380...480 V 50/60 Hz** | | | | | | | | |
| ATV 71H075N4…HU40N4<br>ATV 71W075N4…WU40N4<br>ATV 71P075N4Z…PU40N4Z | | 75 | 90 | 150 | 12 | – | **VW3 A5 101** | 5.500 |
| | | 85 | 95 | 250 | 48 | – | **VW3 A5 102** | 8.000 |
| | | 160 | 200 | 350 | 90 | – | **VW3 A5 103** | 10.000 |
| ATV 71HU55N4…HD18N4<br>ATV 71WU55N4…WD18N4<br>ATV 71PU55N4Z…PD11N4Z | | 85 | 95 | 250 | 48 | – | **VW3 A5 102** | 8.000 |
| | | 160 | 200 | 350 | 90 | – | **VW3 A5 103** | 10.000 |
| | | 200 | 300 | 430 | 215 | 3 | **VW3 A5 104** | 15.500 |
| ATV 71HD22N4, HD30N4<br>ATV 71WD22N4, WD30N4 | | 140 | 170 | 350 | 90 | – | **VW3 A5 103** | 10.000 |
| | | 150 | 300 | 430 | 215 | 3 | **VW3 A5 104** | 15.500 |
| ATV 71HD37N4<br>ATV 71WD37N4 | | 97 | 166 | 350 | 90 | – | **VW3 A5 103** | 10.000 |
| | | 200 | 300 | 430 | 215 | 3 | **VW3 A5 104** | 15.500 |
| ATV 71HD45N4…HD75N4<br>ATV 71WD45N4…WD75N4 | | 150 | 300 | 430 | 215 | 3 | **VW3 A5 104** | 15.500 |
| ATV 71HD90N4 | | 200 | 300 | 430 | 215 | 3 | **VW3 A5 104** | 15.500 |
| ATV 71HC11N4, HC13N4 | | 150 | 250 | 475 | 314 | 3 | **VW3 A5 105** | 32.000 |
| ATV 71HC16N4, HC20N4 | | 250 | 300 | 530 | 481 | 3 | **VW3 A5 106** | 58.000 |
| ATV 71HC25N4 | Motor P 220 kW | 250 | 300 | 530 | 481 | 3 | **VW3 A5 106** | 58.000 |
| | Motor P 250 kW | 200 | 250 | 598 | 759 | 3 | **VW3 A5 107** | 93.000 |
| ATV 71HC28N4, HC31N4 | | 200 | 250 | 598 | 759 | 3 | **VW3 A5 107** | 93.000 |
| ATV 71HC40N4 | Motor P 355 kW | 200 | 250 | 598 | 759 | 3 | **VW3 A5 107** | 93.000 |
| | Motor P 400 kW | 250 | 300 | 682 | 1188 | 3 | **VW3 A5 108** | 120.000 |
| ATV 71HC50N4 | | 250 | 300 | 682 | 1188 | 3 | **VW3 A5 108** | 120.000 |

*(1) Maximum length given for a switching frequency of 2.5 or 4 kHz depending on the drive rating, see characteristics on page 171.*

# Variable speed drives
## Altivar 71: output filters
## Option: motor chokes

### Motor chokes (continued)

| For drives | Maximum length of motor cable (1) | | Loss | Nominal current | Sold in lots of | Reference | Weight |
|---|---|---|---|---|---|---|---|
| | Shielded | Un-shielded | | | | | |
| | m | m | W | A | | | kg |
| **Three-phase supply voltage: 500…690 V 50/60 Hz** | | | | | | | |
| ATV 71HU22Y…HU75Y | 36 | 44 | 150 | 12 | – | **VW3 A5 101** | 5.500 |
| | 41 | 46 | 250 | 48 | – | **VW3 A5 102** | 8.000 |
| | 77 | 97 | 350 | 90 | – | **VW3 A5 103** | 10.000 |
| ATV 71HD11Y…HD30Y | 41 | 46 | 250 | 48 | – | **VW3 A5 102** | 8.000 |
| | 77 | 97 | 350 | 90 | – | **VW3 A5 103** | 10.000 |
| | 97 | 145 | 430 | 215 | 3 | **VW3 A5 104** | 15.500 |
| ATV 71HD37Y…HD55Y | 68 | 82 | 350 | 90 | – | **VW3 A5 103** | 10.000 |
| | 73 | 145 | 430 | 215 | 3 | **VW3 A5 104** | 15.500 |
| ATV 71HD75Y…HD90Y | 73 | 145 | 430 | 215 | 3 | **VW3 A5 104** | 15.500 |
| ATV 71HC11Y, HC13Y | 50 | 250 | 430 | 215 | 3 | **VW3 A5 104** | 15.500 |
| ATV 71HC16Y, HC20Y | 50 | 250 | 475 | 314 | 3 | **VW3 A5 105** | 32.000 |
| ATV 71HC25Y, HC31Y | 50 | 250 | 530 | 759 | 3 | **VW3 A5 106** | 58.000 |
| ATV 71HC40Y, HC50Y | 50 | 250 | 598 | 759 | 3 | **VW3 A5 107** | 93.000 |
| ATV 71HC63Y | 50 | 250 | 682 | 1188 | 3 | **VW3 A5 108** | 120.000 |

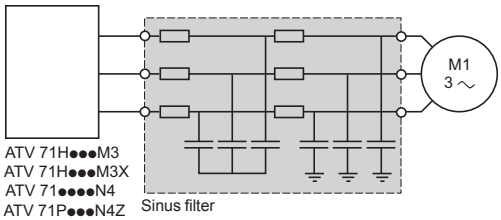
### IP 20 protection kits

| Description | For chokes | Reference | Weight kg |
|---|---|---|---|
| **Mechanical kit including an IP 20 cover and cable clamps** | VW3 A5 104, 105 | **VW3 A9 612** | – |
| | VW3 A5 106…108 | **VW3 A9 613** | – |

*(1) Maximum length given for:*
*- A switching frequency of 2.5 or 4 kHz depending on the drive rating, see characteristics on page 171*
*- A three-phase 690 V 50 Hz line supply voltage.*

# Variable speed drives
## Altivar 71: output filters
## Option: sinus filters

## Sinus filters




Sinus filters allow Altivar 71 drives to operate with longer motor cables (up to 1000 m).
For ATV 71H075M3…HD45M3X, ATV 71●U15N4...●D75N4 and ATV 71P●●●N4Z drives, they also allow the use of unshielded cables while still complying with the standards on radiated EMC emissions (EN55011 class A Gr1 and IEC/EN 61800-3 category C2).

For ATV 71HD55M3X, HD75M3X and ATV 71HD90N4…HC50N4 drives, the sinus filter only operates with a voltage/frequency drive ratio.

The sinus filter is never compatible with the current Flux Vector Control with sensor ratio.

***Note:*** *The Programming Manual must be referred to when setting up the sinus filter.*

### Applications

For ATV 71H075M3…HD45M3X, ATV 71●U15N4... ●D75N4 and ATV 71P●●●N4Z drives, applications requiring:
- Long cable runs
- Mechanical restrictions preventing the use of shielded cables
- An intermediate transformer between the drive and the motor
- Motors connected in parallel.

For ATV 71HD55M3X, HD75M3X and ATV 71HD90N4...HC50N4 drives, applications requiring:
- An intermediate transformer between the drive and the motor.

## General characteristics

| Type of choke | | | VW3 A5 201…206 | VW3 A5 207…211 |
|---|---|---|---|---|
| Degree of protection | | | IP 20 | IP 00 |
| Atmospheric pollution | | | 3C2, 3B1, 3S1 conforming to IEC 721.3.3 | |
| Degree of pollution | | | 2 conforming to standard EN 50178 | |
| Vibration resistance | | | 1.5 mm from 3...13 Hz, 1 gn from 13...200 Hz, conforming to IEC 60068-2 | |
| Shock resistance | | | 15 gn for 11 ms conforming to IEC 60068-2-27 | |
| Maximum relative humidity | | | 95 % | |
| Ambient air temperature around the device | Operation | °C | - 10...+ 40 without derating<br>From 40...50°C with current derating of 1.5% per additional °C | |
| | Storage | °C | - 40…+ 65 | |
| Maximum operating altitude | | m | 1000 without derating<br>From 1000…3000 with current derating of 1% per additional 100 m | |
| Switching frequency | | kHz | 4...8 | |
| Output frequency | | Hz | 0...100 | |
| Voltage drop | | | < 10 % | |
| Maximum voltage | | V | 500~ | |
| Maximum current | | | 1.5 x nominal current for 60 s | |
| Maximum length of motor cable | Unshielded cable | m | 600 or 1000 depending on the drive rating, see page 170 | |

## Connection characteristics

| | | | |
|---|---|---|---|
| Maximum wire size and tightening torque | VW3 A5 201 | | 4 mm² (AWG 10)<br>0.6 Nm |
| | VW3 A5 202 | | 6 mm² (AWG 8)<br>1.5 Nm |
| | VW3 A5 203 | | 10 mm² (AWG 6)<br>1.5 Nm |
| | VW3 A5 204 | | 25 mm² (AWG 2)<br>4 Nm |
| | VW3 A5 205 | | 50 mm² (AWG 0)<br>6 Nm |
| | VW3 A5 206, 207 | | 95 mm² (AWG 4/0)<br>20 Nm |
| | VW3 A5 208, 209 | | Connected on a bar, Ø 11 mm<br>– |
| | VW3 A5 210 | | Connected on a bar, Ø 14 mm<br>– |
| | VW3 A5 211 | | Connected on a bar, 4 x Ø 11 mm<br>– |

References: page 175 | Dimensions: page 217 | Schemes: page 231

# Variable speed drives
## Altivar 71: output filters
## Option: sinus filters

### Sinus filters

| For drives | | Nominal current | Loss at 100 Hz | Reference | Weight |
|---|---|---|---|---|---|
| | | A | W | | kg |
| **Three-phase supply voltage: 200…240 V 50/60 Hz** | | | | | |
| ATV 71H075M3, HU15M3 *(1)* | | 11 | 50 | **VW3 A5 201** | 8.000 |
| ATV 71HU22M3, HU30M3 | | 16 | 70 | **VW3 A5 202** | 11.000 |
| ATV 71HU40M3... HU75M3 | | 33 | 120 | **VW3 A5 203** | 22.000 |
| ATV 71HD11M3X, HD15M3X | | 66 | 180 | **VW3 A5 204** | 45.000 |
| ATV 71HD18M3X, HD22M3X | | 95 | 250 | **VW3 A5 205** | 60.000 |
| ATV 71HD30M3X... HD45M3X | | 180 | 400 | **VW3 A5 206** | 120.000 |
| ATV 71HD55M3X, HD75M3X | | 300 | 1360 | **VW3 A5 208** | 165.000 |
| **Three-phase supply voltage: 380…480 V 50/60 Hz** | | | | | |
| ATV 71HU15N4...HU40N4 *(1)*<br>ATV 71WU15N4…WU40N4<br>ATV 71PU15N4Z…PU40N4Z | | 11 | 50 | **VW3 A5 201** | 8.000 |
| ATV 71HU55N4<br>ATV 71WU55N4<br>ATV 71PU55N4Z | | 16 | 70 | **VW3 A5 202** | 11.000 |
| ATV 71HU75N4...HD15N4<br>ATV 71WU75N4…WD15N4<br>ATV 71PU75N4Z, PD11N4Z | | 33 | 120 | **VW3 A5 203** | 22.000 |
| ATV 71HD18N4... HD30N4<br>ATV 71WD18N4…WD30N4 | | 66 | 180 | **VW3 A5 204** | 45.000 |
| ATV 71HD37N4, HD45N4<br>ATV 71WD37N4, WD45N4 | | 95 | 250 | **VW3 A5 205** | 60.000 |
| ATV 71HD55N4, HD75N4<br>ATV 71WD55N4, WD75N4 | | 180 | 400 | **VW3 A5 206** | 120.000 |
| ATV 71HD90N4, HC11N4 | | 200 | 945 | **VW3 A5 207** | 130.000 |
| ATV 71HC13N4, HC16N4 | | 300 | 1360 | **VW3 A5 208** | 165.000 |
| ATV 71HC20N4 | | 400 | 1900 | **VW3 A5 209** | 190.000 |
| ATV 71HC25N4 | Motor P 220 kW | 400 | 1900 | **VW3 A5 209** | 190.000 |
| | Motor P 250 kW | 600 | 2370 | **VW3 A5 210** | 260.000 |
| ATV 71HC28N4, HC31N4 | | 600 | 2370 | **VW3 A5 210** | 260.000 |
| ATV 71HC40N4 | Motor P 355 kW | 600 | 2370 | **VW3 A5 210** | 260.000 |
| | Motor P 400 kW | 1200 | 5150 | **VW3 A5 211** | 600.000 |
| ATV 71HC50N4 | | 1200 | 5150 | **VW3 A5 211** | 600.000 |

*(1) For ATV 71H075M3, ATV 71HU15M3 and ATV 71HU15N4 drives, it is advisable to use a lower category of motor with a sinus filter.*

Presentation: pages 170 and 174 | Characteristics: page 174 | Dimensions: page 217 | Schemes: page 231

## Table showing possible combinations of ATV 71H●●●M3 and ATV 71H●●●M3X drive options *(1)*

| Motor | | Drive | Options | | | | |
|---|---|---|---|---|---|---|---|
| kW | *HP* | | DC choke | Line choke | Additional EMC input filter | Motor choke | IP 20 motor choke kit |
| **Single-phase supply voltage: 200…240 V 50/60 Hz** | | | | | | | |
| 0.37 | *0.5* | **ATV 71H075M3** | – | – | VW3 A4 401 | VW3 A5 101 | – |
| 0.75 | *1* | **ATV 71HU15M3** | – | – | VW3 A4 401 | VW3 A5 101 | – |
| 1.5 | *2* | **ATV 71HU22M3** | – | – | VW3 A4 402 | VW3 A5 101 | – |
| 2.2 | *3* | **ATV 71HU30M3** | – | – | VW3 A4 402 | VW3 A5 102, 103 | – |
| 3 | – | **ATV 71HU40M3** | – | VW3 A58 501 | VW3 A4 402 | VW3 A5 102, 103 | – |
| 4 | *5* | **ATV 71HU55M3** | – | VW3 A58 502 | VW3 A4 403 | VW3 A5 102, 103 | – |
| 5.5 | *7.5* | **ATV 71HU75M3** | – | VW3 A58 502 | VW3 A4 404 | VW3 A5 102, 103 | – |
| **Three-phase supply voltage: 200…240 V 50/60 Hz** | | | | | | | |
| 0.37 | *0.5* | **ATV 71H037M3** | VW3 A4 501 | VW3 A4 551 | VW3 A4 401 | VW3 A5 101 | – |
| 0.75 | *1* | **ATV 71H075M3** | VW3 A4 503 | VW3 A4 551 | VW3 A4 401 | VW3 A5 101 | – |
| 1.5 | *2* | **ATV 71HU15M3** | VW3 A4 505 | VW3 A4 552 | VW3 A4 401 | VW3 A5 101 | – |
| 2.2 | *3* | **ATV 71HU22M3** | VW3 A4 506 | VW3 A4 552 | VW3 A4 402 | VW3 A5 101 | – |
| 3 | – | **ATV 71HU30M3** | VW3 A4 507 | VW3 A4 553 | VW3 A4 402 | VW3 A5 102, 103 | – |
| 4 | *5* | **ATV 71HU40M3** | VW3 A4 508 | VW3 A4 554 | VW3 A4 402 | VW3 A5 102, 103 | – |
| 5.5 | *7.5* | **ATV 71HU55M3** | VW3 A4 508 | VW3 A4 554 | VW3 A4 403 | VW3 A5 102, 103 | – |
| 7.5 | *10* | **ATV 71HU75M3** | VW3 A4 509 | VW3 A4 555 | VW3 A4 404 | VW3 A5 102, 103 | – |
| 11 | *15* | **ATV 71HD11M3X** | VW3 A4 510 | VW3 A4 555 | VW3 A4 405 | VW3 A5 103 | – |
| 15 | *20* | **ATV 71HD15M3X** | VW3 A4 510 | VW3 A4 556 | VW3 A4 405 | VW3 A5 103 | – |
| 18.5 | *25* | **ATV 71HD18M3X** | VW3 A4 511 | VW3 A4 557 | VW3 A4 406 | VW3 A5 103 | – |
| 22 | *30* | **ATV 71HD22M3X** | VW3 A4 511 | VW3 A4 557 | VW3 A4 406 | VW3 A5 103 | – |
| 30 | *40* | **ATV 71HD30M3X** | VW3 A4 512 | VW3 A4 557 | VW3 A4 408 | VW3 A5 104 | VW3 A9 612 |
| 37 | *50* | **ATV 71HD37M3X** | VW3 A4 512 | VW3 A4 557 | VW3 A4 408 | VW3 A5 104 | VW3 A9 612 |
| 45 | *60* | **ATV 71HD45M3X** | VW3 A4 512 | VW3 A4 557 | VW3 A4 408 | VW3 A5 104 | VW3 A9 612 |
| 55 | *75* | **ATV 71HD55M3X** | – | VW3 A4 562 | VW3 A4 410 | VW3 A5 105 | VW3 A9 612 |
| 75 | *100* | **ATV 71HD75M3X** | – | VW3 A4 563 | VW3 A4 410 | VW3 A5 105 | VW3 A9 612 |
| **Pages** | | 22 | 155 | 160 | 168 | 172 | 173 |

*(1) The options available for ATV 71H●●●M3 and H●●●M3X drives are also valid, at the same rating, for ATV 71H●●●M3383 and ATV 71H●●●M3X383 drives.*

| Sinus filter | Braking resistor | Hoist resistor | Flush-mounting kit (in a dust and damp proof enclosure) | UL Type 1 conformity kit (outside enclosure) | IP 21 or IP 31 conformity kit (outside enclosure) | Control card fan kit | DNV kit |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| VW3 A5 201 | VW3 A7 701 | VW3 A7 801 | VW3 A9 501 | VW3 A9 201 | VW3 A9 101 | – | – |
| VW3 A5 201 | VW3 A7 702 | VW3 A7 802 | VW3 A9 501 | VW3 A9 201 | VW3 A9 101 | – | – |
| VW3 A5 202 | VW3 A7 702 | VW3 A7 803 | VW3 A9 502 | VW3 A9 202 | VW3 A9 102 | – | – |
| VW3 A5 202 | VW3 A7 703 | VW3 A7 803 | VW3 A9 502 | VW3 A9 202 | VW3 A9 102 | – | – |
| VW3 A5 203 | VW3 A7 703 | VW3 A7 803 | VW3 A9 502 | VW3 A9 202 | VW3 A9 102 | – | – |
| VW3 A5 203 | VW3 A7 704 | VW3 A7 804 | VW3 A9 503 | VW3 A9 203 | VW3 A9 103 | – | – |
| VW3 A5 203 | VW3 A7 704 | VW3 A7 804 | VW3 A9 504 | VW3 A9 204 | VW3 A9 104 | – | – |
| | | | | | | | |
| VW3 A5 201 | VW3 A7 701 | VW3 A7 801 | VW3 A9 501 | VW3 A9 201 | VW3 A9 101 | – | VW3 A9 621 |
| VW3 A5 201 | VW3 A7 701 | VW3 A7 801 | VW3 A9 501 | VW3 A9 201 | VW3 A9 101 | – | VW3 A9 621 |
| VW3 A5 201 | VW3 A7 702 | VW3 A7 802 | VW3 A9 501 | VW3 A9 201 | VW3 A9 101 | – | VW3 A9 621 |
| VW3 A5 202 | VW3 A7 702 | VW3 A7 803 | VW3 A9 502 | VW3 A9 202 | VW3 A9 102 | – | VW3 A9 622 |
| VW3 A5 202 | VW3 A7 703 | VW3 A7 803 | VW3 A9 502 | VW3 A9 202 | VW3 A9 102 | – | VW3 A9 622 |
| VW3 A5 203 | VW3 A7 703 | VW3 A7 803 | VW3 A9 502 | VW3 A9 202 | VW3 A9 102 | – | VW3 A9 622 |
| VW3 A5 203 | VW3 A7 704 | VW3 A7 804 | VW3 A9 503 | VW3 A9 203 | VW3 A9 103 | – | VW3 A9 623 |
| VW3 A5 203 | VW3 A7 704 | VW3 A7 804 | VW3 A9 504 | VW3 A9 204 | VW3 A9 104 | – | VW3 A9 624 |
| VW3 A5 204 | VW3 A7 705 | VW3 A7 805 | VW3 A9 505 | VW3 A9 205 | VW3 A9 105 | – | VW3 A9 625 |
| VW3 A5 204 | VW3 A7 706 | VW3 A7 805 | VW3 A9 505 | VW3 A9 205 | VW3 A9 105 | – | VW3 A9 625 |
| VW3 A5 205 | VW3 A7 707 | VW3 A7 806 | VW3 A9 506 | VW3 A9 206 | VW3 A9 106 | VW3 A9 404 | VW3 A9 626 |
| VW3 A5 205 | VW3 A7 707 | VW3 A7 807 | VW3 A9 506 | VW3 A9 206 | VW3 A9 106 | VW3 A9 404 | VW3 A9 626 |
| VW3 A5 206 | VW3 A7 708 | VW3 A7 807 | VW3 A9 508 | VW3 A9 217 | VW3 A9 117 | VW3 A9 406 | VW3 A9 628 |
| VW3 A5 206 | VW3 A7 709 | VW3 A7 808 | VW3 A9 508 | VW3 A9 217 | VW3 A9 117 | VW3 A9 406 | VW3 A9 628 |
| VW3 A5 206 | VW3 A7 709 | VW3 A7 808 | VW3 A9 508 | VW3 A9 217 | VW3 A9 117 | VW3 A9 406 | VW3 A9 628 |
| VW3 A5 208 | VW3 A7 713 | VW3 A7 809 | VW3 A9 510 | VW3 A9 209 | VW3 A9 109 | – | VW3 A9 629 *(1)* |
| VW3 A5 208 | VW3 A7 714 | VW3 A7 810 | VW3 A9 511 | VW3 A9 210 | VW3 A9 110 | – | VW3 A9 631 *(1)* |
| 175 | 137 | 139 | 30 | 32 | 33 | 27 | 28 |

*(1) For the DNV VW3 A9 629 and 631 kits, it is necessary to order a variable speed drive without DC choke, by adding D at the end of the reference.*
*Example : ATV 71HD55M3X becomes ATV 71HD55M3XD, see page 22.*

## Table showing possible combinations of ATV 71H●●●N4 drive options

| Motor | | Drive | Options | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | DC choke | Line choke | Passive filter (1) | Additional EMC input filter | IP 30 EMC filter kit | Motor choke | IP 20 motor choke kit |
| kW | HP | | | | | | | | |
| **Three-phase supply voltage: 380…480 V 50/60 Hz** | | | | | | | | | |
| 0.75 | 1 | **ATV 71H075N4** | VW3 A4 501 | VW3 A4 551 | VW3 A4 6●1 | VW3 A4 401 | – | VW3 A5 101, 102, 103 | – |
| 1.5 | 2 | **ATV 71HU15N4** | VW3 A4 502 | VW3 A4 551 | VW3 A4 6●1 | VW3 A4 401 | – | VW3 A5 101, 102, 103 | – |
| 2.2 | 3 | **ATV 71HU22N4** | VW3 A4 503 | VW3 A4 552 | VW3 A4 6●1 | VW3 A4 401 | – | VW3 A5 101, 102, 103 | – |
| 3 | – | **ATV 71HU30N4** | VW3 A4 503 | VW3 A4 552 | VW3 A4 6●1 | VW3 A4 402 | – | VW3 A5 101, 102, 103 | – |
| 4 | 5 | **ATV 71HU40N4** | VW3 A4 504 | VW3 A4 552 | VW3 A4 6●2 | VW3 A4 402 | – | VW3 A5 101, 102, 103 | – |
| 5.5 | 7.5 | **ATV 71HU55N4** | VW3 A4 505 | VW3 A4 553 | VW3 A4 6●2 | VW3 A4 403 | – | VW3 A5 102, 103, 104 | VW3 A9 612 |
| 7.5 | 10 | **ATV 71HU75N4** | VW3 A4 506 | VW3 A4 553 | VW3 A4 6●3 | VW3 A4 403 | – | VW3 A5 102, 103, 104 | VW3 A9 612 |
| 11 | 15 | **ATV 71HD11N4** | VW3 A4 507 | VW3 A4 554 | VW3 A4 6●3 | VW3 A4 404 | – | VW3 A5 102, 103, 104 | VW3 A9 612 |
| 15 | 20 | **ATV 71HD15N4** | VW3 A4 508 | VW3 A4 554 | VW3 A4 6●4 | VW3 A4 405 | – | VW3 A5 102, 103, 104 | VW3 A9 612 |
| 18.5 | 25 | **ATV 71HD18N4** | VW3 A4 508 | VW3 A4 555 | VW3 A4 6●5 | VW3 A4 405 | – | VW3 A5 102, 103, 104 | VW3 A9 612 |
| 22 | 30 | **ATV 71HD22N4** | VW3 A4 510 | VW3 A4 555 | VW3 A4 6●6 | VW3 A4 406 | – | VW3 A5 103, 104 | VW3 A9 612 |
| 30 | 40 | **ATV 71HD30N4** | VW3 A4 510 | VW3 A4 556 | VW3 A4 6●7 | VW3 A4 407 | – | VW3 A5 103, 104 | VW3 A9 612 |
| 37 | 50 | **ATV 71HD37N4** | VW3 A4 510 | VW3 A4 556 | VW3 A4 6●7 | VW3 A4 407 | – | VW3 A5 103, 104 | VW3 A9 612 |
| 45 | 60 | **ATV 71HD45N4** | VW3 A4 511 | VW3 A4 556 | VW3 A4 6●8 | VW3 A4 408 | – | VW3 A5 104 | VW3 A9 612 |
| 55 | 75 | **ATV 71HD55N4** | VW3 A4 511 | VW3 A4 556 | VW3 A4 6●8 | VW3 A4 408 | – | VW3 A5 104 | VW3 A9 612 |
| 75 | 100 | **ATV 71HD75N4** | VW3 A4 511 | VW3 A4 558 | VW3 A4 6●9 | VW3 A4 408 | – | VW3 A5 104 | VW3 A9 612 |
| 90 | 125 | **ATV 71HD90N4** | – | VW3 A4 558 | VW3 A4 6●9 | VW3 A4 410 | VW3 A9 601 | VW3 A5 104 | VW3 A9 612 |
| 110 | 150 | **ATV 71HC11N4** | – | VW3 A4 559 | VW3 A4 6●0 | VW3 A4 410 | VW3 A9 601 | VW3 A5 105 | VW3 A9 612 |
| 132 | 200 | **ATV 71HC13N4** | – | VW3 A4 560 | VW3 A4 6●1 | VW3 A4 410 | VW3 A9 601 | VW3 A5 105 | VW3 A9 612 |
| 160 | 250 | **ATV 71HC16N4** | – | VW3 A4 561 | VW3 A4 6●2 | VW3 A4 411 | VW3 A9 601 | VW3 A5 106 | VW3 A9 613 |
| 200 | 300 | **ATV 71HC20N4** | – | VW3 A4 569 | VW3 A4 6●3 | VW3 A4 411 | VW3 A9 601 | VW3 A5 106 | VW3 A9 613 |
| 220 | 350 | **ATV 71HC25N4** | – | VW3 A4 562 | VW3 A4 6●3 | VW3 A4 411 | VW3 A9 601 | VW3 A5 106 | VW3 A9 613 |
| 250 | 400 | **ATV 71HC25N4** | – | VW3 A4 564 | VW3 A4 6●1 | VW3 A4 411 | VW3 A9 601 | VW3 A5 107 | VW3 A9 613 |
| 280 | 450 | **ATV 71HC28N4** | – | VW3 A4 564 | VW3 A4 6●2 | VW3 A4 411 | VW3 A9 601 | VW3 A5 107 | VW3 A9 613 |
| 315 | 500 | **ATV 71HC31N4** | – | VW3 A4 565 | VW3 A4 6●2 | VW3 A4 412 | VW3 A9 602 | VW3 A5 107 | VW3 A9 613 |
| 355 | – | **ATV 71HC40N4** | – | VW3 A4 569 | VW3 A4 6●2 | VW3 A4 412 | VW3 A9 602 | VW3 A5 107 | VW3 A9 613 |
| 400 | 600 | **ATV 71HC40N4** | – | VW3 A4 569 | VW3 A4 6●9 | VW3 A4 412 | VW3 A9 602 | VW3 A5 108 | VW3 A9 613 |
| 500 | 700 | **ATV 71HC50N4** | – | VW3 A4 564 | VW3 A4 6●2 | VW3 A4 413 | VW3 A9 602 | VW3 A5 108 | VW3 A9 613 |
| **Pages** | | 23 | 155 | 160 | 162 | 168 | 169 | 172 | 173 |

*(1) There are passive filters for a 460 V ∿ supply, see pages 164 and 165.*

| Sinus filter | Resistance braking unit | Braking resistor | Hoist resistor | Flush-mounting kit (in a dust and damp proof enclosure) | UL Type 1 conformity kit (outside enclosure) | IP 21 or IP 31 conformity kit (outside enclosure) | Control card fan kit | DNV kit *(1)* |
|---|---|---|---|---|---|---|---|---|
| – | – | VW3 A7 701 | VW3 A7 801 | VW3 A9 501 | VW3 A9 201 | VW3 A9 101 | – | VW3 A9 621 |
| VW3 A5 201 | – | VW3 A7 701 | VW3 A7 801 | VW3 A9 501 | VW3 A9 201 | VW3 A9 101 | – | VW3 A9 621 |
| VW3 A5 201 | – | VW3 A7 701 | VW3 A7 801 | VW3 A9 501 | VW3 A9 201 | VW3 A9 101 | – | VW3 A9 621 |
| VW3 A5 201 | – | VW3 A7 701 | VW3 A7 802 | VW3 A9 502 | VW3 A9 202 | VW3 A9 102 | – | VW3 A9 622 |
| VW3 A5 201 | – | VW3 A7 701 | VW3 A7 802 | VW3 A9 502 | VW3 A9 202 | VW3 A9 102 | – | VW3 A9 622 |
| VW3 A5 202 | – | VW3 A7 702 | VW3 A7 802 | VW3 A9 503 | VW3 A9 203 | VW3 A9 103 | – | VW3 A9 623 |
| VW3 A5 203 | – | VW3 A7 702 | VW3 A7 803 | VW3 A9 503 | VW3 A9 203 | VW3 A9 103 | – | VW3 A9 623 |
| VW3 A5 203 | – | VW3 A7 703 | VW3 A7 803 | VW3 A9 504 | VW3 A9 204 | VW3 A9 104 | – | VW3 A9 624 |
| VW3 A5 203 | – | VW3 A7 703 | VW3 A7 804 | VW3 A9 505 | VW3 A9 205 | VW3 A9 105 | – | VW3 A9 625 |
| VW3 A5 204 | – | VW3 A7 704 | VW3 A7 804 | VW3 A9 505 | VW3 A9 205 | VW3 A9 105 | – | VW3 A9 625 |
| VW3 A5 204 | – | VW3 A7 704 | VW3 A7 804 | VW3 A9 506 | VW3 A9 206 | VW3 A9 106 | VW3 A9 404 | VW3 A9 626 |
| VW3 A5 204 | – | VW3 A7 704 | VW3 A7 804 | VW3 A9 507 | VW3 A9 207 | VW3 A9 107 | VW3 A9 405 | VW3 A9 627 |
| VW3 A5 205 | – | VW3 A7 705 | VW3 A7 805 | VW3 A9 507 | VW3 A9 207 | VW3 A9 107 | VW3 A9 405 | VW3 A9 627 |
| VW3 A5 205 | – | VW3 A7 707 | VW3 A7 805 | VW3 A9 509 | VW3 A9 208 | VW3 A9 108 | VW3 A9 407 | VW3 A9 628 |
| VW3 A5 206 | – | VW3 A7 707 | VW3 A7 805 | VW3 A9 509 | VW3 A9 208 | VW3 A9 108 | VW3 A9 407 | VW3 A9 628 |
| VW3 A5 206 | – | VW3 A7 707 | VW3 A7 806 | VW3 A9 509 | VW3 A9 208 | VW3 A9 108 | VW3 A9 407 | VW3 A9 628 |
| VW3 A5 207 | – | VW3 A7 710 | VW3 A7 811 | VW3 A9 510 | VW3 A9 209 | VW3 A9 109 | – | VW3 A9 629 |
| VW3 A5 207 | – | VW3 A7 711 | VW3 A7 812 | VW3 A9 511 | VW3 A9 210 | VW3 A9 110 | – | VW3 A9 631 |
| VW3 A5 208 | – | VW3 A7 711 | VW3 A7 812 | VW3 A9 512 | VW3 A9 211 | VW3 A9 111 | – | VW3 A9 633 |
| VW3 A5 208 | – | VW3 A7 712 | VW3 A7 813 | VW3 A9 513 | VW3 A9 212 | VW3 A9 112 | – | VW3 A9 635 |
| VW3 A5 209 | VW3 A7 101 | VW3 A7 715 | VW3 A7 814 | VW3 A9 514, 515 | VW3 A9 213, 214 | VW3 A9 113, 114 | – | VW3 A9 637 |
| VW3 A5 209 | VW3 A7 101 | VW3 A7 716 | VW3 A7 815 | VW3 A9 514, 515 | VW3 A9 213, 214 | VW3 A9 113, 114 | – | VW3 A9 638 |
| VW3 A5 210 | VW3 A7 101 | VW3 A7 716 | VW3 A7 815 | VW3 A9 514, 515 | VW3 A9 213, 214 | VW3 A9 113, 114 | – | VW3 A9 638 |
| VW3 A5 210 | VW3 A7 101 | VW3 A7 716 | VW3 A7 815 | VW3 A9 514, 515 | VW3 A9 213, 214 | VW3 A9 113, 114 | – | VW3 A9 638 |
| VW3 A5 210 | VW3 A7 102 | VW3 A7 717 | VW3 A7 816 | – | – | VW3 A9 115 | – | VW3 A9 639 |
| VW3 A5 210 | VW3 A7 102 | VW3 A7 717 | VW3 A7 816 | – | – | VW3 A9 115 | – | VW3 A9 640 |
| VW3 A5 211 | VW3 A7 102 | VW3 A7 717 | VW3 A7 816 | – | – | VW3 A9 115 | – | VW3 A9 640 |
| VW3 A5 211 | VW3 A7 102 | VW3 A7 718 | VW3 A7 817 | – | – | VW3 A9 116 | – | VW3 A9 641 |
| 175 | 135 | 137 | 139 | 30 | 32 | 33 | 27 | 28 |

*(1) For the DNV VW3 A9 629…641 kits, it is necessary to order a variable speed drive without DC choke, by adding D at the end of the reference.*
*Example : ATV 71HD90N4 becomes ATV 71HD90N4D, see page 23.*

## Table showing possible combinations of ATV 71W●●●N4 drive options

| Motor | | Drive | Options | | | |
|---|---|---|---|---|---|---|
| | | | DC choke | Line choke | Passive filter *(1)* | Additional EMC filter |
| kW | *HP* | | | | | |
| **Three-phase supply voltage: 380…480 V 50/60 Hz** | | | | | | |
| 0.75 | *1* | **ATV 71W075N4** | VW3 A4 501 | VW3 A4 551 | VW3 A4 6●1 | VW3 A4 401 |
| 1.5 | *2* | **ATV 71WU15N4** | VW3 A4 502 | VW3 A4 551 | VW3 A4 6●1 | VW3 A4 401 |
| 2.2 | *3* | **ATV 71WU22N4** | VW3 A4 503 | VW3 A4 552 | VW3 A4 6●1 | VW3 A4 401 |
| 3 | – | **ATV 71WU30N4** | VW3 A4 503 | VW3 A4 552 | VW3 A4 6●1 | VW3 A4 402 |
| 4 | *5* | **ATV 71WU40N4** | VW3 A4 504 | VW3 A4 552 | VW3 A4 6●2 | VW3 A4 402 |
| 5.5 | *7.5* | **ATV 71WU55N4** | VW3 A4 505 | VW3 A4 553 | VW3 A4 6●2 | VW3 A4 403 |
| 7.5 | *10* | **ATV 71WU75N4** | VW3 A4 506 | VW3 A4 553 | VW3 A4 6●3 | VW3 A4 403 |
| 11 | *15* | **ATV 71WD11N4** | VW3 A4 507 | VW3 A4 554 | VW3 A4 6●3 | VW3 A4 404 |
| 15 | *20* | **ATV 71WD15N4** | VW3 A4 508 | VW3 A4 554 | VW3 A4 6●4 | VW3 A4 405 |
| 18.5 | *25* | **ATV 71WD18N4** | VW3 A4 508 | VW3 A4 555 | VW3 A4 6●5 | VW3 A4 405 |
| 22 | *30* | **ATV 71WD22N4** | VW3 A4 510 | VW3 A4 555 | VW3 A4 6●6 | VW3 A4 406 |
| 30 | *40* | **ATV 71WD30N4** | VW3 A4 510 | VW3 A4 556 | VW3 A4 6●7 | VW3 A4 407 |
| 37 | *50* | **ATV 71WD37N4** | VW3 A4 510 | VW3 A4 556 | VW3 A4 6●7 | VW3 A4 407 |
| 45 | *60* | **ATV 71WD45N4** | VW3 A4 511 | VW3 A4 556 | VW3 A4 6●8 | VW3 A4 408 |
| 55 | *75* | **ATV 71WD55N4** | VW3 A4 511 | VW3 A4 556 | VW3 A4 6●8 | VW3 A4 408 |
| 75 | *100* | **ATV 71WD75N4** | VW3 A4 511 | VW3 A4 558 | VW3 A4 6●9 | VW3 A4 408 |
| **Pages** | | 24 | 155 | 160 | 162 | 168 |

*(1) There are passive filters for a 460 V ∿ supply, see pages 164 and 165.*

| Motor choke | IP 20 motor choke kit | Sinus filter | Braking resistor | Hoist resistor | Ready-assembled IP 54 base plate |
|---|---|---|---|---|---|
| VW3 A5 101, 102, 103 | – | – | VW3 A7 701 | VW3 A7 801 | VW3 A9 901 |
| VW3 A5 101, 102, 103 | – | VW3 A5 201 | VW3 A7 701 | VW3 A7 801 | VW3 A9 901 |
| VW3 A5 101, 102, 103 | – | VW3 A5 201 | VW3 A7 701 | VW3 A7 801 | VW3 A9 901 |
| VW3 A5 101, 102, 103 | – | VW3 A5 201 | VW3 A7 701 | VW3 A7 802 | VW3 A9 901 |
| VW3 A5 101, 102, 103 | – | VW3 A5 201 | VW3 A7 701 | VW3 A7 802 | VW3 A9 901 |
| VW3 A5 102, 103, 104 | VW3 A9 612 | VW3 A5 202 | VW3 A7 702 | VW3 A7 802 | VW3 A9 902 |
| VW3 A5 102, 103, 104 | VW3 A9 612 | VW3 A5 203 | VW3 A7 702 | VW3 A7 803 | VW3 A9 902 |
| VW3 A5 102, 103, 104 | VW3 A9 612 | VW3 A5 203 | VW3 A7 703 | VW3 A7 803 | VW3 A9 903 |
| VW3 A5 102, 103, 104 | VW3 A9 612 | VW3 A5 203 | VW3 A7 703 | VW3 A7 804 | VW3 A9 904 |
| VW3 A5 102, 103, 104 | VW3 A9 612 | VW3 A5 204 | VW3 A7 704 | VW3 A7 804 | VW3 A9 904 |
| VW3 A5 103, 104 | VW3 A9 612 | VW3 A5 204 | VW3 A7 704 | VW3 A7 804 | VW3 A9 905 |
| VW3 A5 103, 104 | VW3 A9 612 | VW3 A5 204 | VW3 A7 704 | VW3 A7 804 | VW3 A9 906 |
| VW3 A5 103, 104 | VW3 A9 612 | VW3 A5 205 | VW3 A7 705 | VW3 A7 805 | VW3 A9 906 |
| VW3 A5 104 | VW3 A9 612 | VW3 A5 205 | VW3 A7 707 | VW3 A7 805 | VW3 A9 907 |
| VW3 A5 104 | VW3 A9 612 | VW3 A5 206 | VW3 A7 707 | VW3 A7 805 | VW3 A9 907 |
| VW3 A5 104 | VW3 A9 612 | VW3 A5 206 | VW3 A7 707 | VW3 A7 806 | VW3 A9 907 |
| 172 | 173 | 175 | 137 | 139 | 26 |

## Table showing possible combinations of ATV 71P●●●N4Z drive options

| Motor | | Drive | Options | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | DC choke | Line choke | Passive filter *(1)* | Additional EMC filter | Motor choke | IP 20 motor choke kit |
| kW | *HP* | | | | | | | |
| **Three-phase supply voltage: 380…480 V 50/60 Hz** | | | | | | | | |
| 0.75 | *1* | **ATV 71P075N4Z** | VW3 A4 501 | VW3 A4 551 | VW3 A4 6●1 | VW3 A4 401 | VW3 A5 101 | – |
| 1.5 | *2* | **ATV 71PU15N4Z** | VW3 A4 502 | VW3 A4 551 | VW3 A4 6●1 | VW3 A4 401 | VW3 A5 101, 102, 103 | – |
| 2.2 | *3* | **ATV 71PU22N4Z** | VW3 A4 503 | VW3 A4 552 | VW3 A4 6●1 | VW3 A4 401 | VW3 A5 101, 102, 103 | – |
| 3 | – | **ATV 71PU30N4Z** | VW3 A4 503 | VW3 A4 552 | VW3 A4 6●1 | VW3 A4 402 | VW3 A5 101, 102, 103 | – |
| 4 | *5* | **ATV 71PU40N4Z** | VW3 A4 504 | VW3 A4 552 | VW3 A4 6●2 | VW3 A4 402 | VW3 A5 101, 102, 103 | – |
| 5.5 | *7.5* | **ATV 71PU55N4Z** | VW3 A4 505 | VW3 A4 553 | VW3 A4 6●2 | VW3 A4 403 | VW3 A5 102, 103, 104 | VW3 A9 612 |
| 7.5 | *10* | **ATV 71PU75N4Z** | VW3 A4 506 | VW3 A4 553 | VW3 A4 6●3 | VW3 A4 403 | VW3 A5 102, 103, 104 | VW3 A9 612 |
| 11 | *15* | **ATV 71PD11N4Z** | VW3 A4 507 | VW3 A4 554 | VW3 A4 6●3 | VW3 A4 404 | VW3 A5 102, 103, 104 | VW3 A9 612 |
| **Pages** | | 24 | 155 | 160 | 162 | 168 | 172 | 173 |

*(1) There are passive filters for a 460 V ∿ supply, see pages 164 and 165.*

| Sinus filter | Braking resistor | Hoist resistor | Kit for mounting in a dust and damp proof enclosure | Fan | UL Type 1 conformity kit (outside enclosure) | IP 21 or IP 31 conformity kit (outside enclosure) |
|---|---|---|---|---|---|---|
| | | | | | | |
| VW3 A5 201 | VW3 A7 701 | VW3 A7 801 | VW3 A9 801 | VZ3 V1 203 | VW3 A9 201 | VW3 A9 101 |
| VW3 A5 201 | VW3 A7 701 | VW3 A7 801 | VW3 A9 801 | VZ3 V1 203 | VW3 A9 201 | VW3 A9 101 |
| VW3 A5 201 | VW3 A7 701 | VW3 A7 801 | VW3 A9 801 | VZ3 V1 203 | VW3 A9 201 | VW3 A9 101 |
| VW3 A5 201 | VW3 A7 701 | VW3 A7 802 | VW3 A9 802 | VZ3 V1 209 | VW3 A9 202 | VW3 A9 102 |
| VW3 A5 201 | VW3 A7 701 | VW3 A7 802 | VW3 A9 802 | VZ3 V1 209 | VW3 A9 202 | VW3 A9 102 |
| VW3 A5 202 | VW3 A7 702 | VW3 A7 802 | VW3 A9 803 | VZ3 V1 204 | VW3 A9 203 | VW3 A9 103 |
| VW3 A5 203 | VW3 A7 702 | VW3 A7 803 | VW3 A9 803 | VZ3 V1 204 | VW3 A9 203 | VW3 A9 103 |
| VW3 A5 203 | VW3 A7 703 | VW3 A7 803 | – | VZ3 V1 210 | VW3 A9 204 | VW3 A9 104 |
| 175 | 137 | 139 | 31 | 31 | 32 | 33 |

## Table showing possible combinations of ATV 71H●●●Y drive options

| Motor | | | Drive | Options | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Line choke | Motor choke | IP 20 motor choke kit | Resistance braking unit | Braking resistor | Hoist resistor |
| 500 V | *575 V* | 690 V | | | | | | | |
| kW | *HP* | kW | | | | | | | |
| **Three-phase supply voltage: 500…690 V 50/60 Hz** | | | | | | | | | |
| 1.5 | *2* | 2.2 | **ATV 71HU22Y** | VW3 A4 551 | VW3 A5 101, 102, 103 | – | – | VW3 A7 701 | VW3 A7 801 |
| 2.2 | *3* | 3 | **ATV 71HU30Y** | VW3 A4 551 | VW3 A5 101, 102, 103 | – | – | VW3 A7 701 | VW3 A7 802 |
| 3 | – | 4 | **ATV 71HU40Y** | VW3 A4 551 | VW3 A5 101, 102, 103 | – | – | VW3 A7 701 | VW3 A7 802 |
| 4 | *5* | 5.5 | **ATV 71HU55Y** | VW3 A4 552 | VW3 A5 101, 102, 103 | – | – | VW3 A7 701 | VW3 A7 802 |
| 5.5 | *7.5* | 7.5 | **ATV 71HU75Y** | VW3 A4 552 | VW3 A5 101, 102, 103 | – | – | VW3 A7 702 | VW3 A7 803 |
| 7.5 | *10* | 11 | **ATV 71HD11Y** | VW3 A4 553 | VW3 A5 102, 103, 104 | VW3 A9 612 | – | VW3 A7 702 | VW3 A7 803 |
| 11 | *15* | 15 | **ATV 71HD15Y** | VW3 A4 553 | VW3 A5 102, 103, 104 | VW3 A9 612 | – | VW3 A7 703 | VW3 A7 804 |
| 15 | *20* | 18.5 | **ATV 71HD18Y** | VW3 A4 554 | VW3 A5 102, 103, 104 | VW3 A9 612 | – | VW3 A7 703 | VW3 A7 804 |
| 18.5 | *25* | 22 | **ATV 71HD22Y** | VW3 A4 554 | VW3 A5 102, 103, 104 | VW3 A9 612 | – | VW3 A7 704 | VW3 A7 804 |
| 22 | *30* | 30 | **ATV 71HD30Y** | VW3 A4 555 | VW3 A5 102, 103, 104 | VW3 A9 612 | – | VW3 A7 704 | VW3 A7 804 |
| 30 | *40* | 37 | **ATV 71HD37Y** | VW3 A4 555 | VW3 A5 103, 104 | VW3 A9 612 | – | VW3 A7 704 | VW3 A7 805 |
| 37 | *50* | 45 | **ATV 71HD45Y** | VW3 A4 555 | VW3 A5 103, 104 | VW3 A9 612 | – | VW3 A7 705 | VW3 A7 805 |
| 45 | *60* | 55 | **ATV 71HD55Y** | VW3 A4 556 | VW3 A5 103, 104 | VW3 A9 612 | – | VW3 A7 705 | VW3 A7 805 |
| 55 | *75* | 75 | **ATV 71HD75Y** | VW3 A4 556 | VW3 A5 104 | VW3 A9 612 | – | VW3 A7 707 | VW3 A7 818 |
| 75 | *100* | 90 | **ATV 71HD90Y** | VW3 A4 556 | VW3 A5 104 | VW3 A9 612 | – | VW3 A7 707 | VW3 A7 818 |
| 90 | *125* | 110 | **ATV 71HC11Y** | VW3 A4 570 | VW3 A5 104 | VW3 A9 612 | – | – | VW3 A7 806 |
| 110 | *150* | 132 | **ATV 71HC13Y** | VW3 A4 571 | VW3 A5 104 | VW3 A9 612 | – | – | VW3 A7 805 |
| 132 | – | 160 | **ATV 71HC16Y** | VW3 A4 571 | VW3 A5 105 | VW3 A9 612 | – | – | VW3 A7 805 |
| 160 | *200* | 200 | **ATV 71HC20Y** | VW3 A4 560 | VW3 A5 105 | VW3 A9 612 | VW3 A7 103 | – | VW3 A7 806 |
| 200 | *250* | 250 | **ATV 71HC25Y** | VW3 A4 572 | VW3 A5 106 | VW3 A9 613 | VW3 A7 103 | – | VW3 A7 716 |
| 250 | *350* | 315 | **ATV 71HC31Y** | VW3 A4 572 | VW3 A5 106 | VW3 A9 613 | VW3 A7 103 | – | VW3 A7 814 |
| 315 | *450* | 400 | **ATV 71HC40Y** | VW3 A4 568 | VW3 A5 107 | VW3 A9 613 | VW3 A7 104 | – | VW3 A7 717 |
| 400 | *550* | 500 | **ATV 71HC50Y** | VW3 A4 572 | VW3 A5 107 | VW3 A9 613 | VW3 A7 104 | – | VW3 A7 718 |
| 500 | *700* | 630 | **ATV 71HC63Y** | VW3 A4 572 | VW3 A5 108 | VW3 A9 613 | VW3 A7 104 | – | VW3 A7 816 |
| **Pages** | | | 25 | 160 | 173 | 173 | 135 | 137 | 139 |

| Flushing-mounting kit (in a dust and damp proof enclosure) | UL Type 1 conformity kit (outside enclosure) | IP 21 or IP 31 conformity kit (outside enclosure) | Control card fan kit | DNV kit |
|---|---|---|---|---|
| VW3 A9 506 | VW3 A9 206 | VW3 A9 106 | VW3 A9 404 | VW3 A9 642 |
| VW3 A9 506 | VW3 A9 206 | VW3 A9 106 | VW3 A9 404 | VW3 A9 642 |
| VW3 A9 506 | VW3 A9 206 | VW3 A9 106 | VW3 A9 404 | VW3 A9 642 |
| VW3 A9 506 | VW3 A9 206 | VW3 A9 106 | VW3 A9 404 | VW3 A9 642 |
| VW3 A9 506 | VW3 A9 206 | VW3 A9 106 | VW3 A9 404 | VW3 A9 642 |
| VW3 A9 506 | VW3 A9 206 | VW3 A9 106 | VW3 A9 404 | VW3 A9 642 |
| VW3 A9 506 | VW3 A9 206 | VW3 A9 106 | VW3 A9 404 | VW3 A9 642 |
| VW3 A9 506 | VW3 A9 206 | VW3 A9 106 | VW3 A9 404 | VW3 A9 642 |
| VW3 A9 506 | VW3 A9 206 | VW3 A9 106 | VW3 A9 404 | VW3 A9 642 |
| VW3 A9 506 | VW3 A9 206 | VW3 A9 106 | VW3 A9 404 | VW3 A9 642 |
| VW3 A9 509 | VW3 A9 208 | VW3 A9 108 | VW3 A9 407 | VW3 A9 643 |
| VW3 A9 509 | VW3 A9 208 | VW3 A9 108 | VW3 A9 407 | VW3 A9 643 |
| VW3 A9 509 | VW3 A9 208 | VW3 A9 108 | VW3 A9 407 | VW3 A9 643 |
| VW3 A9 509 | VW3 A9 208 | VW3 A9 108 | VW3 A9 407 | VW3 A9 643 |
| VW3 A9 509 | VW3 A9 208 | VW3 A9 108 | VW3 A9 407 | VW3 A9 643 |
| VW3 A9 512 | VW3 A9 211 | VW3 A9 111 | – | VW3 A9 644 |
| VW3 A9 512 | VW3 A9 211 | VW3 A9 111 | – | VW3 A9 645 |
| VW3 A9 512 | VW3 A9 211 | VW3 A9 111 | – | VW3 A9 645 |
| VW3 A9 514, 515 | VW3 A9 213, 214 | VW3 A9 113, 114 | – | VW3 A9 646 |
| VW3 A9 514, 515 | VW3 A9 213, 214 | VW3 A9 113, 114 | – | VW3 A9 647 |
| VW3 A9 514, 515 | VW3 A9 213, 214 | VW3 A9 113, 114 | – | VW3 A9 647 |
| – | – | VW3 A9 116 | – | VW3 A9 648 |
| – | – | VW3 A9 116 | – | VW3 A9 649 |
| – | – | VW3 A9 116 | – | VW3 A9 649 |
| 30 | 32 | 33 | 27 | 28 |

## List of options common to Altivar 71 drives

| Description | Reference | Page |
|---|---|---|
| **Logic input adapter** | | |
| 115 V ∿ logic input adapter | VW3 A3 101 | 26 |
| **HMI terminal** | | |
| Remote graphic display terminal | VW3 A1 101 | 108 |
| **Encoder interface cards** | | |
| With RS 422 compatible differential outputs | VW3 A3 401, 402 | 113 |
| With open collector outputs | VW3 A3 403, 404 | 113 |
| With push-pull outputs | VW3 A3 405…407 | 113 |
| **I/O extension cards** *(1)* | | |
| Logic | VW3 A3 201 | 115 |
| Extended | VW3 A3 202 | 115 |
| **Programmable card** *(1)* | | |
| "Controller Inside" programmable card | VW3 A3 501 | 123 |
| **PowerSuite software workshop** | | |
| PowerSuite software workshop for PC | VW3 A8 104, 105 | 304 |

## List of options specific to Altivar 71H●●●M3383, M3X383 and N4383 drives

| Description | Reference | Page |
|---|---|---|
| **Encoder interface cards** | | |
| Resolver | VW3 A3 408 | 113 |
| Universal with SinCos, SinCos Hiperface®, EnDat® or SSI output | VW3 A3 409 | 113 |
| With RS 422 compatible differential outputs with encoder emulation | VW3 A3 411 | 113 |

## List of communication cards *(1)*

| Description | Reference | Page |
|---|---|---|
| Modbus TCP | VW3 A3 310 | 126 and 310 |
| EtherNet/IP | VW3 A3 316 | 127 |
| Standard Fipio | VW3 A3 311 | 128 and 314 |
| Substitution Fipio | VW3 A3 301 | 128 and 314 |
| Modbus Plus | VW3 A3 302 | 128 and 322 |
| DeviceNet | VW3 A3 309 | 129 |
| INTERBUS | VW3 A3 304 | 129 |
| CC-Link | VW3 A3 317 | 129 |
| Modbus/Uni-Telway | VW3 A3 303 | 131, 317 and 325 |
| PROFIBUS DP | VW3 A3 307 | 130 |

*(1) For card compatibility table, see page opposite.*

## Card compatibility table *(1)*

| Type of card | Logic I/O VW3 A3 201 | Extended I/O VW3 A3 202 | Programmable "Controller inside" VW3 A3 501 | Communication VW3 A3 3●● |
|---|---|---|---|---|
| **Logic I/O VW3 A3 201** | | | | |
| **Extended I/O VW3 A3 202** | | | | |
| **Programmable "Controller inside" VW3 A3 501** | | | | |
| **Communication VW3 A3 3●●** | | | | |

*Possible to combine*

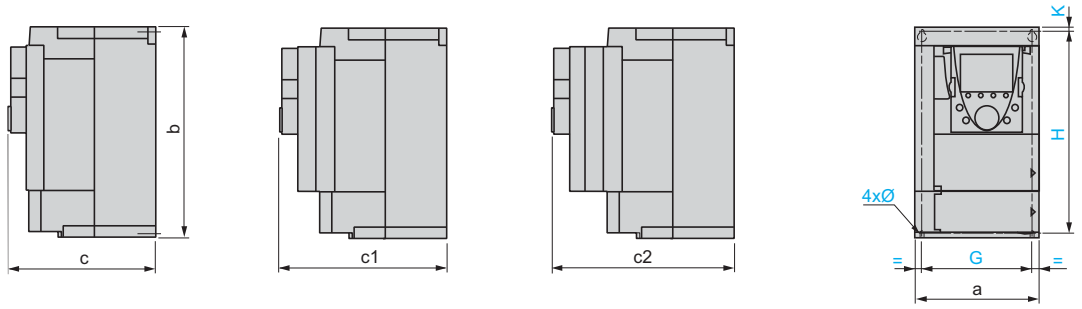
*Not possible to combine*

*(1) Maximum combination involving two types of card is 2.*

# Variable speed drives
## Altivar 71
## UL Type 1/IP 20 drives

### ATV 71H●●●M3, ATV 71HD11M3X, HD15M3X, ATV 71H075N4...HD18N4

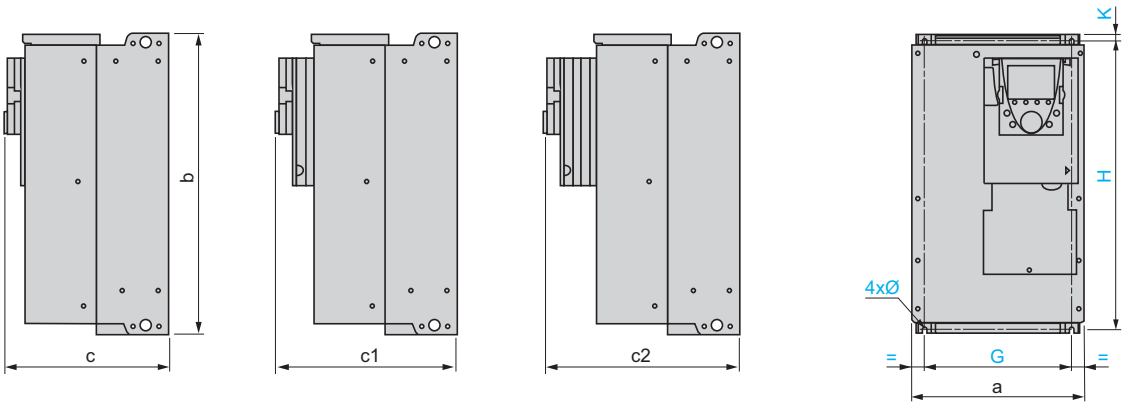
**Without option card** | **1 option card** *(1)* | **2 option cards** *(1)* | **Common front view**




| ATV 71H | a | b | c | c1 | c2 | G | H | K | Ø |
|---|---|---|---|---|---|---|---|---|---|
| 037M3...U15M3, 075N4...U22N4 | 130 | 230 | 175 | 198 | 221 | 113.5 | 220 | 5 | 5 |
| U22M3...U40M3, U30N4, U40N4 | 155 | 260 | 187 | 210 | 233 | 138 | 249 | 4 | 5 |
| U55M3, U55N4, U75N4 | 175 | 295 | 187 | 210 | 233 | 158 | 283 | 6 | 5 |
| U75M3, D11N4 | 210 | 295 | 213 | 236 | 259 | 190 | 283 | 6 | 6 |
| D11M3X, D15M3X, D15N4, D18N4 | 230 | 400 | 213 | 236 | 259 | 210 | 386 | 8 | 6 |

### ATV 71HD18M3X...45M3X, ATV 71HD22N4...HD37N4, ATV 71HU22Y...HD30Y

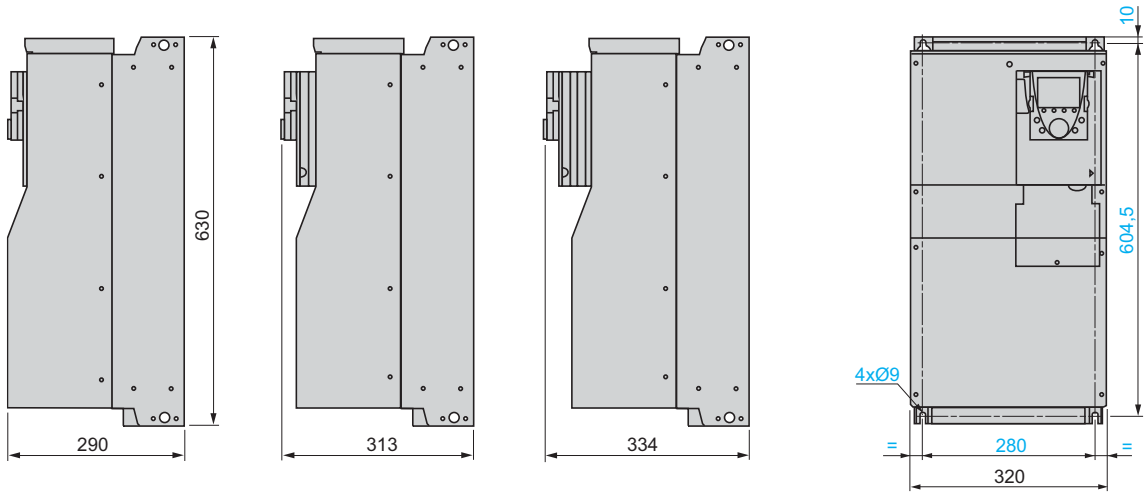
**Without option card** | **1 option card** *(1)* | **2 option cards** *(1)* | **Common front view**




| ATV 71H | a | b | c | c1 | c2 | G | H | K | Ø |
|---|---|---|---|---|---|---|---|---|---|
| D18M3X, D22M3X, D22N4, U22Y...D30Y | 240 | 420 | 236 | 259 | 282 | 206 | 403 | 10 | 6 |
| D30N4, D37N4 | 240 | 550 | 266 | 289 | 312 | 206 | 529 | 10 | 6 |
| D30M3X...D45M3X | 320 | 550 | 266 | 289 | 312 | 280 | 524 | 10 | 9 |

### ATV 71HD45N4...HD75N4, ATV 71HD37Y...HD90Y

**Without option card** | **1 option card** *(1)* | **2 option cards** *(1)* | **Common front view**



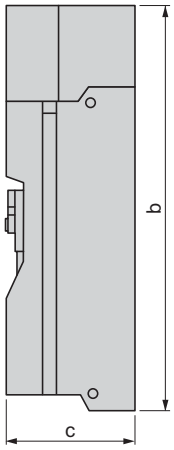

*(1) Option cards: I/O extension cards, communication cards or "Controller Inside" programmable card.*

Presentation: pages 4 to 9
Characteristics: pages 10 to 17
References: pages 22 to 25
Schemes: pages 218 to 241
Functions: pages 268 to 299

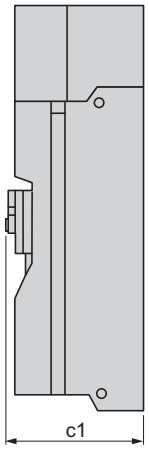
# Variable speed drives
## Altivar 71
## UL Type 1/IP 20 drives

### ATV 71HD55M3X, HD75M3X, ATV 71HD90N4...HC28N4, ATV 71HC11Y…HC31Y

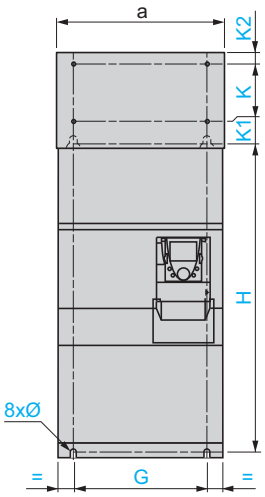
**With or without 1 option card** *(1)*



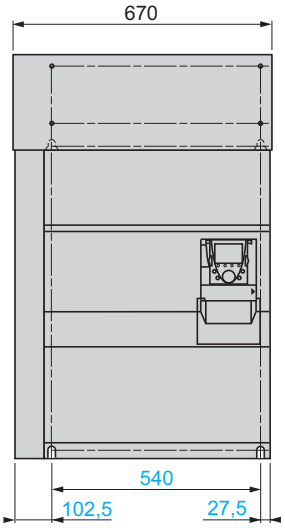

**2 option cards** *(1)*




**Common front view**



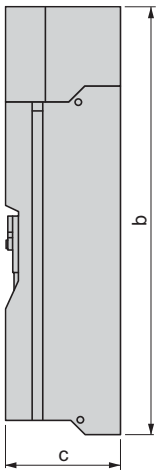

**ATV 71HC20N4…HC28N4 with braking unit VW3 A7 101**



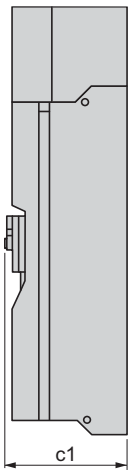

| ATV 71H | a | b | c | c1 | G | H | K | K1 | K2 | Ø |
|---|---|---|---|---|---|---|---|---|---|---|
| D55M3X, D90N4 | 320 | 920 | 377 | 392 | 250 | 650 | 150 | 75 | 30 | 11.5 |
| D75M3X, C11N4 | 360 | 1022 | 377 | 392 | 298 | 758 | 150 | 75 | 30 | 11.5 |
| C13N4, C11Y…C16Y | 340 | 1190 | 377 | 392 | 285 | 920 | 150 | 75 | 30 | 11.5 |
| C16N4 | 440 | 1190 | 377 | 392 | 350 | 920 | 150 | 75 | 30 | 11.5 |
| C20N4…C28N4, C20Y…C31Y | 595 | 1190 | 377 | 392 | 540 | 920 | 150 | 75 | 30 | 11.5 |

### ATV 71HC31N4…HC50N4, ATV 71HC40Y…HC63Y

**With or without 1 option card** *(1)*

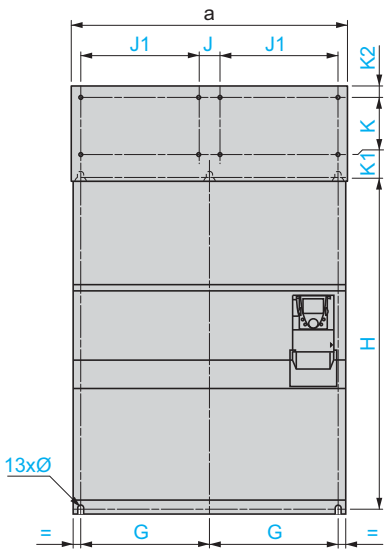



**2 option cards** *(1)*



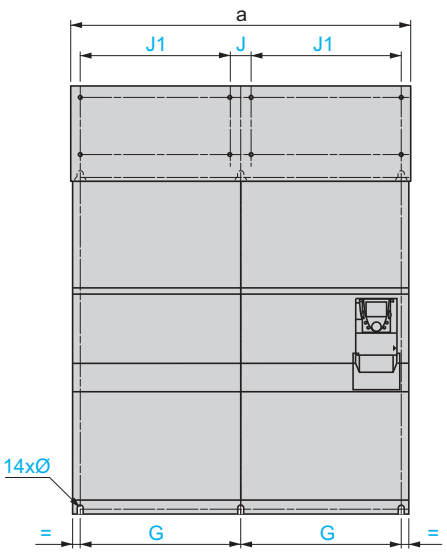

**ATV 71HC31N4, HC40N4**

**Front view**




**ATV 71HC50N4, HC40Y…HC63Y**

**Front view**



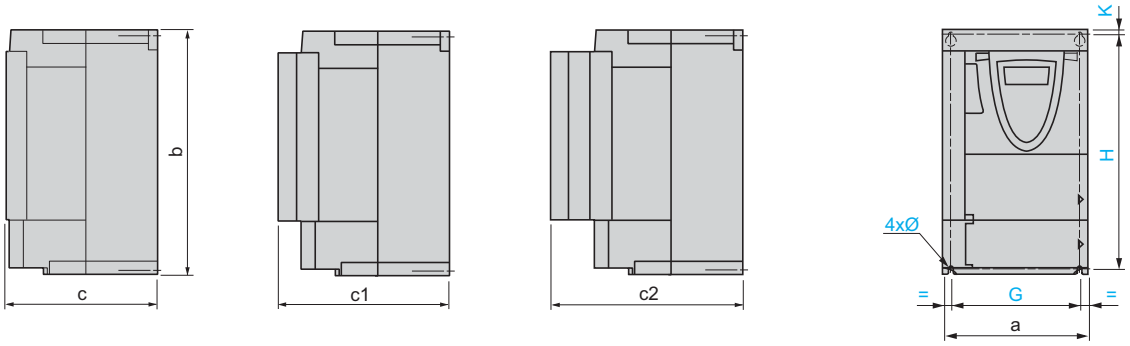

| ATV 71H | a | b | c | c1 | G | J | J1 | H | K | K1 | K2 | Ø |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C31N4, C40N4 | 890 | 1390 | 377 | 392 | 417.5 | 75 | 380 | 1120 | 150 | 75 | 30 | 11.5 |
| C50N4, HC40Y…HC63Y | 1120 | 1390 | 377 | 392 | 532.5 | 75 | 495 | 1120 | 150 | 75 | 30 | 11.5 |

*(1) Option cards: I/O extension cards, communication cards or "Controller Inside" programmable card.*

Presentation: pages 4 to 9
Characteristics: pages 10 to 17
References: pages 22 to 25
Schemes: pages 218 to 241
Functions: pages 268 to 299

## Variable speed drives without graphic display terminal
## ATV 71H●●●M3Z, ATV 71HD11M3XZ, HD15M3XZ, ATV 71H075N4Z...HD18N4Z, ATV 71P●●●N4Z

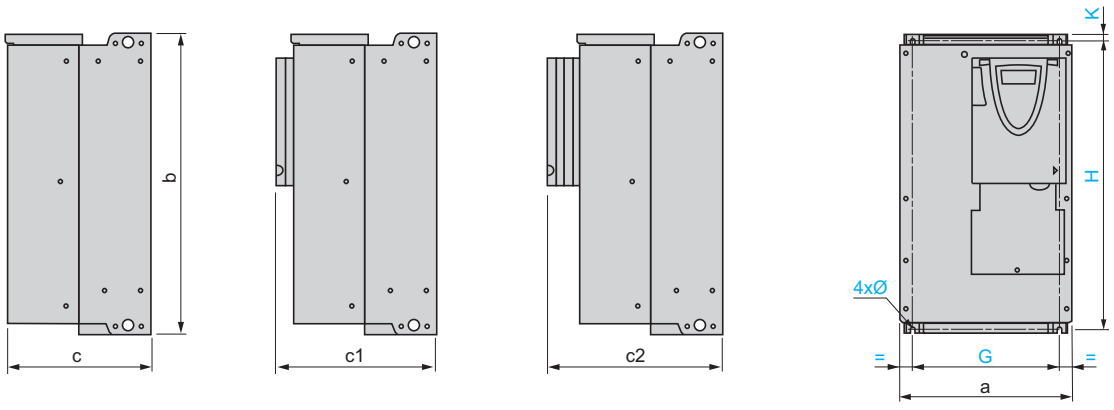
**Without option card** *(1)* | **1 option card** *(1)* | **2 option cards** *(1)* | **Common front view**




| ATV 71 | a | b | c | c1 | c2 | G | H | K | Ø |
|---|---|---|---|---|---|---|---|---|---|
| **H037M3Z...HU15M3Z, H075N4Z...HU22N4Z P075N4Z, PU22N4Z** | 130 | 230 | 149 | 172 | 195 | 113.5 | 220 | 5 | 5 |
| **HU22M3Z...HU40M3Z, HU30N4Z, HU40N4Z PU30N4Z, PU40N4Z** | 155 | 260 | 161 | 184 | 207 | 138 | 249 | 4 | 5 |
| **HU55M3Z, HU55N4Z, HU75N4Z PU55N4Z, PU75N4Z** | 175 | 295 | 161 | 184 | 207 | 158 | 283 | 6 | 6 |
| **HU75M3Z, HD11N4Z, PD11N4Z** | 210 | 295 | 187 | 210 | 233 | 190 | 283 | 6 | 6 |
| **HD11M3XZ, HD15M3XZ HD15N4Z, HD18N4Z** | 230 | 400 | 187 | 210 | 233 | 210 | 386 | 8 | 6 |

## Variable speed drives without graphic display terminal
## ATV 71HD22N4Z...HD37N4Z

**Without option card** | **1 option card** *(1)* | **2 option cards** *(1)* | **Common front view**

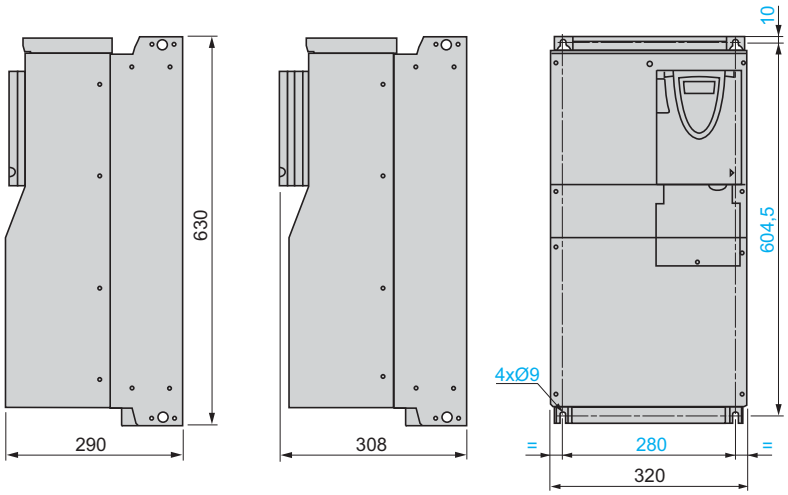



| ATV 71H | a | b | c | c1 | c2 | G | H | K | Ø |
|---|---|---|---|---|---|---|---|---|---|
| **D22N4Z** | 240 | 420 | 210 | 233 | 256 | 206 | 403 | 10 | 6 |
| **D30N4Z, D37N4Z** | 240 | 550 | 230 | 253 | 276 | 206 | 531.5 | 10 | 6 |

*(1) Option cards: I/O extension cards, communication cards or "Controller Inside" programmable card.*

**Variable speed drives without graphic display terminal**
**ATV 71HD45N4Z...HD75N4Z**

| With or without 1 option card *(1)* | 2 option cards *(1)* | Common front view |
|---|---|---|




*(1) Option cards: I/O extension cards, communication cards or "Controller Inside" programmable card.*

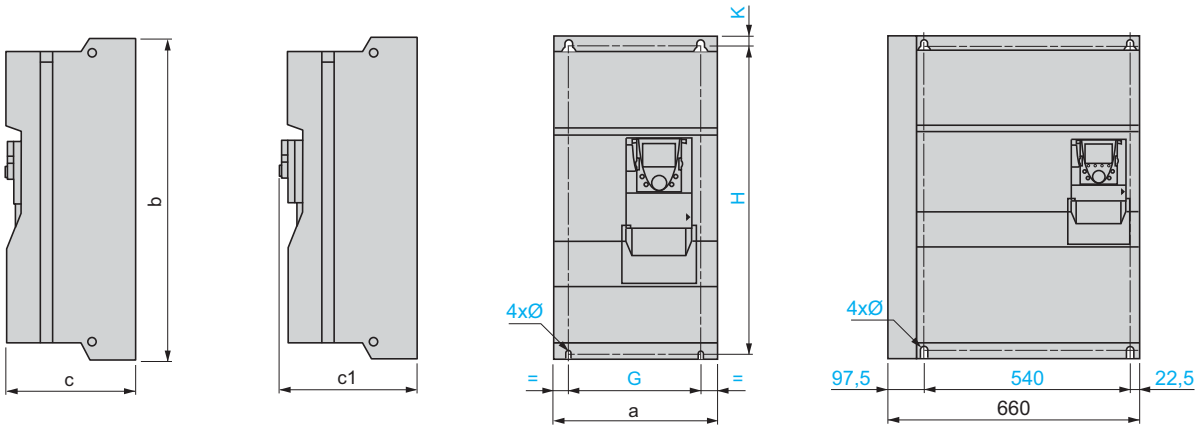
## Variable speed drives without DC choke
## ATV 71HD55M3XD, HD75M3XD, ATV 71HD90N4D...HC28N4D

**With or without 1 option card** *(1)*

**2 option cards** *(1)*

**Common front view**

**ATV 71HC20N4D...HC28N4D with braking unit VW3 A7 101**




| ATV 71H | a | b | c | c1 | G | H | K | Ø |
|---|---|---|---|---|---|---|---|---|
| **D55M3XD, D90N4D** | 310 | 680 | 377 | 392 | 250 | 650 | 15 | 11.5 |
| **D75M3XD, C11N4D** | 350 | 782 | 377 | 392 | 298 | 758 | 12 | 11.5 |
| **C13N4D** | 330 | 950 | 377 | 392 | 285 | 920 | 15 | 11.5 |
| **C16N4D** | 430 | 950 | 377 | 392 | 350 | 920 | 15 | 11.5 |
| **C20N4D...C28N4D** | 585 | 950 | 377 | 392 | 540 | 920 | 15 | 11.5 |

## Variable speed drives without DC choke
## ATV 71HC31N4D...HC50N4D

**With or without 1 option card** *(1)*

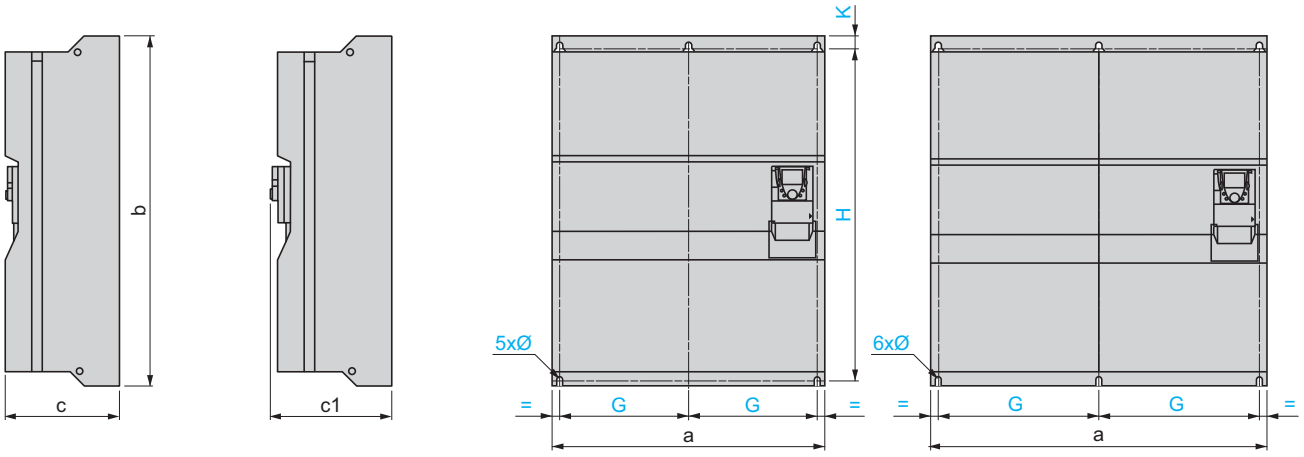
**2 option cards** *(1)*

**ATV 71HC31N4D, HC40N4D**

**Front view**

**ATV 71HC50N4D**

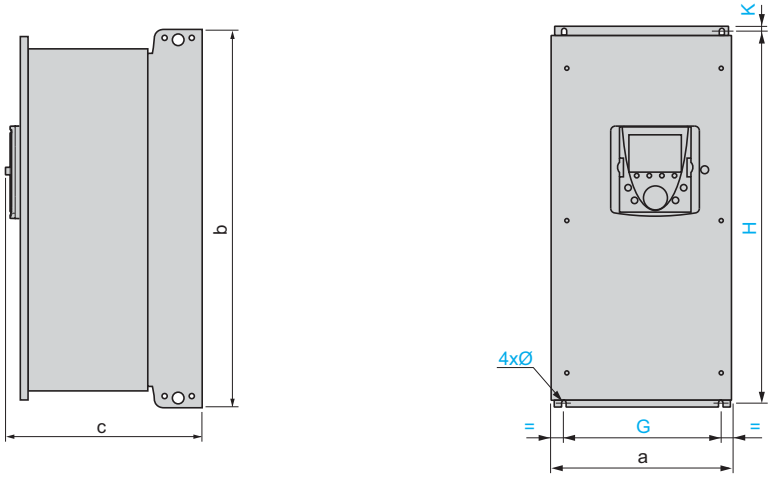
**Front view**




| ATV 71H | a | b | c | c1 | G | H | K | Ø |
|---|---|---|---|---|---|---|---|---|
| **C31N4D, C40N4D** | 880 | 1150 | 377 | 392 | 417.5 | 1120 | 15 | 11.5 |
| **C50N4D** | 1110 | 1150 | 377 | 392 | 532.5 | 1120 | 15 | 11.5 |

*(1) Option cards: I/O extension cards, communication cards or "Controller Inside" programmable card.*

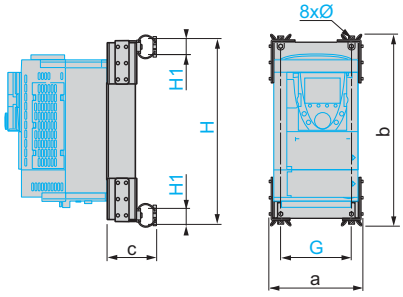
## ATV 71W075N4…WD75N4 variable speed drives




| ATV 71W | a | b | c | G | H | K | Ø |
|---|---|---|---|---|---|---|---|
| **075N4…U22N4** | 240 | 490 | 272 | 200 | 476 | 6 | 6 |
| **U30N4, U40N4** | 240 | 490 | 286 | 200 | 476 | 6 | 6 |
| **U55N4, U75N4** | 260 | 525 | 286 | 220 | 511 | 6 | 6 |
| **D11N4** | 295 | 560 | 315 | 250 | 544 | 8 | 6 |
| **D15N4, D18N4** | 315 | 665 | 315 | 270 | 647 | 10 | 6 |
| **D22N4** | 285 | 720 | 315 | 245 | 700 | 10 | 7 |
| **D30N4, D37N4** | 285 | 880 | 343 | 245 | 860 | 10 | 7 |
| **D45N4…D75N4** | 362 | 1000 | 364 | 300 | 975 | 10 | 9 |

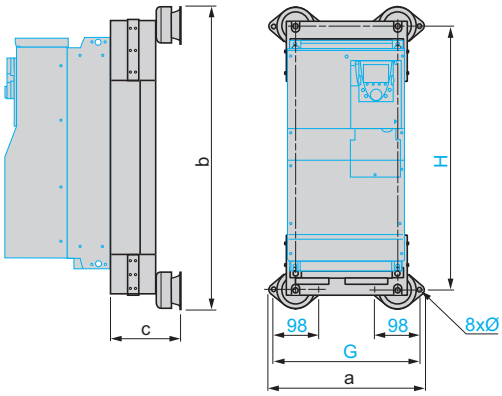
## DNV kits

### VW3 A9 621...625



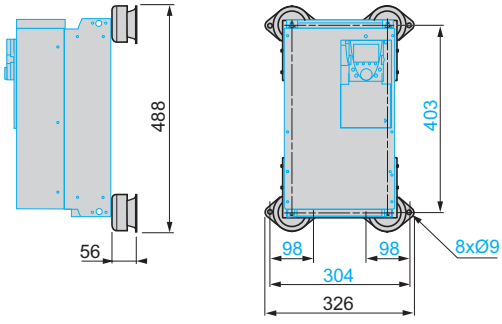

| VW3 | a | b | c | Ø | G | H | H1 |
|---|---|---|---|---|---|---|---|
| **A9 621** | 148 | 336 | 84 | 5.8 | 105 | 324.4 | 49.4 |
| **A9 622** | 173 | 370 | 105 | 5.8 | 130 | 358.4 | 49.4 |
| **A9 623** | 193 | 445 | 121 | 7 | 150 | 424.4 | 69.4 |
| **A9 624** | 228 | 455 | 120 | 7 | 190 | 434.4 | 69.4 |
| **A9 625** | 248 | 550 | 129 | 7 | 190 | 529.4 | 69.4 |

### VW3 A9 626...628

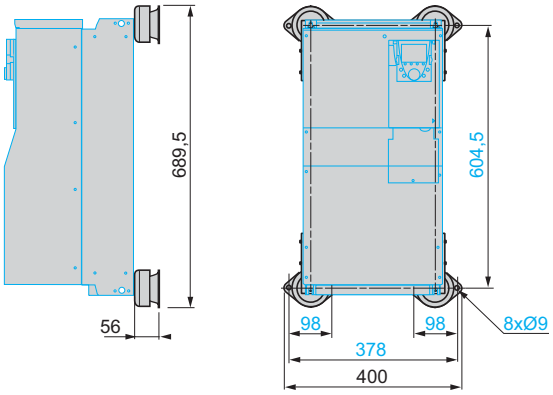



| VW3 | a | b | c | Ø | G | H |
|---|---|---|---|---|---|---|
| **A9 626** | 320 | 588 | 140 | 9 | 298 | 502.5 |
| **A9 627** | 320 | 716 | 140 | 9 | 298 | 631 |
| **A9 628** | 400 | 810 | 180 | 9 | 388 | 725 |

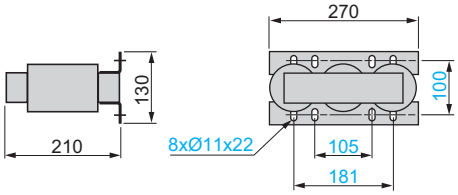
### VW3 A9 642



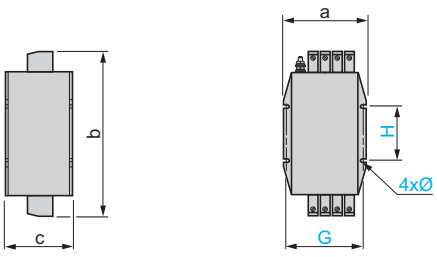

### VW3 A9 643




### Line choke for DNV kit VW3 A9 643 *(1)*




### EMC input filter for DNV kits VW3 A9 642 and 643 *(1)*




| For kit | a | b | c | Ø | G | H |
|---|---|---|---|---|---|---|
| **VW3 A9 642** | 156 | 237 | 91 | 6.6 | 140 | 80 |
| **VW3 A9 643** | 171 | 348 | 141 | 6.6 | 155 | 115 |

*(1) For mounting the line choke upstream of the variable speed drive, see page 28.*

*(1) For mounting the EMC filter next to the variable speed drive, see page 28.*

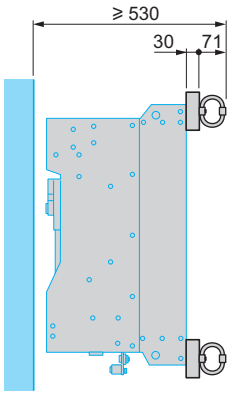
Presentation:
page 28

References:
page 28

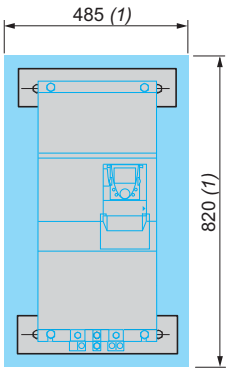
Functions:
pages 268 to 299

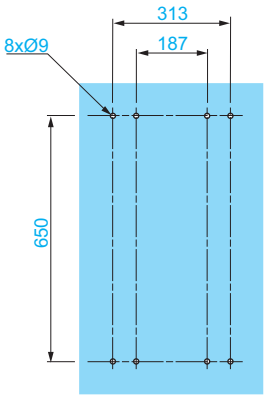
## DNV kits (continued)

### VW3 A9 629



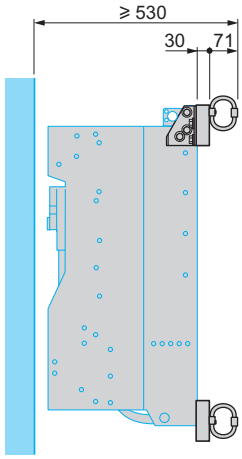

**Drill holes and mounting recommendations**



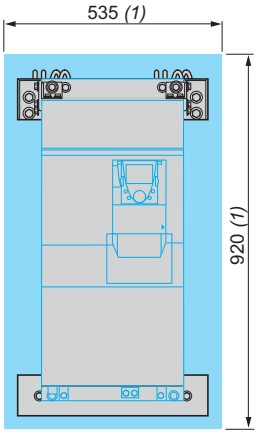



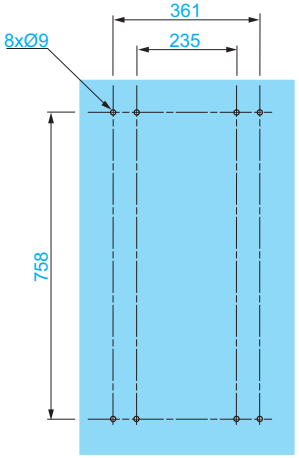

*(1) Minimum free area to be left around the drive.*

### VW3 A9 631




**Drill holes and mounting recommendations**



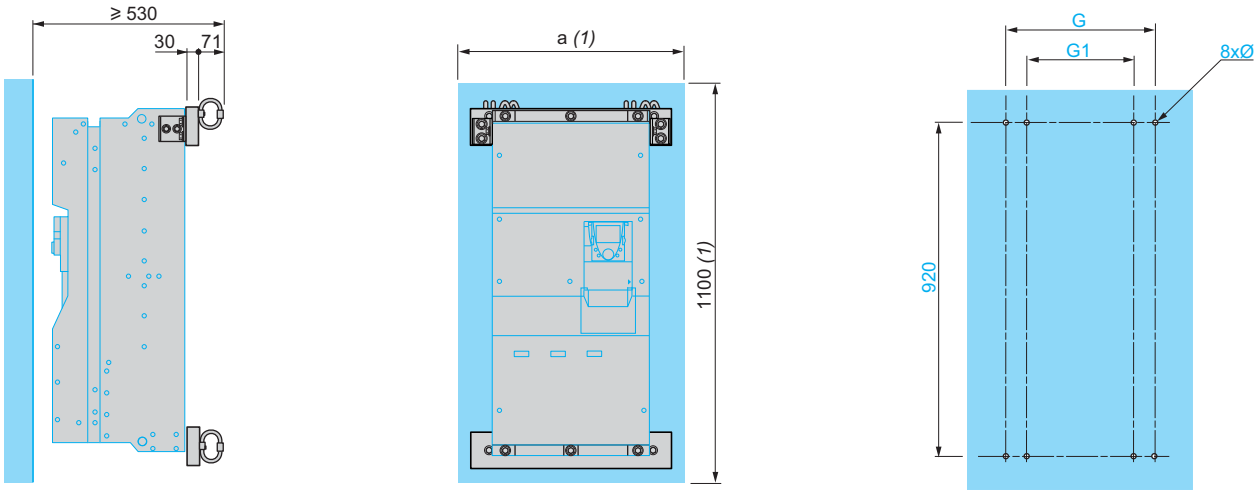




*(1) Minimum free area to be left around the drive.*

## DNV kits (continued)

### VW3 A9 633, 635, 637, 638, 644...647

**Drill holes and mounting recommendations**

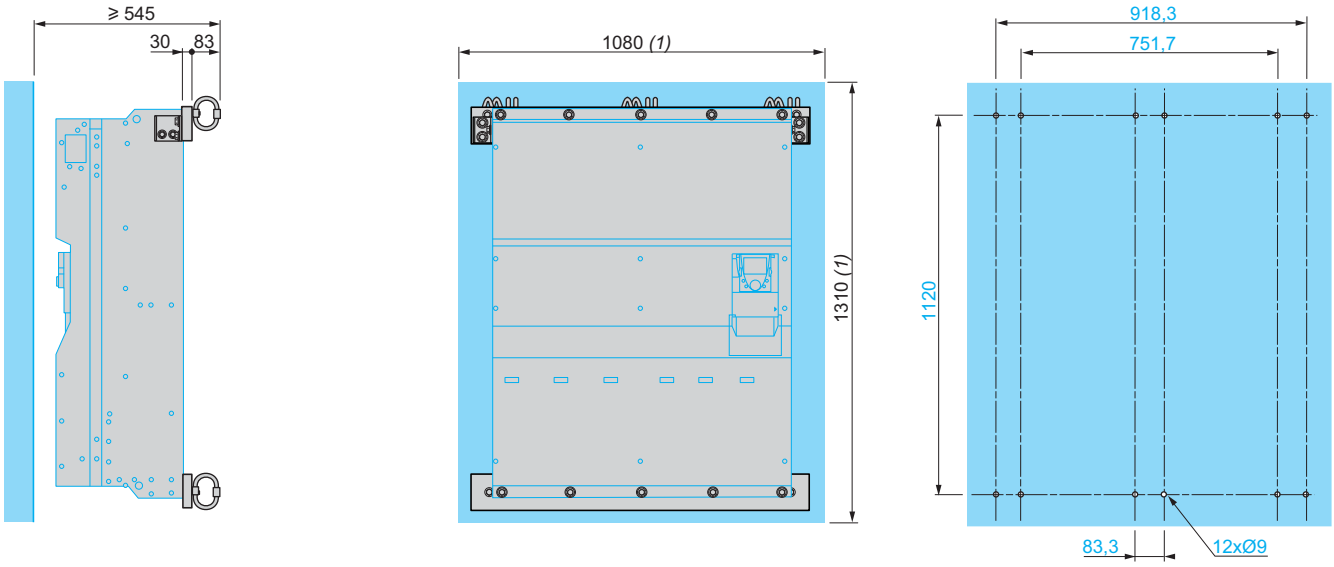



| VW3 | a | Ø | G | G1 |
|---|---|---|---|---|
| **A9 633, 644, 645** | 520 | 9 | 348 | 222 |
| **A9 635** | 620 | 9 | 413 | 287 |
| **A9 637, 638, 646, 647** | 770 | 9 | 603 | 477 |

*(1) Minimum free area to be left around the drive.*

### VW3 A9 639, 640

**Drill holes and mounting recommendations**

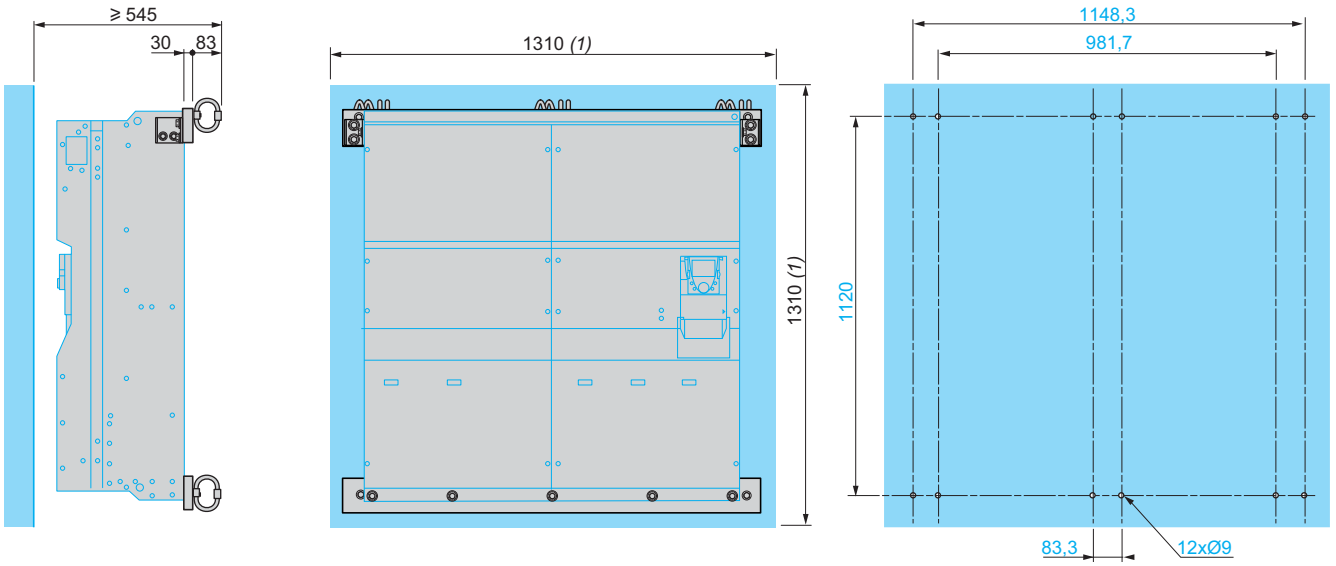



*(1) Minimum free area to be left around the drive.*

## DNV kits (continued)

### VW3 A9 641, 648, 649

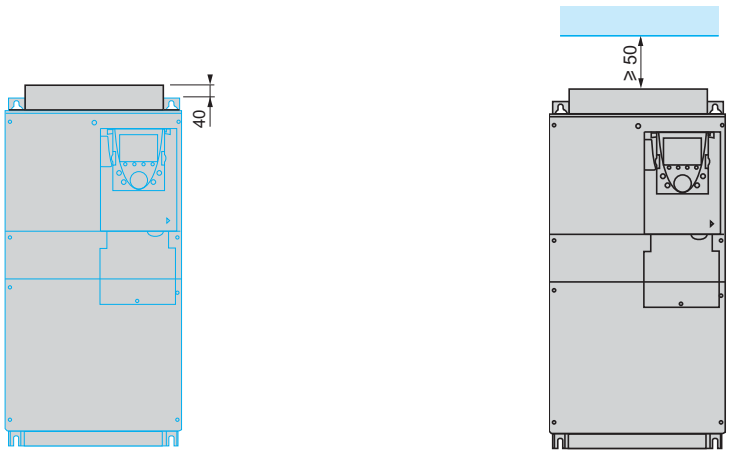
**Drill holes and mounting recommendations**




*(1) Minimum free area to be left around the drive.*

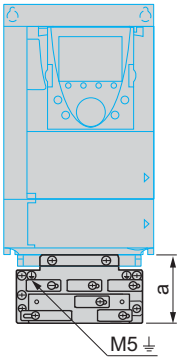
## Control card fan kits VW3 A9 404…407

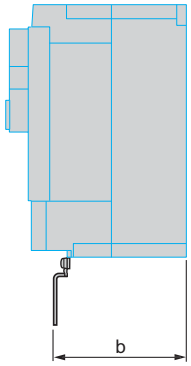
**Mounting recommendations**



## EMC mounting plates *(1)*

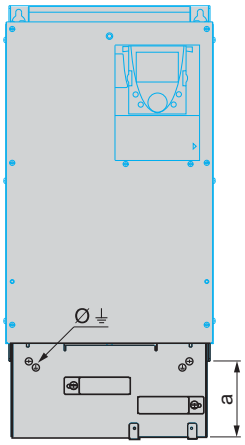
**For ATV 71H●●●M3, ATV 71HD11M3X, HD15M3X, ATV 71H075N4…HD18N4, ATV 71P●●●N4Z**

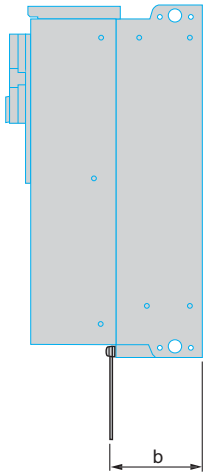



| For ATV 71 | a | b |
|---|---|---|
| H037M3…HU15M3<br>H075N4…HU22N4<br>P075N4Z…PU22N4Z | 83 | 70 |
| HU22M3…HU40M3<br>HU30N4, HU40N4<br>PU30N4Z, PU40N4Z | 83 | 85 |
| HU55M3<br>HU55N4, HU75N4<br>PU55N4Z, PU75N4Z | 95 | 85 |
| HU75M3…HD15M3X<br>HD11N4…HD18N4<br>PD11N4Z | 95 | 118 |

**For ATV 71HD18M3X…HD45M3X, ATV 71HD22N4…HD75N4, ATV 71HU22Y…HD90Y**




| For ATV 71 | a | b | Ø |
|---|---|---|---|
| HD18M3X, HD22M3X<br>HD22N4<br>HU22Y…HD30Y | 122 | 120 | M5 |
| HD30N4, HD37N4 | 113 | 127 | M5 |
| HD30M3X…HD45M3X | 118 | 128 | M8 |
| HD45N4…HD75N4<br>HD37Y…HD90Y | 118 | 173 | M8 |

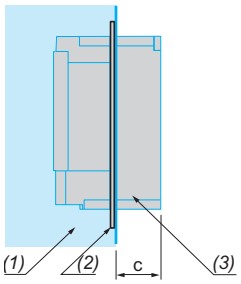
*(1) Supplied with the drive except for ATV 71HD55M3X, HD75M3X, ATV 71HD90N4…HC50N4 or ATV 71HC11Y…HC63Y. In the case of these drives, the mounting plate is supplied with the UL Type 1 or IP 31 conformity kit, which must be ordered separately, see pages 32 and 33. For dimensions, see pages 202 and 203.*

Functions:
pages 268 to 299

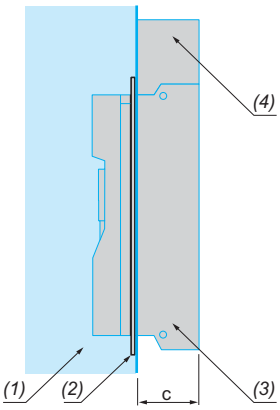
## Kits for flush-mounting in a dust and damp proof enclosure

### Installing the drive using the flush-mounting kit

**Side view**




**Side view**

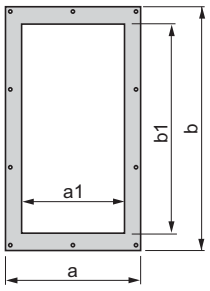


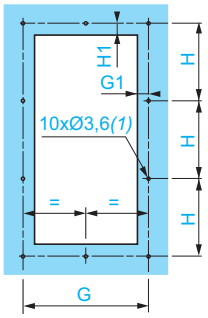

| For ATV 71 drives | c | Kit VW3 |
|---|---|---|
| H037M3, HU15M3, H075N4…HU22N4 | 60 | A9 501 |
| HU22M3…HU55M3, HU30N4…HU75N4 | 70 | A9 502, 503 |
| HU75M3…HD15M3X, HD11N4…HD18N4 | 90 | A9 504, 505 |
| HD18M3X…HD45M3X, HD22N4…HD75N4, HU22Y…HD90Y | 105 | A9 506…509 |
| HD55M3X, HD55M3XD, HD90N4, HD90N4D | 150 | A9 510 |
| HD75M3X, HD75M3XD, HC11N4…HC28N4, HC11N4D…HC28N4D, HC11Y…HC31Y | 250 | A9 511…515 |

*(1) Dust and damp proof enclosure.*
*(2) Kit for flush-mounting in a dust and damp proof enclosure.*
*(3) Drive power section outside the enclosure.*
*(4) DC choke for ATV 71HD55M3X, HD75M3X and ATV 71HD90N4…HC28N4 drives.*
*Transformer for powering the fan for drives ATV 71HC11Y…HC31Y.*

### VW3 A9 501…505

**Cut-outs and drill holes**



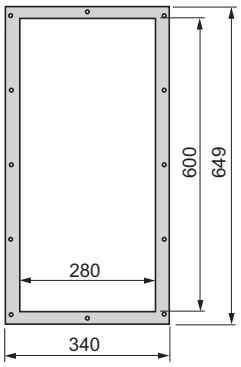



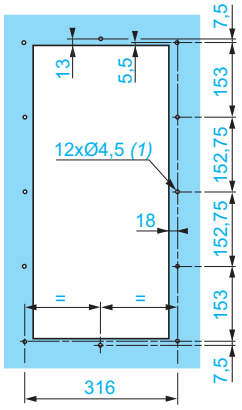

| VW3 | a | a1 | b | b1 | G | G1 | H | H1 |
|---|---|---|---|---|---|---|---|---|
| A9 501 | 222 | 170 | 397 | 351 | 205 | 17.5 | 127 | 15 |
| A9 502 | 250 | 198 | 429.5 | 384.5 | 233 | 17.5 | 137.5 | 14 |
| A9 503 | 267 | 215 | 465 | 419 | 250 | 17.5 | 149.5 | 14.5 |
| A9 504 | 302 | 250 | 481.5 | 438 | 285 | 17.5 | 155 | 13 |
| A9 505 | 324.5 | 270 | 584.5 | 537.5 | 305 | 17.5 | 189.5 | 15.5 |

*(1) Ø 3.6 hole for M4 self-tapping screw.*

### VW3 A9 506

**Cut-outs and drill holes**

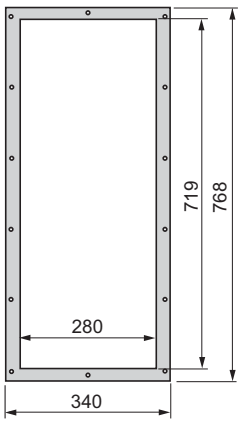


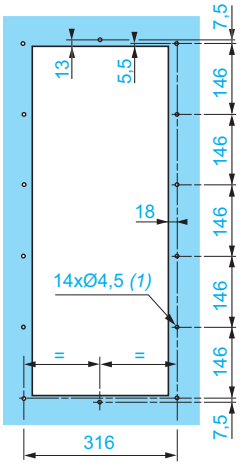




*(1) Ø 4.5 hole for M5 self-tapping screw.*

### VW3 A9 507

**Cut-outs and drill holes**

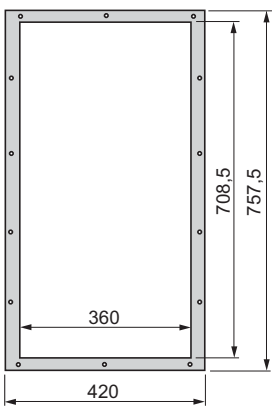


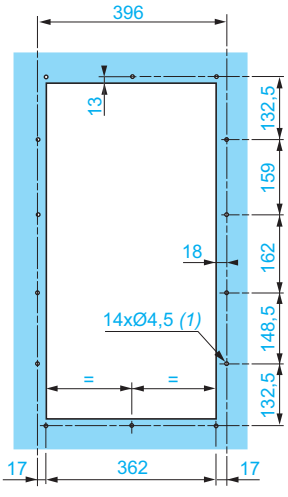




*(1) Ø 4.5 hole for M5 self-tapping screw.*

### VW3 A9 508

**Cut-outs and drill holes**



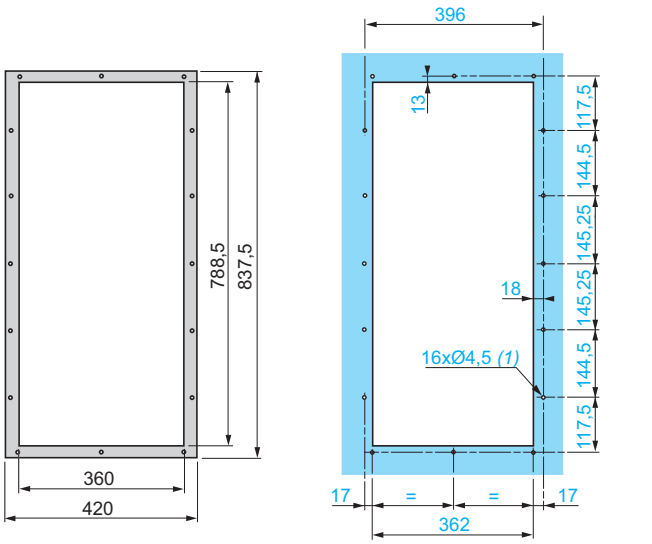

*(1) Ø 4.5 hole for M5 self-tapping screw.*

Presentation: page 30
References: page 30
Functions: pages 268 to 299

## Kits for flush-mounting in a dust and damp proof enclosure (continued)

### VW3 A9 509

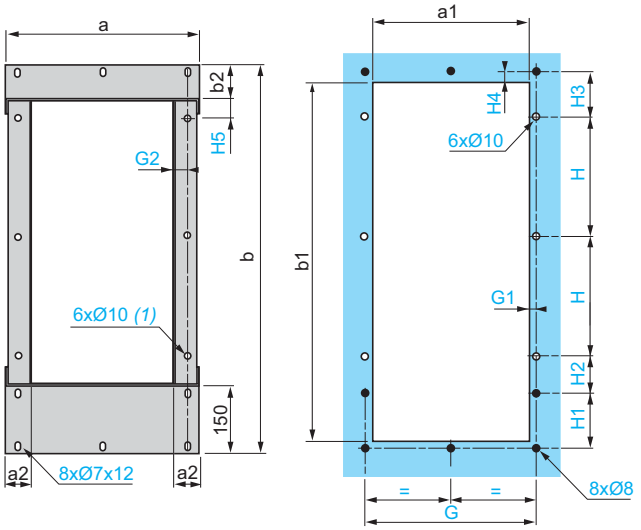
**Cut-outs and drill holes**



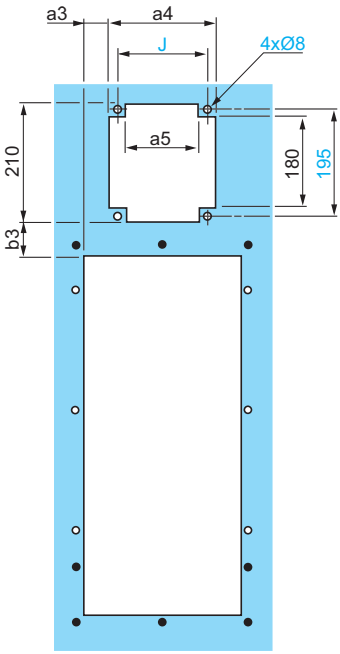

*(1) Ø 4.5 hole for M5 self-tapping screw.*

### VW3 A9 510, 511

**Cut-outs and drill holes without DC choke**




**Cut-outs and drill holes with DC choke**




| VW3 | a | a1 | a2 | b | b1 | b2 | G | G1 |
|---|---|---|---|---|---|---|---|---|
| A9 510 | 420 | 340 | 55 | 850 | 790 | 80 | 370 | 15 |
| A9 511 | 440 | 360 | 45 | 885 | 845 | 66 | 396 | 18 |
| VW3 | G2 | H | H1 | H2 | H3 | H4 | H5 | |
| A9 510 | 30 | 260 | 120 | 80 | 100 | 15 | 35 | |
| A9 511 | 23 | 310 | 70 | 91.5 | 83.5 | 10 | 27.5 | |

*(1) For fixing using an M8 minimum screw.*

| VW3 | a3 | a4 | a5 | b3 | J |
|---|---|---|---|---|---|
| A9 510 | 82.5 | 180 | 120 | 45 | 150 |
| A9 511 | 87.5 | 190 | 130 | 35 | 160 |

Presentation:
page 30

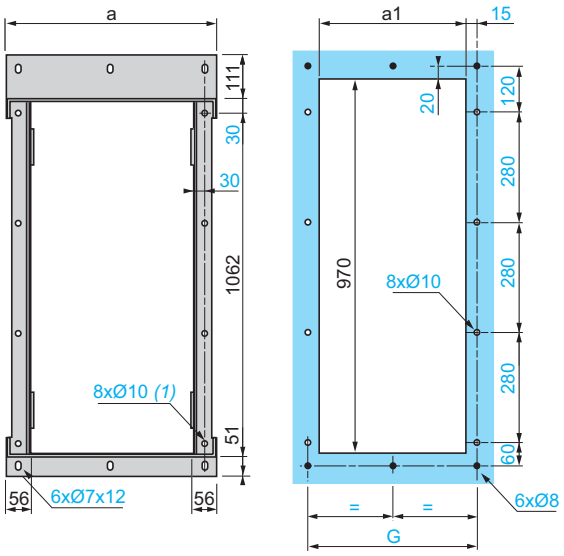
References:
page 30

Functions:
pages 268 to 299

## Kits for flush-mounting in a dust and damp proof enclosure (continued)

### VW3 A9 512, 513

**Cut-outs and drill holes without DC choke**

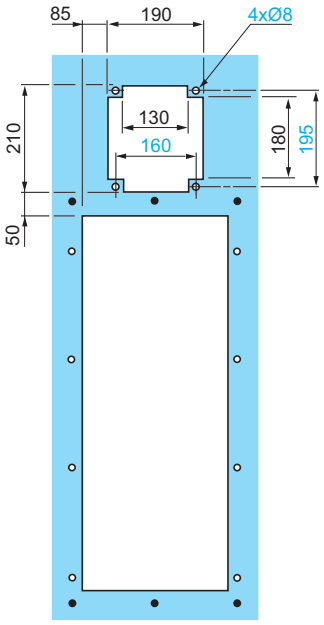



| VW3 | a | a1 | G |
|---|---|---|---|
| **A9 512** | 442 | 360 | 390 |
| **A9 513** | 542 | 460 | 490 |

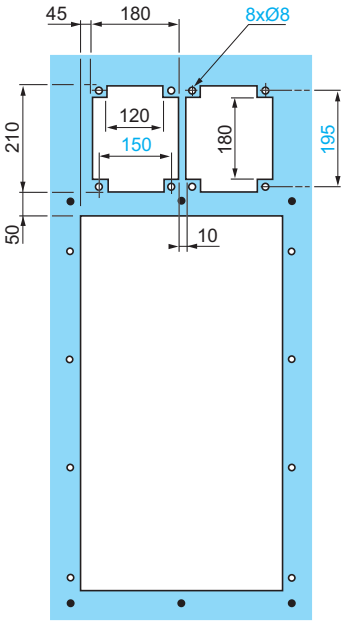
*(1) For fixing using an M8 minimum screw.*

### VW3 A9 512

**Cut-outs and drill holes with DC choke or transformer for fan**

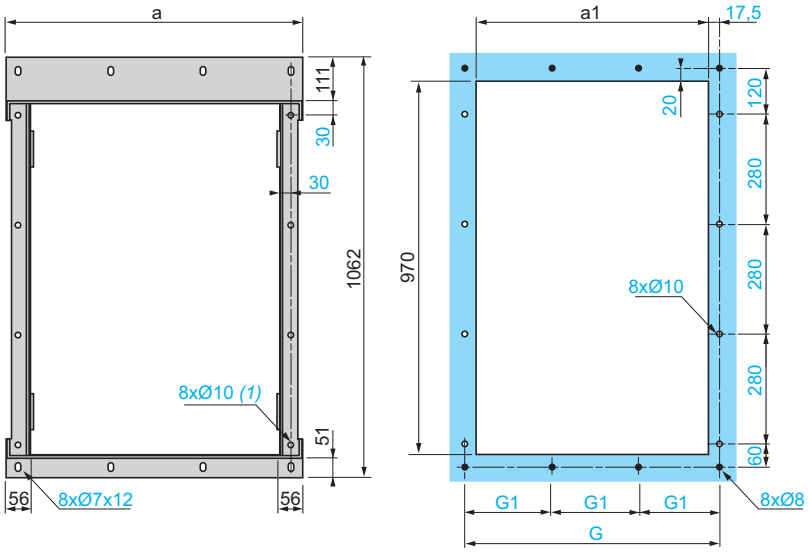



### VW3 A9 513




### VW3 A9 514 (without braking unit), VW3 A9 515 (with braking unit)

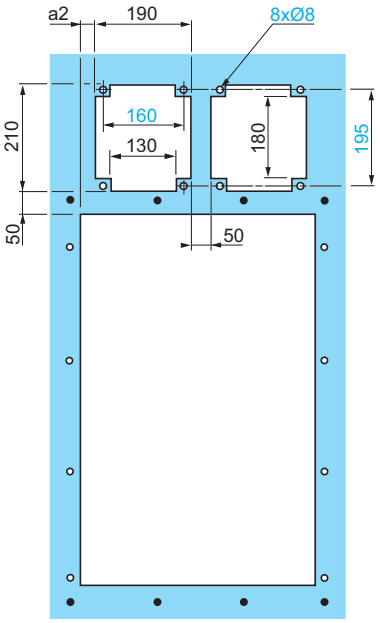
**Cut-outs and drill holes without DC choke**




| VW3 | a | a1 | G | G1 |
|---|---|---|---|---|
| **A9 514** | 697 | 610 | 645 | 215 |
| **A9 515** | 772 | 685 | 720 | 240 |

*(1) For fixing using an M8 minimum screw.*

**Cut-outs and drill holes with DC choke or transformer for fan**




| VW3 | a2 |
|---|---|
| **A9 514** | 90 |
| **A9 515** | 165 |

Presentation:
page 30

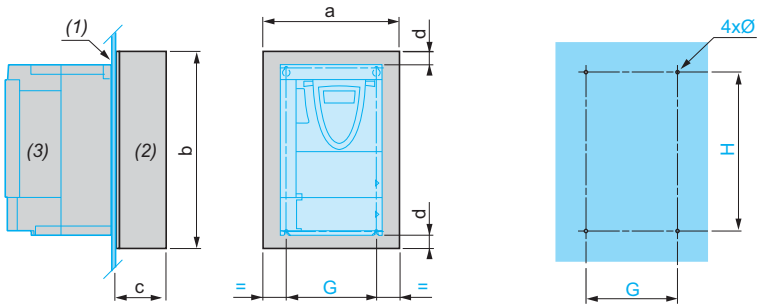
References:
page 30

Functions:
pages 268 to 299

## Kits for mounting in a dust and damp proof enclosure

**VW3 A9 801...803**

**Drill holes in the enclosure**

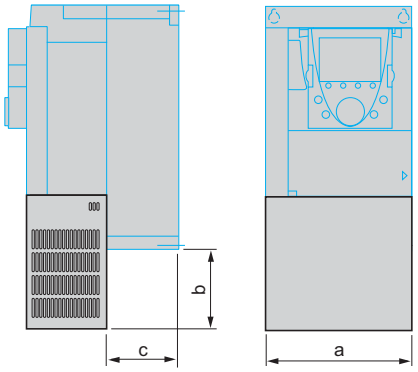



| VW3 | a | b | c | d | G | H | Ø |
|---|---|---|---|---|---|---|---|
| **A9 801** | 150 | 226 | 80 | 2 | 113.5 | 220 | M4 |
| **A9 802** | 175 | 450 | 80 | 95 | 138 | 249 | M4 |
| **A9 803** | 300 | 700 | 83 | 203 | 158 | 283 | M5 |

*(1) Enclosure plate*
*(2) Kit VW3 A9 801, VW3 A9 802 or VW3 A9 803*
*(3) ATV 71P●●●N4Z drive*

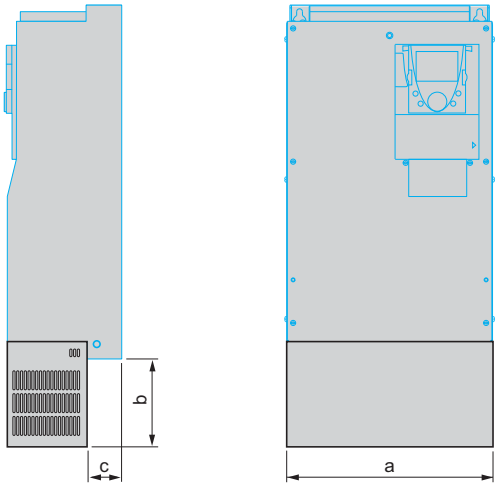
## UL Type 1 conformity kits VW3 A9 2●●, IP 21 or IP 31 conformity kits VW3 A9 1●●

**VW3 A9 201...205, 101...105**




| VW3 | a | b | c |
|---|---|---|---|
| **A9 201** | 132.6 | 32 | 60 |
| **A9 202** | 155 | 35 | 70 |
| **A9 203** | 176 | 32 | 70 |
| **A9 204** | 211.6 | 36 | 90 |
| **A9 205** | 231.6 | 40 | 90 |
| **A9 101** | 132.6 | 115 | 60 |
| **A9 102** | 155 | 105 | 70 |
| **A9 103** | 176 | 115 | 70 |
| **A9 104** | 211.6 | 115 | 90 |
| **A9 105** | 231.6 | 130 | 90 |

**VW3 A9 206...208, 217, 106...108, 117**




| VW3 | a | b | c |
|---|---|---|---|
| **A9 206** | 240 | 60 | 102 |
| **A9 207** | 240 | 52 | 102 |
| **A9 217** | 320 | 48 | 102 |
| **A9 208** | 320 | 136 | 116 |
| **A9 106** | 240 | 186 | 102 |
| **A9 107** | 240 | 178 | 102 |
| **A9 117** | 320 | 180 | 102 |
| **A9 108** | 320 | 180 | 116 |

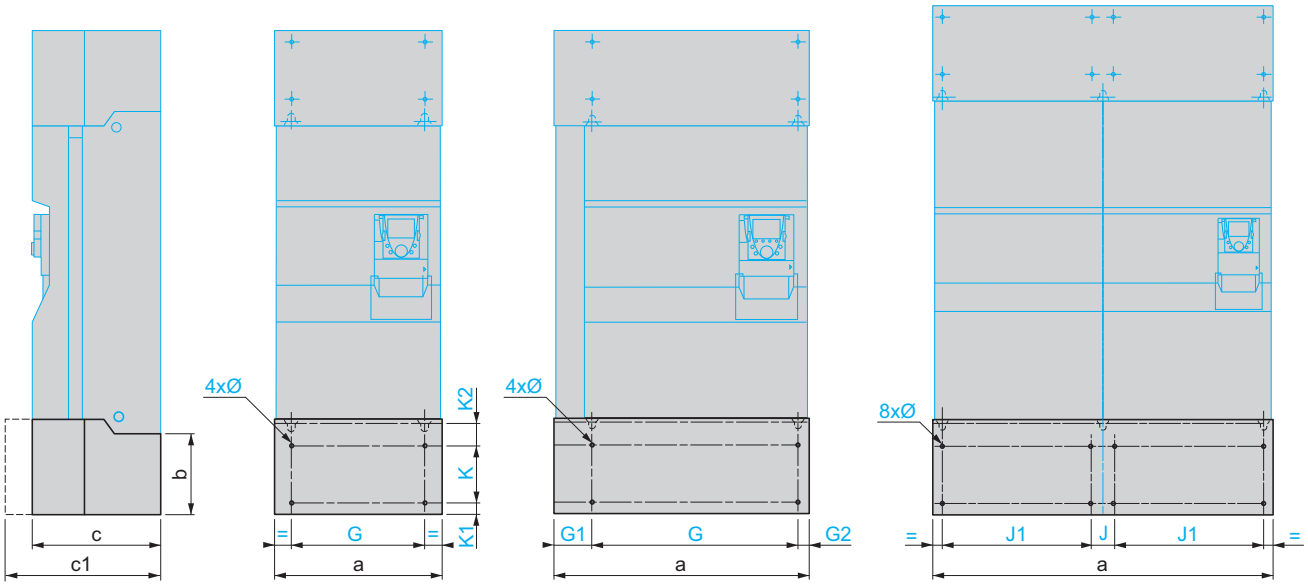
Presentation:
pages 31 to 33

References:
pages 31 to 33

Functions:
pages 268 to 299

**UL Type 1 conformity kits VW3 A9 2●●, IP 21 or IP 31 conformity kits VW3 A9 1●● (continued)**

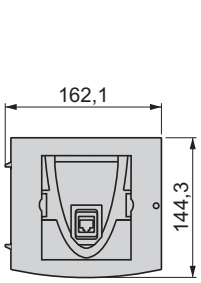
| VW3 A9 209…214, VW3 A9 109…116 | VW3 A9 209…213, VW3 A9 109…113, 115 | VW3 A9 214, 114 (with braking unit) | VW3 A9 116 |
|---|---|---|---|

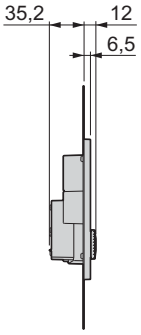



| VW3 | a | b | c | c1 | G | G1 | G2 | K | K1 | K2 | Ø | J | J1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **A9 209** | 334 | 220 | 377 | – | 250 | – | – | 95 | 65 | 75 | 11.5 | – | – |
| **A9 210** | 374 | 300 | 377 | – | 298 | – | – | 172 | 65 | 75 | 11.5 | – | – |
| **A9 211** | 345 | 315 | 377 | – | 285 | – | – | 250 | 65 | 75 | 11.5 | – | – |
| **A9 212** | 445 | 375 | 377 | – | 350 | – | – | 250 | 65 | 75 | 11.5 | – | – |
| **A9 213** | 600 | 375 | 377 | – | 540 | – | – | 250 | 65 | 75 | 11.5 | – | – |
| **A9 214** | 670 | 375 | 377 | – | 540 | 102 | 27 | 250 | 65 | 75 | 11.5 | – | – |
| **A9 109** | 334 | 220 | 377 | – | 250 | – | – | 95 | 65 | 75 | 11.5 | – | – |
| **A9 110** | 374 | 300 | 377 | – | 298 | – | – | 172 | 65 | 75 | 11.5 | – | – |
| **A9 111** | 345 | 315 | 377 | – | 285 | – | – | 250 | 65 | 75 | 11.5 | – | – |
| **A9 112** | 445 | 375 | 377 | – | 350 | – | – | 250 | 65 | 75 | 11.5 | – | – |
| **A9 113** | 600 | 375 | 377 | – | 540 | – | – | 250 | 65 | 75 | 11.5 | – | – |
| **A9 114** | 670 | 375 | 377 | – | 540 | 102 | 27 | 250 | 65 | 75 | 11.5 | – | – |
| **A9 115** | 895 | 475 | – | 477 | 835 | – | – | 350 | 65 | 75 | 11.5 | – | – |
| **A9 116** | 1125 | 475 | – | 477 | – | – | – | 350 | 65 | 75 | 11.5 | 70 | 495 |

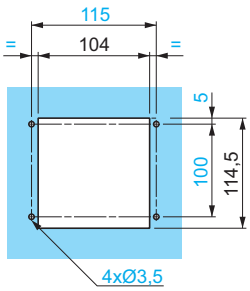
## Remote graphic display terminal

### IP 54 kit VW3 A1 102

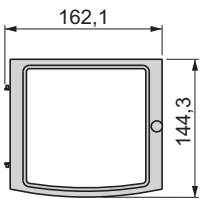


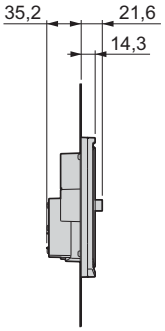




**Cut-outs and drill holes**



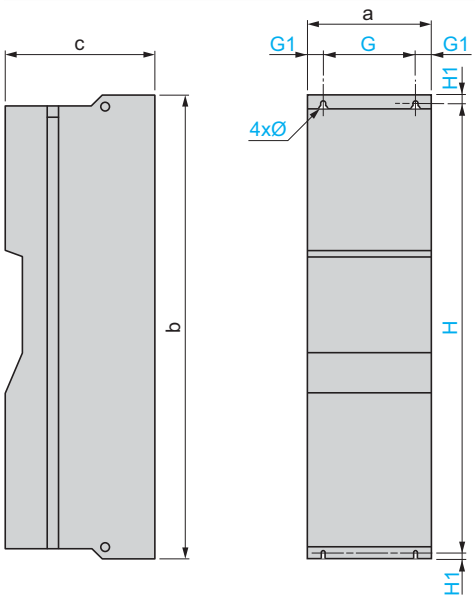

### IP65 door VW3 A1 103




## Braking units VW3 A7 101 *(1)*, VW3 A7 102…104

### VW3 A7 102…104

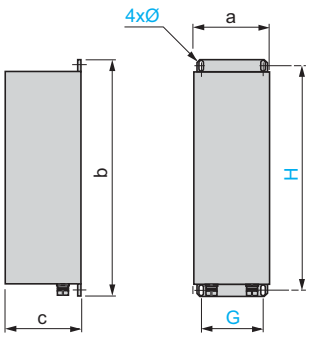



| VW3 | a | b | c | G | G1 | H | H1 | Ø |
|---|---|---|---|---|---|---|---|---|
| **A7 101** *(1)* | 75 | 950 | 377 | – | – | – | – | – |
| **A7 102…104** | 310 | 1150 | 377 | 265 | 22.5 | 1120 | 15 | 11.5 |

*(1) Braking unit VW3 A7 101 can only be mounted on the left side of the drive, see page 189.*

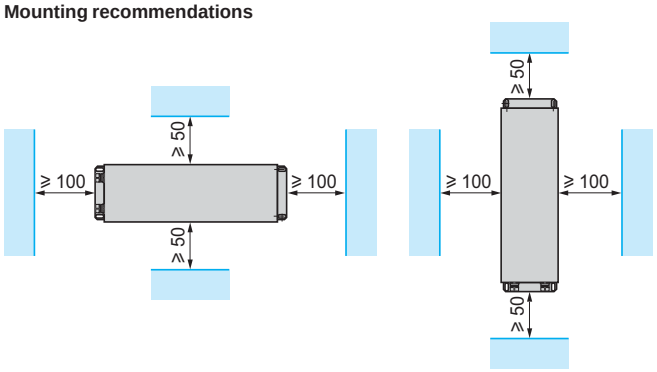
## Braking resistors

### VW3 A7 701…703




| VW3 | a | b | c | G | H | Ø |
|---|---|---|---|---|---|---|
| **A7 701** | 95 | 293 | 95 | 70 | 275 | 6 x 12 |
| **A7 702** | 95 | 293 | 95 | 70 | 375 | 6 x 12 |
| **A7 703** | 140 | 393 | 120 | 120 | 375 | 6 x 12 |

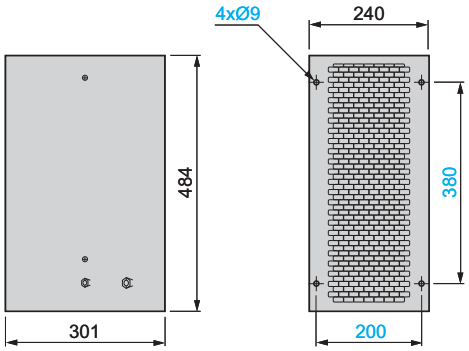
**Mounting recommendations**

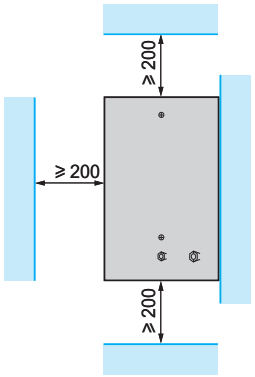


## Braking resistors (continued)

### VW3 A7 704...709

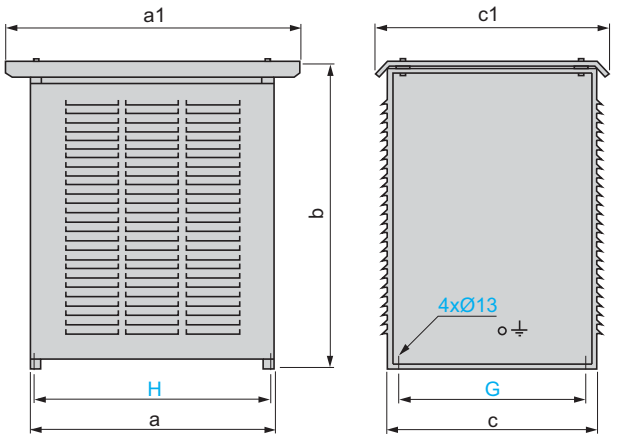
**Mounting recommendations**

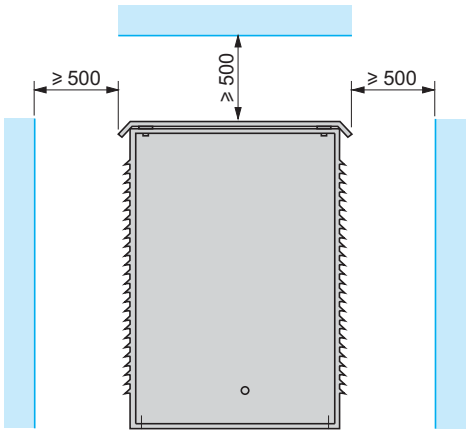



### VW3 A7 710...712, 715...718 *(1)*

**Mounting recommendations**



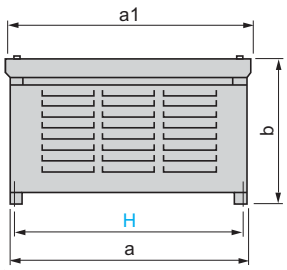



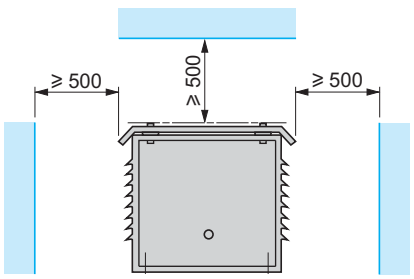

| VW3 | a | a1 | b | c | c1 | G | H |
|---|---|---|---|---|---|---|---|
| **A7 710** | 860 | 1040 | 690 | 480 | 560 | 400 | 832 |
| **A7 711** | 960 | 1140 | 1150 | 380 | 460 | 300 | 932 |
| **A7 712** | 860 | 1040 | 1150 | 540 | 620 | 460 | 832 |
| **A7 715** | 960 | 1140 | 1150 | 540 | 620 | 460 | 932 |
| **A7 716** *(1)* | 960 | 1140 | 1150 | 740 | 820 | 660 | 932 |
| **A7 717** *(1) (2)* | 960 | 1140 | 1150 | 540 | 620 | 460 | 932 |
| **A7 718** *(1) (2)* | 960 | 1140 | 1150 | 740 | 820 | 660 | 932 |

*(1) For mounting in series or parallel, a space of 300 mm must be left between each resistor.*
*(2) The dimension is given for 1 component. References VW3 A7 717, 718 comprise two components; all components must be taken into account to determine the overall dimensions. A space of 300 mm must be left between each component.*

### VW3 A7 713, 714

**Mounting recommendations**

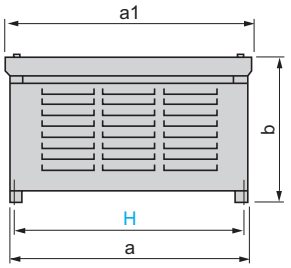


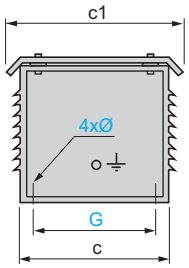




| VW3 | a | a1 | b | c | c1 | G | H |
|---|---|---|---|---|---|---|---|
| **A7 713** | 760 | 790 | 440 | 480 | 540 | 400 | 732 |
| **A7 714** | 960 | 990 | 440 | 480 | 540 | 400 | 932 |

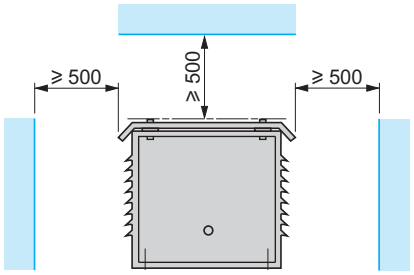
## Hoist resistors

### VW3 A7 801...804, 807...809



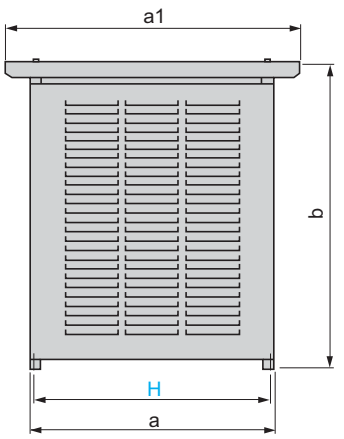

**Mounting recommendations**

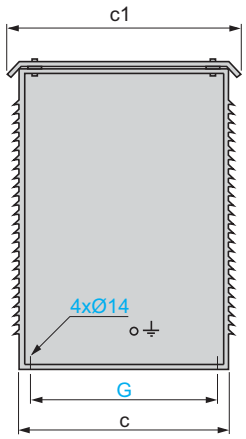


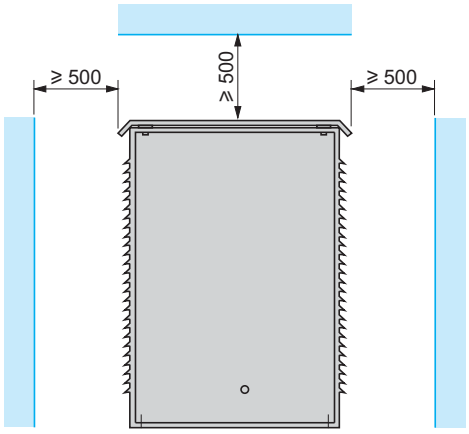

| VW3 | a | a1 | b | c | c1 | G | H | Ø |
|---|---|---|---|---|---|---|---|---|
| **A7 801** | 490 | 452 | 203.5 | 153 | 202 | 95 | 470 | 10 |
| **A7 802** | 420 | 450 | 452 | 480 | 540 | 400 | 392 | 13 |
| **A7 803** | 580 | 610 | 452 | 480 | 540 | 400 | 552 | 13 |
| **A7 804** | 960 | 990 | 452 | 480 | 540 | 400 | 932 | 13 |
| **A7 807** | 860 | 890 | 452 | 480 | 540 | 400 | 832 | 13 |
| **A7 808** | 860 | 890 | 743 | 480 | 540 | 400 | 832 | 13 |
| **A7 809** | 860 | 890 | 743 | 480 | 450 | 400 | 832 | 13 |

### VW3 A7 805, 806, 810...818 *(1)*

**Mounting recommendations**



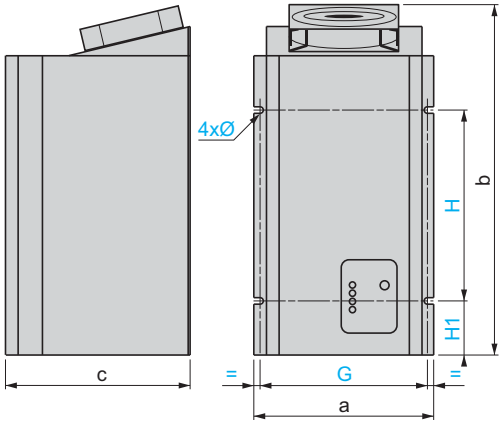

| VW3 | a | a1 | b | c | c1 | G | H |
|---|---|---|---|---|---|---|---|
| **A7 805** *(1)* | 860 | 1040 | 1150 | 540 | 620 | 460 | 832 |
| **A7 806** *(1)* | 860 | 1040 | 1150 | 740 | 820 | 660 | 832 |
| **A7 810** | 860 | 1040 | 1150 | 540 | 620 | 460 | 832 |
| **A7 811** | 960 | 1140 | 1150 | 540 | 620 | 460 | 932 |
| **A7 812** | 960 | 1140 | 1150 | 740 | 820 | 660 | 932 |
| **A7 813** *(2)* | 960 | 1140 | 1150 | 540 | 620 | 460 | 932 |
| **A7 814** *(1) (2)* | 960 | 1140 | 1150 | 540 | 620 | 460 | 932 |
| **A7 815** *(2)* | 960 | 1140 | 1150 | 740 | 820 | 660 | 932 |
| **A7 816** *(1) (2)* | 960 | 1140 | 1150 | 740 | 820 | 660 | 932 |
| **A7 817** *(2)* | 960 | 1140 | 1700 | 740 | 820 | 660 | 932 |
| **A7 818** | 960 | 1140 | 1150 | 740 | 820 | 660 | 932 |

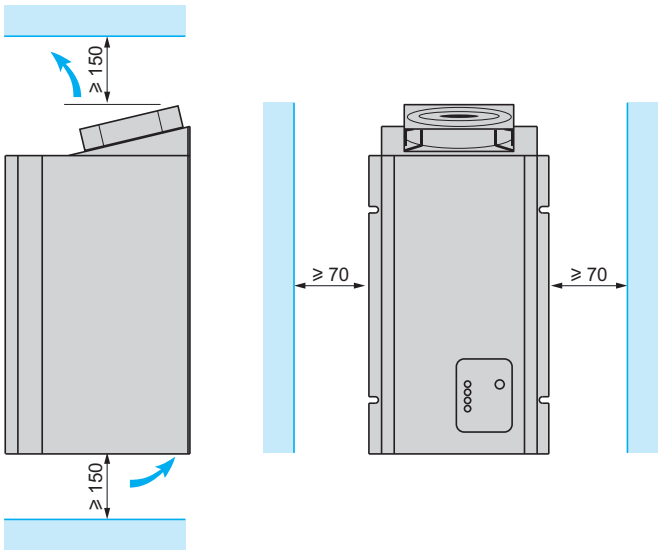
*(1) For mounting in series or parallel, a space of 300 mm must be left between each resistor.*
*(2) The dimension is given for 1 component. References VW3 A7 813…815 comprise 2 components and references VW3 A7 816 and 817 comprise 3 components; all components must be taken into account to determine the overall dimensions. A space of 300 mm must be left between each component.*

## Network braking units

### VW3 A7 201…205, 231, 232

**Mounting recommendations**

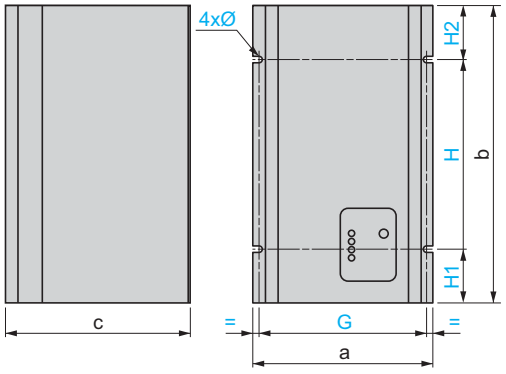


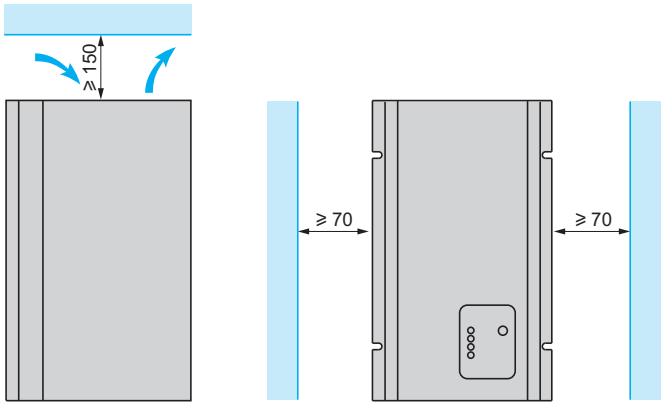




| VW3 | a | b | c | G | H | H1 | Ø |
|---|---|---|---|---|---|---|---|
| **A7 201, 202** | 270 | 500 | 295 | 260 | 260 | 80 | 7 |
| **A7 203…205, A7 231…232** | 270 | 580 | 295 | 260 | 340 | 80 | 7 |

### VW3 A7 206…208, 233…237

**Mounting recommendations**



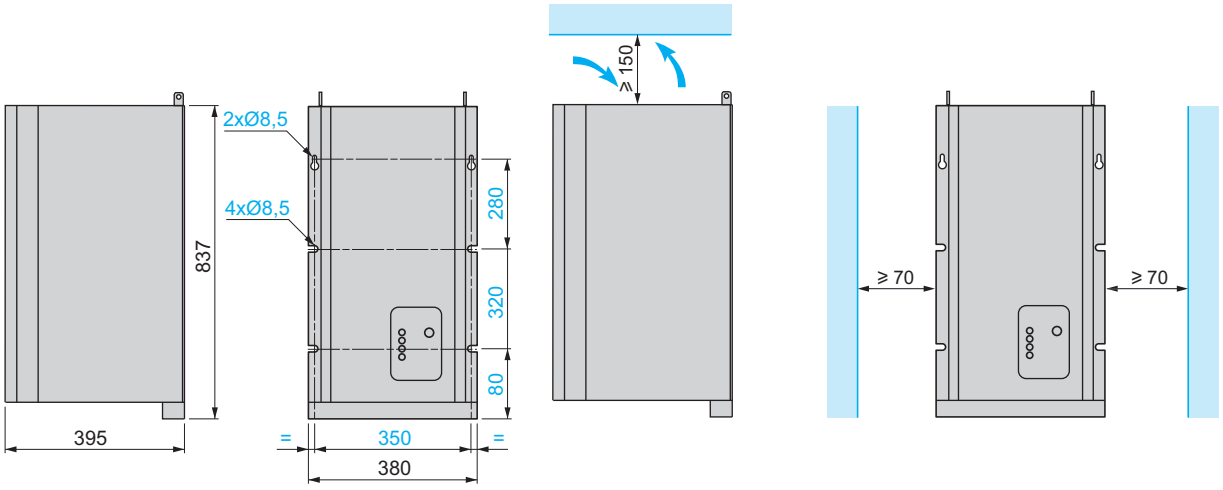




| VW3 | a | b | c | G | H | H1 | H2 | Ø |
|---|---|---|---|---|---|---|---|---|
| **A7 206…208** | 245 | 700 | 272 | 260 | 440 | 80 | 180 | 7 |
| **A7 233…237** | 272 | 700 | 295 | 260 | 440 | 80 | 180 | 7 |

## Network braking units (continued)

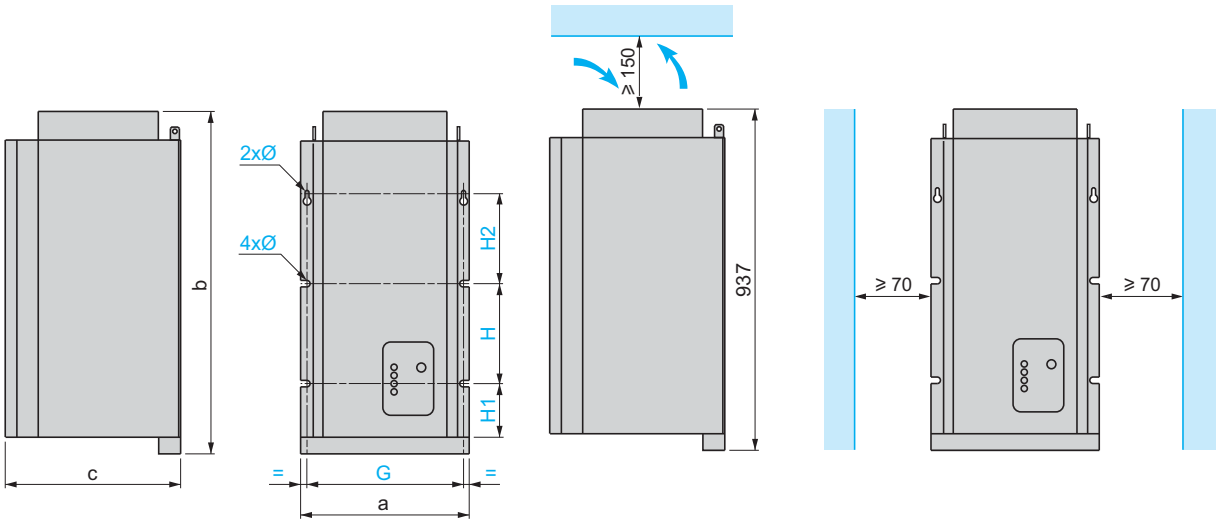
### VW3 A7 209, 210, 238, 239

**Mounting recommendations**




### VW3 A7 211, 212, 240, 241

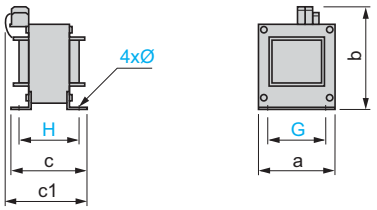
**Mounting recommendations**




| VW3 | a | b | c | G | H | H1 | H2 | Ø |
|---|---|---|---|---|---|---|---|---|
| **A7 211, 240** | 380 | 937 | 395 | 350 | 320 | 80 | 280 | 8.5 |
| **A7 212, 241** | 380 | 1037 | 395 | 350 | 320 | 80 | 280 | 8.5 |

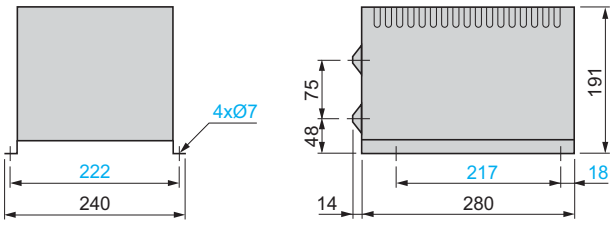
## DC chokes

### VW3 A4 501...510



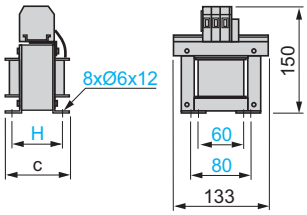

| VW3 | a | b | c | c1 | G | H | Ø |
|---|---|---|---|---|---|---|---|
| **A4 501** | 60 | 103 | 60 | 95 | 50 | 51 | 3.5 |
| **A4 502** | 60 | 103 | 77 | 118 | 50 | 68 | 3.5 |
| **A4 503** | 96 | 134 | 80 | 115 | 80 | 65 | 5.5 |
| **A4 504** | 96 | 134 | 79 | 115 | 80 | 64 | 5.5 |
| **A4 505** | 96 | 134 | 85 | 120 | 80 | 70 | 5.5 |
| **A4 506** | 96 | 134 | 89 | 120 | 80 | 74 | 5.5 |
| **A4 507** | 96 | 134 | 99 | 130 | 80 | 84 | 5.5 |
| **A4 508** | 108 | 142 | 112 | 145 | 90 | 97 | 5.5 |
| **A4 509** | 96 | 134 | 89 | 120 | 80 | 74 | 5.5 |
| **A4 510** | 126 | 171 | 120 | 170 | 105 | 103 | 7 |

### VW3 A4 511, 512



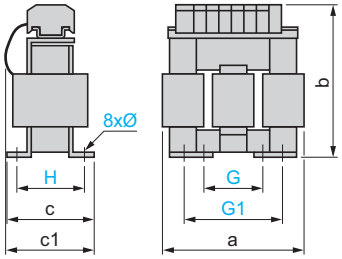

## Line chokes

### VW3 A58501, A58502



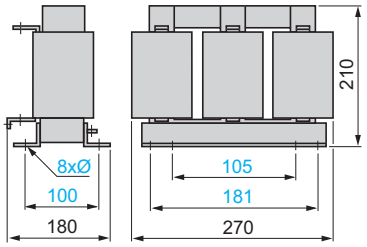

| VW3 | c | H |
|---|---|---|
| **A58501** | 95 | 65 |
| **A58502** | 105 | 77 |

### VW3 A4 551...555



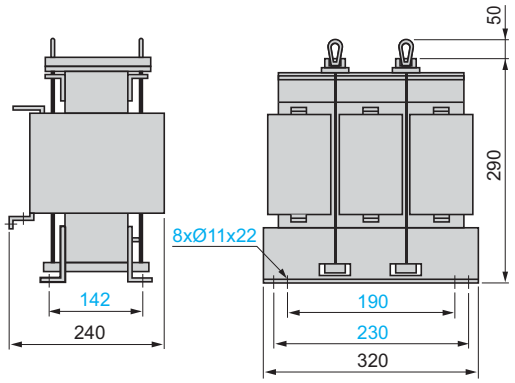

| VW3 | a | b | c | c1 | G | G1 | H | Ø |
|---|---|---|---|---|---|---|---|---|
| **A4 551** | 100 | 135 | 55 | 60 | 40 | 60 | 42 | 6 x 9 |
| **A4 552, A4 553** | 130 | 155 | 85 | 90 | 60 | 80.5 | 62 | 6 x 12 |
| **A4 554** | 155 | 170 | 115 | 135 | 75 | 107 | 90 | 6 x 12 |
| **A4 555** | 180 | 210 | 125 | 165 | 85 | 122 | 105 | 6 x 12 |

### VW3 A4 556

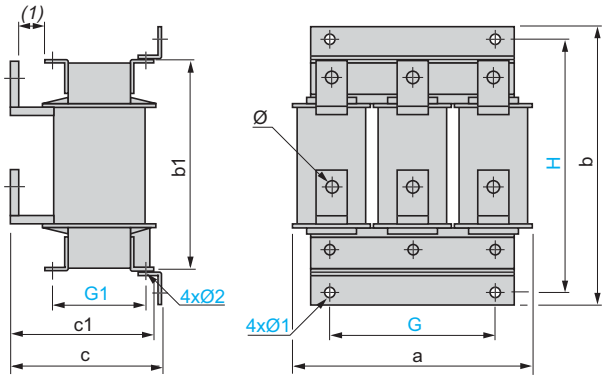



| VW3 | Ø |
|---|---|
| **A4 556** | 11 x 22 |

### VW3 A4 557




### VW3 A4 558...565, 568...572




| VW3 | a | b | b1 | c | c1 | G | G1 | H | Ø | Ø1 | Ø2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **A4 558, 570** | 280 | 305 | 240 | 210 | 200 | 200 | 125 | 275 | 9 | 9 | 9 |
| **A4 559** | 280 | 330 | 260 | 210 | 200 | 200 | 125 | 300 | 11 | 9 | 9 |
| **A4 560, 561, 568** | 320 | 380 | 300 | 210 | 200 | 225 | 150 | 350 | 11 | 9 | 9 |
| **A4 562...564** | 320 | 380 | 300 | 250 | 230 | 225 | 150 | 350 | 13 | 11 | 11 |
| **A4 565** | 385 | 440 | 340 | 275 | 250 | 300 | 125 | 400 | 2 x Ø13 | 13.5 | 13.5 |
| **A4 569** | 320 | 380 | 300 | 250 | 230 | 225 | 150 | 350 | 13 | 11 | 11 |
| **A4 571** | 385 | 440 | 340 | 265 | 245 | 300 | 150 | 400 | 13 | 13 | 13 |
| **A4 572** | 385 | 440 | 340 | 305 | 245 | 300 | 150 | 400 | 13 | 13 | 13 |

*(1) 25 mm minimum.*

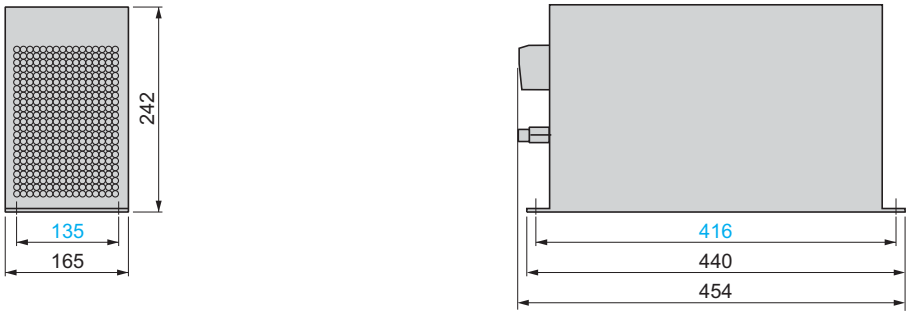
Presentation: pages 152 and 156
Characteristics: pages 155 and 159
References: pages 155 and 160
Schemes: pages 222 to 225
Functions: pages 268 to 299

## Passive filters VW3 A4 601…609, 621…627, 641…648, 661…666

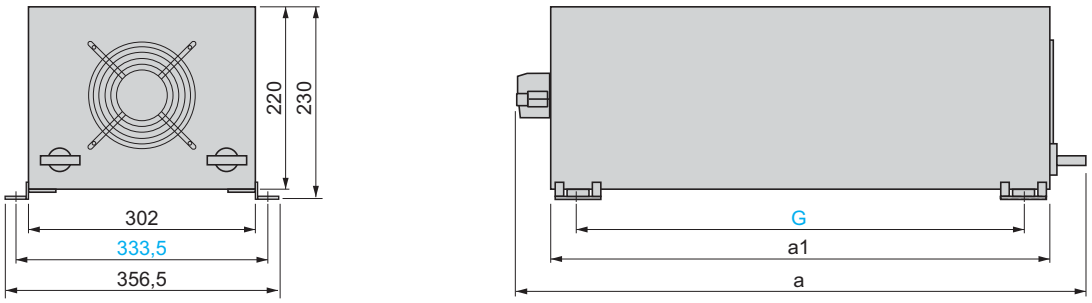
**Mounting recommendations** *(1)*




### VW3 A4 601…604, 621, 622, 641…644, 661…663




### VW3 A4 605…609, 623…627, 645…648, 664…666

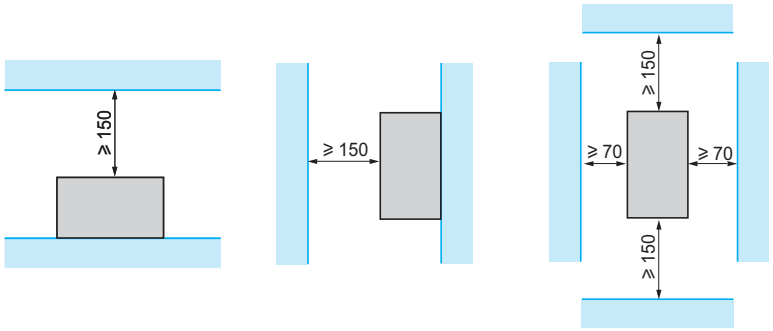



| VW3 | a | a1 | G |
|---|---|---|---|
| **A4 605, 606, 623…625, 645, 646, 664, 665** | 698 | 600 | 532.5 |
| **A4 607…609, 626, 627, 647, 648, 666** | 938 | 840 | 772.5 |

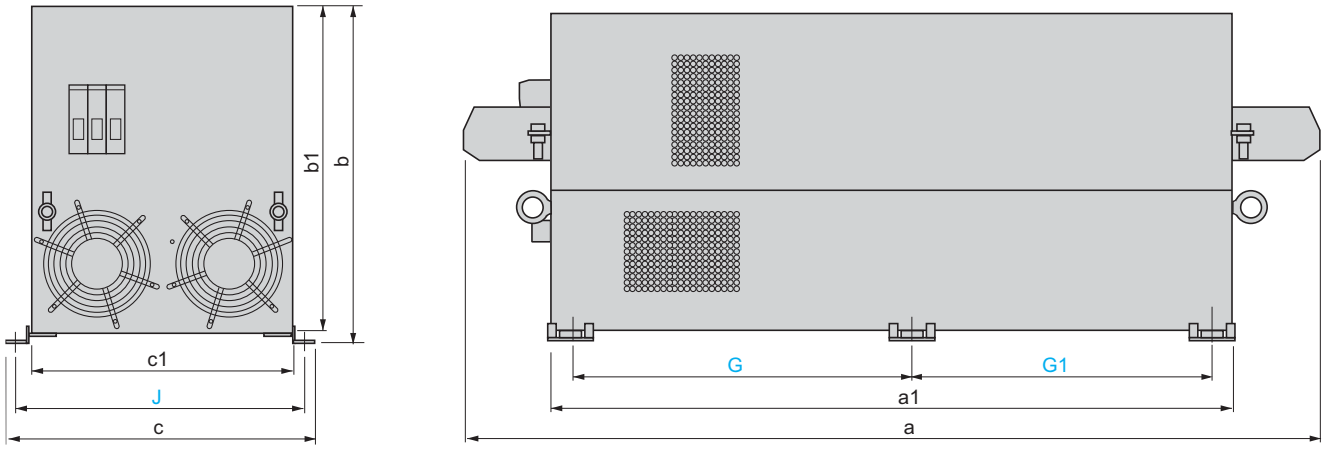
*(1) Vertical mounting only*

## Passive filters VW3 A4 610…613, 619, 628…633, 639, 649…651, 656, 657, 667…671, 676, 677 (continued)

**Mounting recommendations** *(1)*

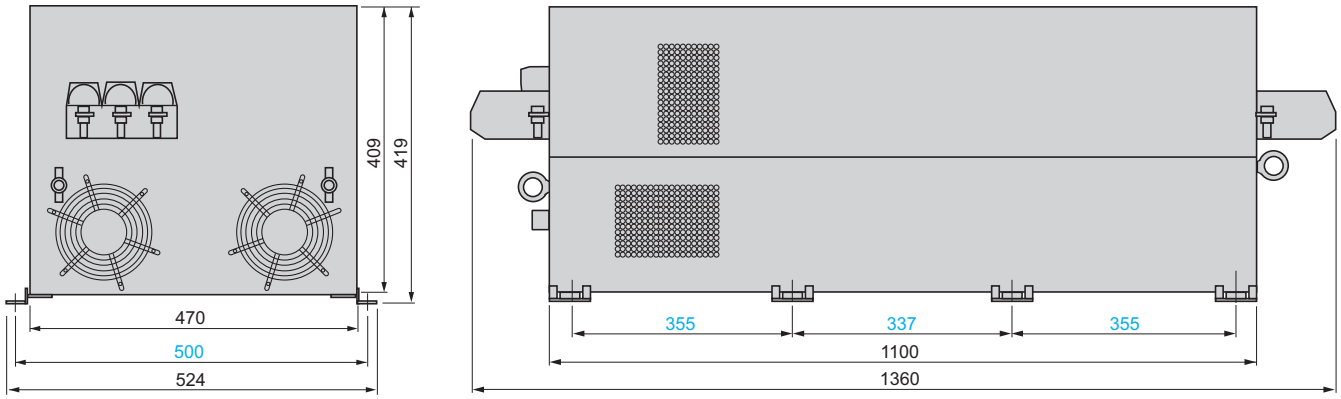



### VW3 A4 610…613, 619, 628…632, 639, 649…651, 656, 657, 667…670, 676, 677




| VW3 | a | a1 | b | b1 | c | c1 | G | G1 | J |
|---|---|---|---|---|---|---|---|---|---|
| **A4 610, 611, 628, 629, 649, 667, 668** | 1060 | 830 | 400 | 390 | 393 | 345 | 395 | 377 | 370 |
| **A4 612, 619, 630, 631, 650, 656, 657, 669** | 1160 | 900 | 419 | 409 | 454 | 406 | 430 | 412 | 430 |
| **A4 613, 632, 639, 651, 670, 676, 677** | 1330 | 1070 | 419 | 409 | 454 | 406 | 515 | 497 | 430 |

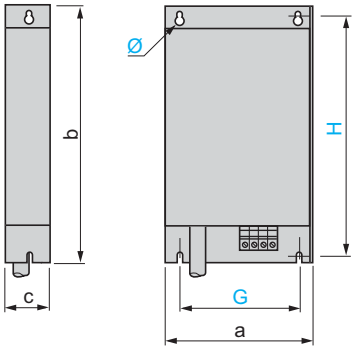
### VW3 A4 633, 671



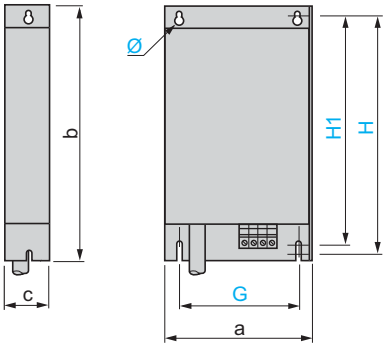

*(1) Horizontal or vertical mounting*

## Additional EMC input filters

### VW3 A4 401...404

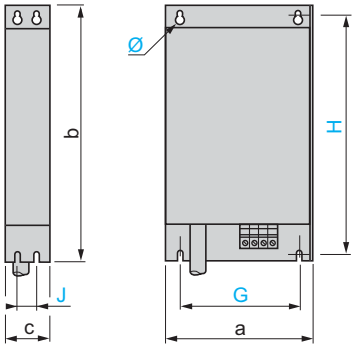



### VW3 A4 405, 409




| VW3 | a | b | c | G | H | H1 | Ø |
|---|---|---|---|---|---|---|---|
| **A4 401** | 130 | 290 | 40 | 105 | 275 | – | 4.5 |
| **A4 402** | 155 | 324 | 50 | 130 | 309 | – | 4.5 |
| **A4 403** | 175 | 370 | 60 | 150 | 355 | – | 6.5 |
| **A4 404** | 210 | 380 | 60 | 190 | 365 | – | 6.5 |
| **A4 405** | 230 | 498.5 | 62 | 190 | 479.5 | 460 | 6.5 |
| **A4 409** | 230 | 498.5 | 62 | 190 | 479.5 | 460 | 6.5 |

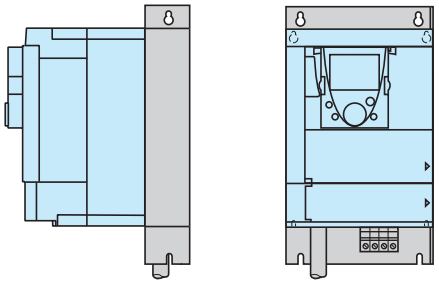
### VW3 A4 406...408




| VW3 | a | b | c | G | H | J | Ø |
|---|---|---|---|---|---|---|---|
| **A4 406** | 240 | 522 | 79 | 200 | 502.5 | 40 | 9 |
| **A4 407** | 240 | 650 | 79 | 200 | 631 | 40 | 9 |
| **A4 408** | 320 | 750 | 119 | 280 | 725 | 80 | 9 |

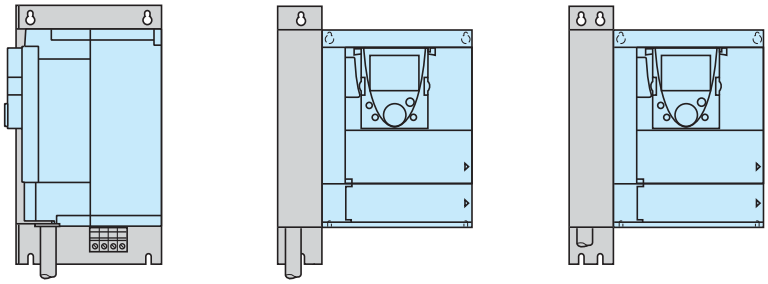
### Mounting the filter under the drive

**Front view**



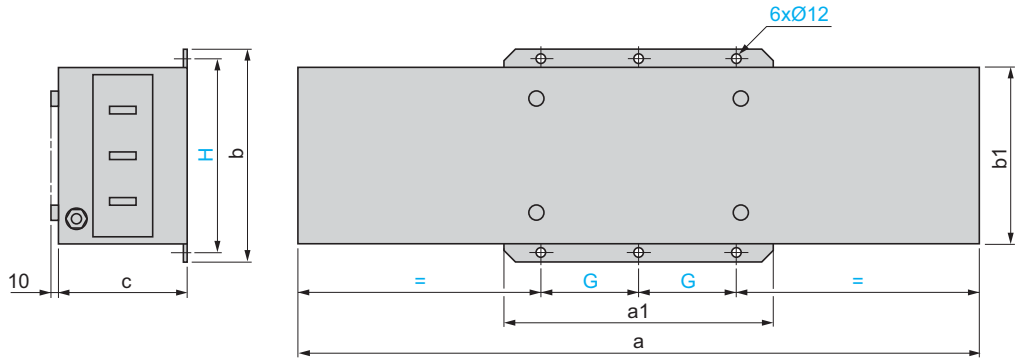
### Mounting the filter next to the drive

**Front view**



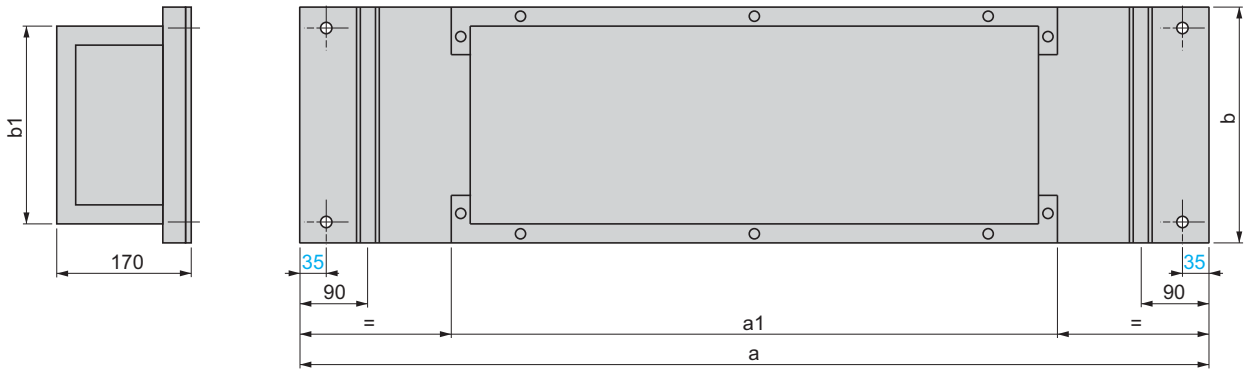
## Additional EMC input filters (continued)

### VW3 A4 410…413




| VW3 | a | a1 | b | b1 | c | G | H |
|---|---|---|---|---|---|---|---|
| **A4 410** | 800 | 302 | 261 | 219 | 139 | 120 | 235 |
| **A4 411** | 800 | 302 | 261 | 219 | 139 | 120 | 235 |
| **A4 412** | 900 | 352 | 281 | 239 | 174 | 145 | 255 |
| **A4 413** | 1000 | 401 | 301 | 259 | 164 | 170 | 275 |

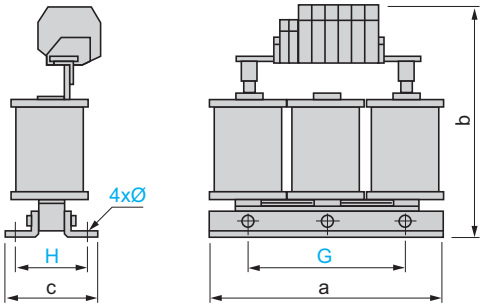
### IP 30 protection kits for filters VW3 A4 410…413



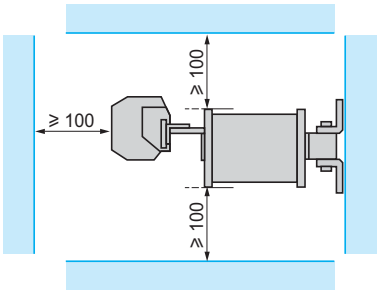

| VW3 | a | a1 | b | b1 |
|---|---|---|---|---|
| **A9 601** | 1200 | 800 | 310 | 270 |
| **A9 602** | 1400 | 1000 | 350 | 310 |

## Motor chokes *(1)*

### VW3 A5 101, 102

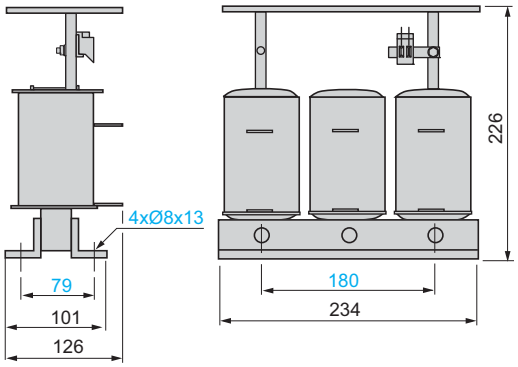



**Mounting recommendations** *(2)*

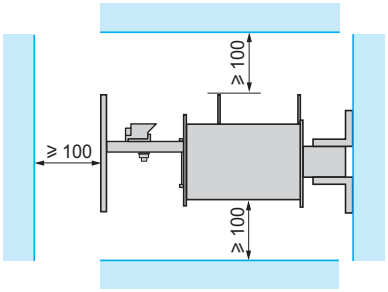



| VW3 | a | b | c | G | H | Ø |
|---|---|---|---|---|---|---|
| **A5 101** | 190 | 210 | 90 | 170 | 45 | 8 x 12 |
| **A5 102** | 190 | 235 | 120 | 170 | 48 | 8 x 12 |

### VW3 A5 103



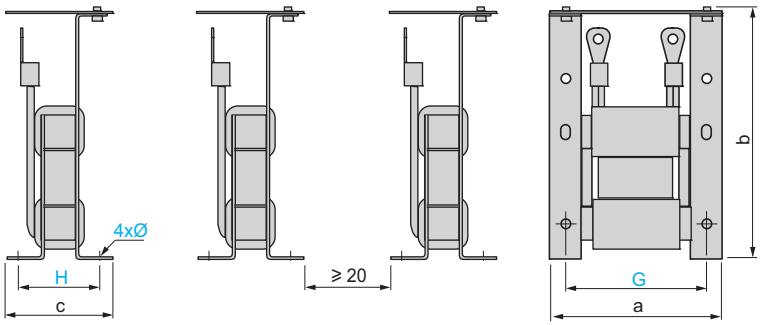

**Mounting recommendations** *(2)*




*(1) It is absolutely essential that the motor chokes are mounted on a metal support (grille, frame, etc.)*
*(2) Because of the magnetic field and/or the heat dissipation, it is essential to follow the mounting recommendations provided.*

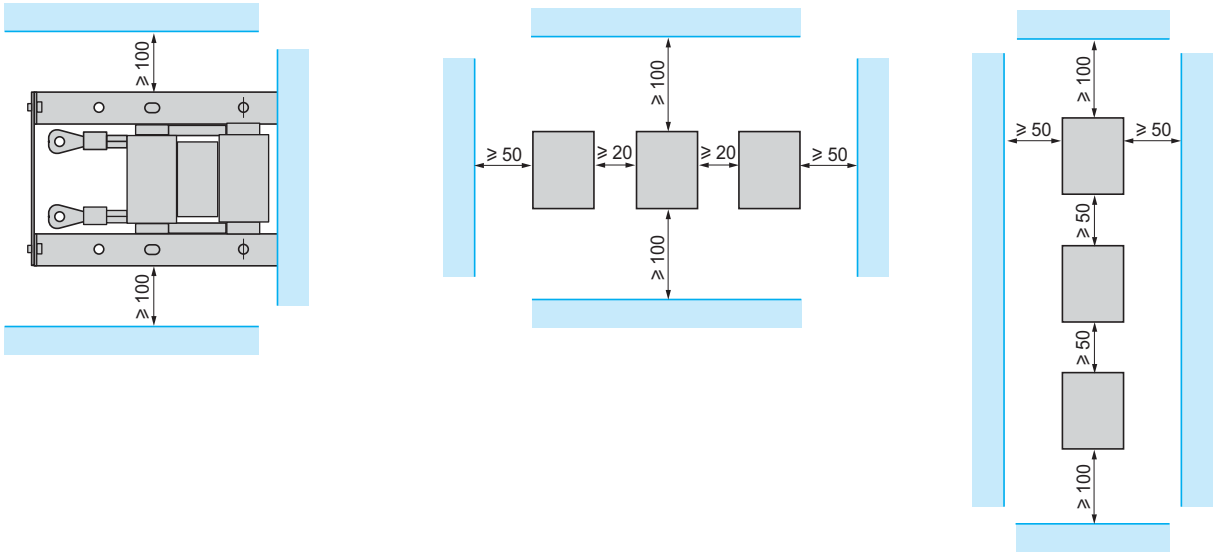
## Motor chokes (continued) *(1)*

### VW3 A5 104, 105 *(2)*




| VW3 | a | b | c | G | H | Ø |
|---|---|---|---|---|---|---|
| **A5 104** | 170 | 250 | 100 | 150 | 75 | 9 x 13 |
| **A5 105** | 210 | 250 | 110 | 175 | 75 | 9 x 13 |

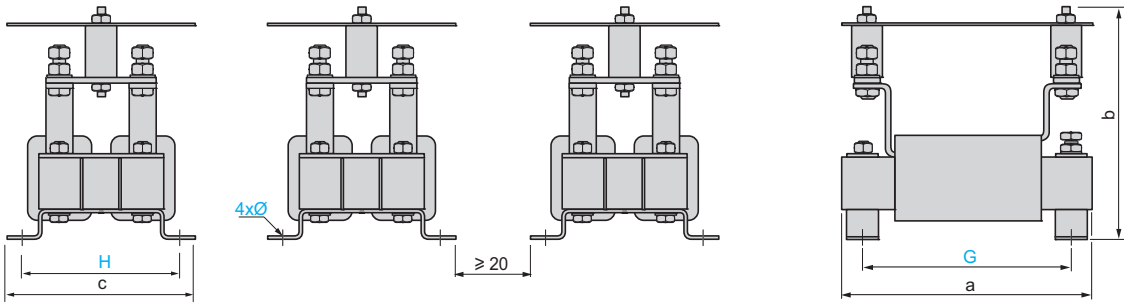
**Mounting recommendations** *(3)*




*(1) It is absolutely essential that the motor chokes are mounted on a metal support (grille, frame, etc.)*
*(2) References VW3 A5 104 and 105 comprise 3 components.*
*(3) Because of the magnetic field and/or the heat dissipation, it is essential to follow the mounting recommendations provided.*

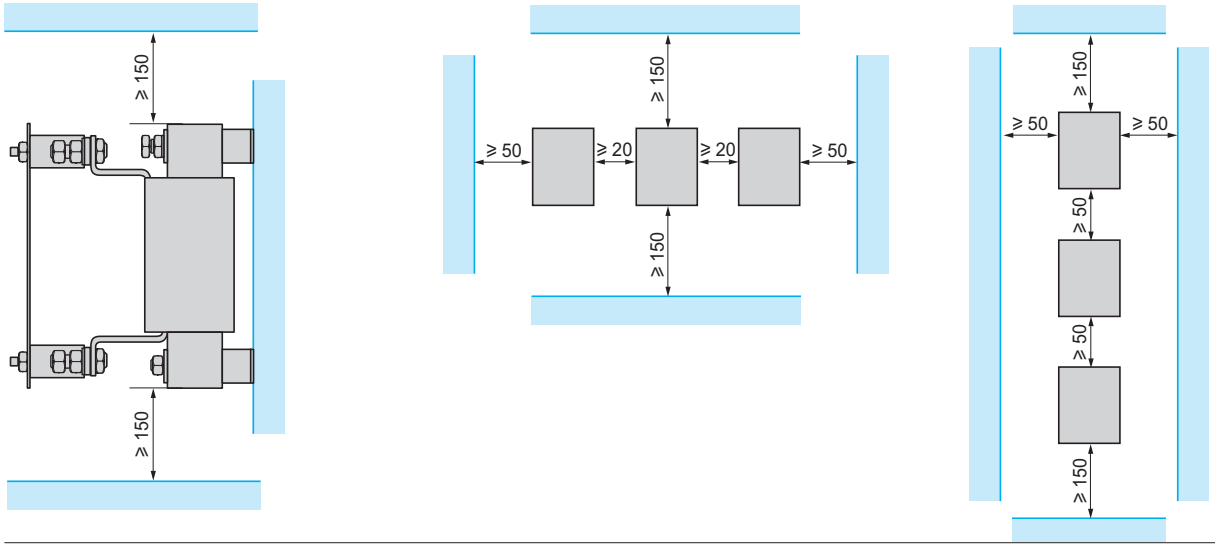
**Motor chokes (continued)** *(1)*

**VW3 A5 106…108** *(2)*



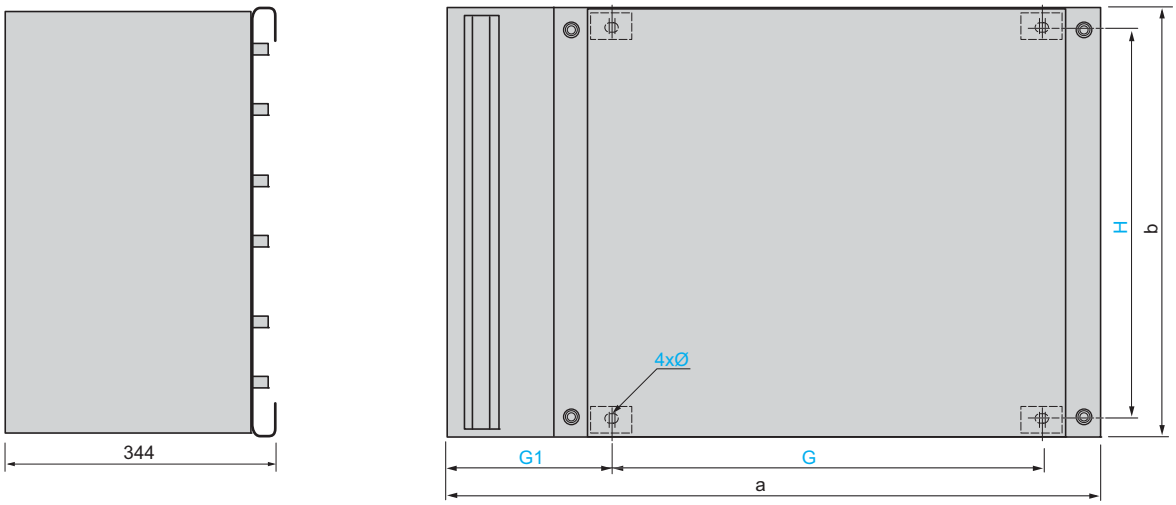

| VW3 | a | b | c | G | H | Ø |
|---|---|---|---|---|---|---|
| **A5 106** | 245 | 250 | 200 | 225 | 175 | 9 x 13 |
| **A5 107** | 315 | 250 | 210 | 275 | 200 | 9 x 13 |
| **A5 108** | 370 | 250 | 230 | 325 | 200 | 9 x 13 |

**Mounting recommendations** *(3)*




*(1) It is absolutely essential that the motor chokes are mounted on a metal support (grille, frame, etc.)*
*(2) References VW3 A5 106…108 comprise 3 components.*
*(3) Because of the magnetic field and/or the heat dissipation, it is essential to follow the mounting recommendations provided.*

**IP 20 protection kits for chokes VW3 A5 104…108**

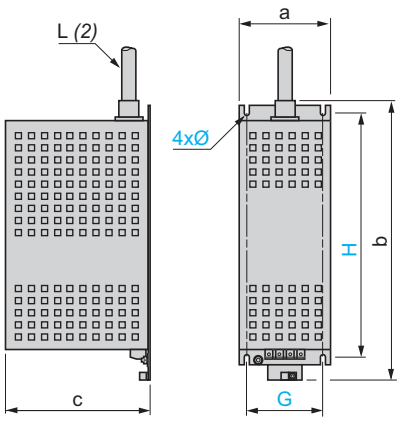



| VW3 | a | b | G | G1 | H | Ø |
|---|---|---|---|---|---|---|
| **A9 612** | 780 | 580 | 530 | 190 | 526 | 10 x 15 |
| **A9 613** | 1180 | 780 | 800 | 200 | 726 | 10 x 15 |

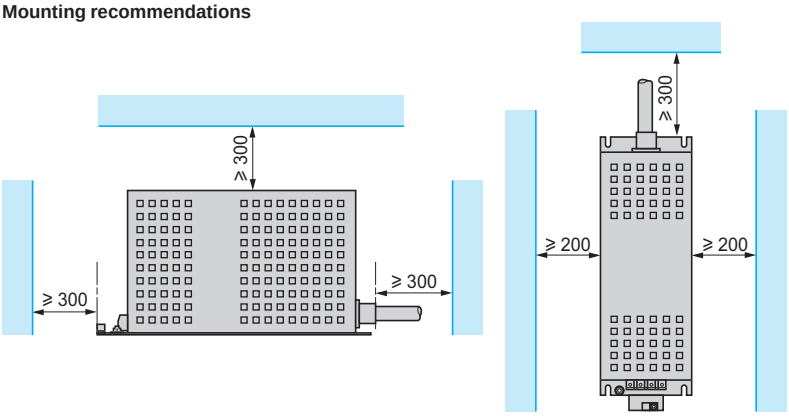
Presentation: pages 170 and 171
Characteristics: page 171
References: pages 172 and 173
Schemes: page 231
Functions: pages 268 to 299

## Sinus filters *(1)*

### VW3 A5 201...206



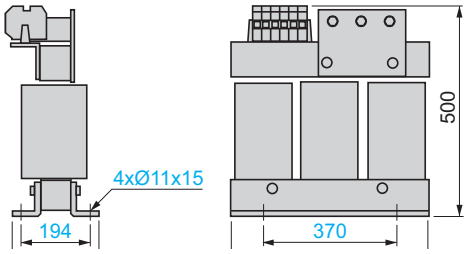

**Mounting recommendations**

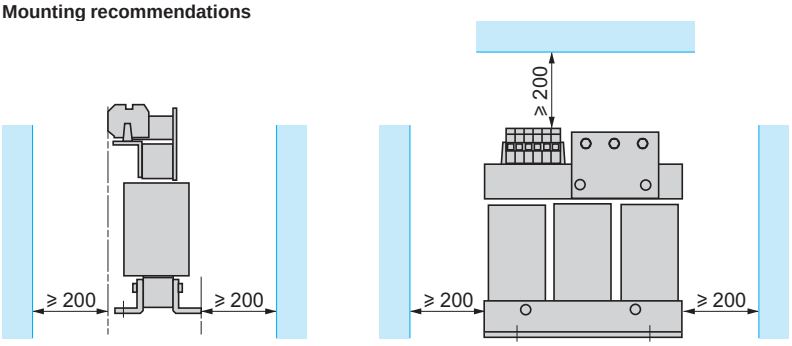



| VW3 | a | b | c | G | H | Ø | L *(2)* |
|---|---|---|---|---|---|---|---|
| **A5 201** | 120 | 335 | 160 | 100 | 280 | 6.6 | 700 |
| **A5 202** | 120 | 405 | 190 | 100 | 350 | 6.6 | 900 |
| **A5 203** | 150 | 470 | 240 | 120 | 380 | 6.6 | 900 |
| **A5 204** | 210 | 650 | 280 | 160 | 530 | 8.6 | 1500 |
| **A5 205** | 250 | 780 | 360 | 200 | 650 | 11 | 1600 |
| **A5 206** | 310 | 1060 | 375 | 220 | 880 | 11 | 2700 |

### VW3 A5 207

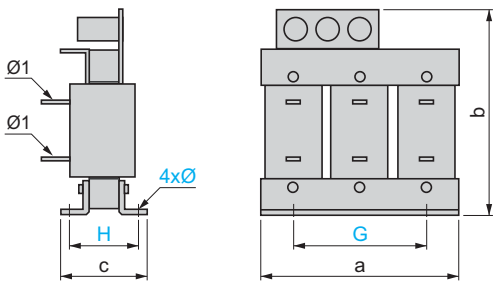
**Mounting recommendations**

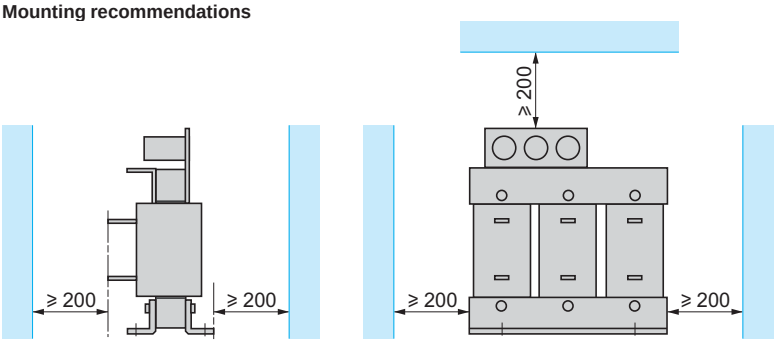



### VW3 A5 208...211

**Mounting recommendations**




| VW3 | a | b | c | G | H | Ø | Ø1 |
|---|---|---|---|---|---|---|---|
| **A5 208** | 420 | 500 | 345 | 370 | 231 | 11 x 15 | 11 |
| **A5 209** | 480 | 600 | 340 | 430 | 238 | 13 x 18 | 11 |
| **A5 210** | 480 | 710 | 370 | 430 | 258 | 13 x 18 | 14 |
| **A5 211** | 620 | 930 | 500 | 525 | 352 | 13 x 22 | 4 x Ø11 |

*(1) Sinus filters emit considerable heat and must not be placed underneath the drive.*
*(2) Length of the cable integrated in the sinus filter.*

# Variable speed drives
Altivar 71
Safety requirements

## "Power Removal" safety function

The Altivar 71 drive integrates the "Power Removal" safety function which prohibits unintended equipment operation. The motor no longer produces torque.

This safety function:
■ Complies with the standard for safety of machinery EN 954-1, category 3
■ Complies with operational safety standard IEC/EN 61508, SIL2 capability (safety control-signalling applied to processes and systems)
The SIL (Safety Integrity Level) capability depends on the connection scheme for the drive and for the safety function. Failure to observe the setup recommendations could inhibit the SIL capability of the "Power Removal" safety function.
■ Complies with draft product standard IEC/EN 61800-5-2 for the two stop functions:
□ Safe Torque Off ("STO"): response time ≤ 100 ms
□ Safe Stop 1 ("SS1")

The "Power Removal" safety function has a redundant electronic architecture *(1)* which is monitored continuously by a diagnostics function.

This level SIL2 and category 3 safety function is certified as conforming to these standards by the INERIS certification body under a program of voluntary certification.

## Categories relating to safety according to EN 954-1

| Category | Basic safety principle | Control system requirements | Behaviour in the event of a fault |
|---|---|---|---|
| **B** | Selection of components that comply with the relevant standards | Control in accordance with good engineering practice | Possible loss of the safety function |
| **1** | Selection of components and safety principles | Use of tried and tested components and proven safety principles | Possible loss of the safety function with a lower probability than in **B** |
| **2** | Selection of components and safety principles | Cyclic testing. The test intervals must be appropriate to both the machine and its application | Fault detected at each test |
| **3** | Structure of the safety circuits | A single fault must not result in loss of the safety function. This single fault must be detected, if reasonably practicable | Safety function ensured, except in the event of an accumulation of faults |
| **4** | Structure of the safety circuits | A single fault must not result in loss of the safety function. This fault must be detected when or before the safety function is next invoked. An accumulation of faults must not result in loss of the safety function. | Safety function always ensured |

The machinery manufacturer is responsible for selecting the safety category. The category depends of the level of risk factors given in standard EN 954-1.

***Note**: The Altivar 71 drive can be used up to category 3*

## Safety Integrity Levels (SIL) according to standard IEC/EN 61508

SIL1 according to standard IEC/EN 61508 is comparable with category 1 according to EN 954-1 (SIL1: mean probability of undetected hazardous failure per hour between $10^{-5}$ and $10^{-6}$).
SIL2 according to standard IEC/EN 61508 is comparable with category 3 according to EN 954-1 (SIL2: mean probability of undetected hazardous failure per hour between $10^{-6}$ and $10^{-7}$).

*(1) Redundant: consists of mitigating the effects of failure of one component by means of the correct operation of another, assuming that faults do not occur simultaneously on both.*

## "Power Removal" safety function considerations

The "Power Removal" safety function cannot be considered as a means of electrical disconnection of the motor (no electrical isolation); if necessary, a Vario switch disconnector must be used.
The "Power Removal" safety function is not designed to overcome any malfunction in the drive process control or application functions.
The output signals available on the drive must not be considered as safety signals (e.g. "Power Removal" active); these are Preventa-type safety module outputs which must be integrated into a safety control-signalling circuit.

The schemes on the following pages take into account conformity to standard IEC/EN 60204-1 which defines three stopping categories:
■ Category 0: Stopping by immediate removal of the power from the actuators (e.g. uncontrolled stop)
■ Category 1: Controlled stop maintaining the power on the actuators until the machine stops, then removal of the power when the actuators stop when stop is achieved
■ Category 2: Controlled stop maintaining the power on the actuators

## Connection schemes and applications

### Conforming to category 1 of standard EN 954-1 and level SIL1 according to standard IEC/EN 61508

Use of the connection schemes on pages 222 and 223 which use a line contactor or a Vario switch disconnector between the drive and the motor.
In this case, the "Power Removal" safety function is not used and the motor stops in accordance with category 0 of standard IEC/EN 60204-1.

### Conforming to category 3 of standard EN 954-1 and level SIL2 according to standard IEC/EN 61508

The connection schemes use the "Power Removal" safety function of the Altivar 71 drive combined with a Preventa safety module to monitor the emergency stop circuits.

**Machines with short freewheel stopping times** (low inertia or high resistive torque, see page 224).
When the activation command is given on the PWR input with the controlled motor, the motor power supply is immediately switched off and the motor stops according to category 0 of standard IEC/EN 60204-1.
Restarting is not permitted even when the activation command is given after the motor has come to a complete stop ("STO").
This safe stop is maintained while the PWR input remains activated.

This scheme must also be used for hoisting applications.
On a "Power Removal" command, the drive requires the brake to be engaged, but a Preventa safety module contact must be inserted in series in the brake control circuit to engage it safely when a request is made to activate the "Power Removal" safety function.

**Machines with long freewheel stopping times** (high inertia or low resistive torque, see page 225).
When the activation command is given, deceleration of the motor controlled by the drive is first requested, then, following a time delay controlled by a Preventa-type fault relay *(1)* which corresponds to the deceleration time, the "Power Removal" safety function is activated by the PWR input. The motor stops according to category 1 of standard IEC/EN 60204-1 ("SS1").

**Periodic test**
The "Power Removal" safety input must be activated at least once a year for preventive maintenance purposes. The drive must be switched off before preventive maintenance takes place, and then powered up again. If the power supply to the motor is not switched off during testing, safety integrity is no longer assured for the "Power Removal" safety function. The drive must therefore be replaced to ensure the operational safety of the machine or of the system process.

*(1) Please refer to the "Safety solutions using Preventa" catalogue.*

# Variable speed drives
Altivar 71
Safety requirements

## Applications in a potentially explosive atmosphere (ATEX)

### Classification of zones

European directive 1999/92/EC (referred to as the ATEX 137 directive, or worker protection directive) classifies the ATEX zones and compatible product types. It is the user's responsibility to define the ATEX zone where the ATEX motor controlled by the Altivar 71 variable speed drive will be installed.

The Altivar 71 variable speed drive must always be installed outside the hazardous ATEX zone. The various installation schemes proposed in the ATEX guide *(1)* are compatible with operation of the ATEX motor in zone 1, 21, 2 or 22. The table below summarizes the characteristics relating to each ATEX zone.

| Atmosphere | Zone | Definition | Time and presence of explosive atmosphere |
|---|---|---|---|
| | | | Hours/year |
| **Gas** | 0 | The potentially explosive atmosphere is present permanently, or over long periods, or frequently owing to malfunctions | > 1000 hr |
| **Dust** | 20 | | |
| **Gas** | 1 | The potentially explosive atmosphere can be present owing to probable malfunctions | 10…1000 hr |
| **Dust** | 21 | | |
| **Gas** | 2 | The presence of a potentially explosive atmosphere is unlikely, and if it occurs it is for a short duration and not during normal operation | < 10 hr |
| **Dust** | 22 | | |

***Note**: Installation of electrical equipment and motors is prohibited in ATEX zone 0 or 20.*

### General considerations

European directive 94/9/EC (also referred to as directive ATEX 95, or product directive) defines the constraints applicable to ATEX products and the associated certification requirements.
The OEM, the installer and the user are responsible for the selection and operation of the components they use to provide ATEX protection of the systems they design or operate:
■ The motor must be ATEX certified and compatible with use in zone 1, 21, 2 or 22
■ The motor must be equipped with ATEX certified thermal sensor switch(es), or ATEX certified thermal sensor(s), associated with a control unit, itself ATEX certified.
**Caution**: In general the control units are designed to operate outside the hazardous ATEX zone. It is then possible to place these control units close to the variable speed drive, in the protected zone.

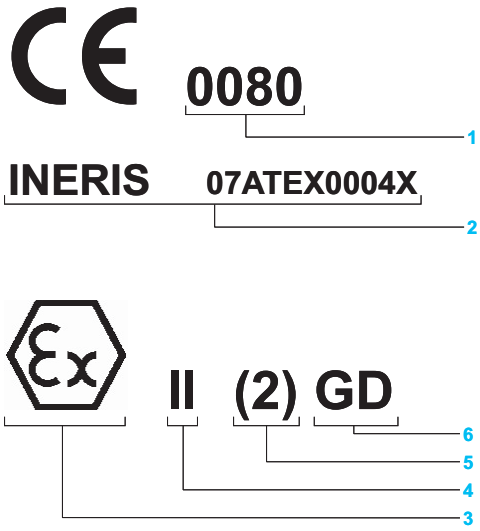
### Thermal protection of the ATEX motor

Use of the “Power Removal” safety function enables the variable speed drive to provide thermal protection in the event of excessive temperature rise of the ATEX motor, but it does not enable it to safely control and regulate the temperature of the ATEX motor.
All motor types ATEX certified for use in zone 1, 21, 2 or 22, which are equipped with ATEX thermal sensors, can be protected by the Altivar 71 variable speed drive.

The switching device, integrated with the thermal sensor or integrated with the thermal protection control unit of the ATEX motor, must be connected to the PWR safety input of the Altivar 71 variable speed drive. When the excessive temperature of the ATEX motor is reached, the control device automatically triggers the “Power Removal” safety function. The electrical power supply of the motor is then switched off in order to ensure a temperature of the motor casing lower than the temperature that is dangerous for the gas or dust mixture in which the ATEX motor is installed.
When the ATEX application requires the use of the “Power Removal” safety function, the safety module (of Preventa type) *(2)* must be used. The schemes proposed in the ATEX guide *(1)* show how the switching devices, integrated with the thermal sensor or with the thermal protection control unit, are connected to the safety module. The output of the safety module must be connected to the PWR safety input of the Altivar 71 variable speed drive.

*(1) Please consult the ATEX guide, available on our website “www.telemecanique.com”*
*(2) Please refer to the “Safety solutions using Preventa” catalogue.*

# Variable speed drives
## Altivar 71
## Safety requirements




### ATEX marking identification

ATEX certified Altivar 71 variable speed drives can be identified by the marking corresponding to all the applications covered by the drive's ATEX certification.

1 **0080** corresponds to the identification number of the INERIS notified body that issued the notifications for the quality assurance systems for the drive production units in compliance with EN 50980.

2 **INERIS 07ATEX0004X** corresponds to the identification of the certification report issued by the INERIS notified body for conformity of the variable speed drive with the requirements of ATEX directive 94/9/EC.

3 The logo corresponds to the identification of an ATEX product

4 **II** allows the equipment to be used in ATEX surface applications (use prohibited for mining applications).

5 **(2)** The brackets "**( )**" identify the Altivar 71 variable speed drive as being equipment associated with the control and signalling of an ATEX motor installed in a hazardous zone. The figure **2** corresponds to identification of the ATEX motor as category 2 equipment, for use in ATEX zone 1 or 21.
***Note:*** *Category 3 motors for use in ATEX zone 2 or 22 are also covered by this marking.*

6 **G** for Gas, corresponds to ATEX applications for explosive gas atmospheres.
**D** for Dust, corresponds to ATEX applications for atmospheres containing an explosive dust mixture.

### General

Operation of the equipment and the cable connection method must comply with the local regulations in the installation location. The rules given by ATEX installation standards, when applicable, should also be observed:
■ IEC 60079-14 for applications in an explosive gas atmosphere
■ IEC 61241-14 for applications in a combustible dust atmosphere
In zone 1 or 2, for applications in an explosive gas atmosphere, the requirements of IEC 60079-14 apply to the installation:
■ **IEC 60079-14**: Electrical apparatus for explosive gas atmospheres
■ **Part 14**: Electrical installations in hazardous areas (other than mines).
In zone 21 or 22, for applications in a combustible dust atmosphere, the requirements of IEC 61241-14 apply to the installation:
■ **IEC 61241-14**: Electrical apparatus for use in the presence of combustible dust
■ **Part 14**: Selection and installation.
The schemes proposed in the ATEX guide *(1)* for the use of Altivar 71 variable speed drives in ATEX applications take account of the nature of the thermal sensors mounted in the ATEX motor.
**Note: Motor stopping categories according to standard IEC/EN 60204-1**
The installation schemes proposed in the ATEX guide *(1)* show the use of the Preventa XPS-AC safety module *(2)* in combination with an ATEX application for implementing the safety function in stopping category 0 according to standard IEC/EN 60204-1.
The user should make sure that use of the delayed activation fault relay (Preventa XPS-ATE module) *(2)* is compatible in combination with its ATEX application, for stopping category 1 according to standard IEC/EN 60204-1.

### Periodic ATEX test

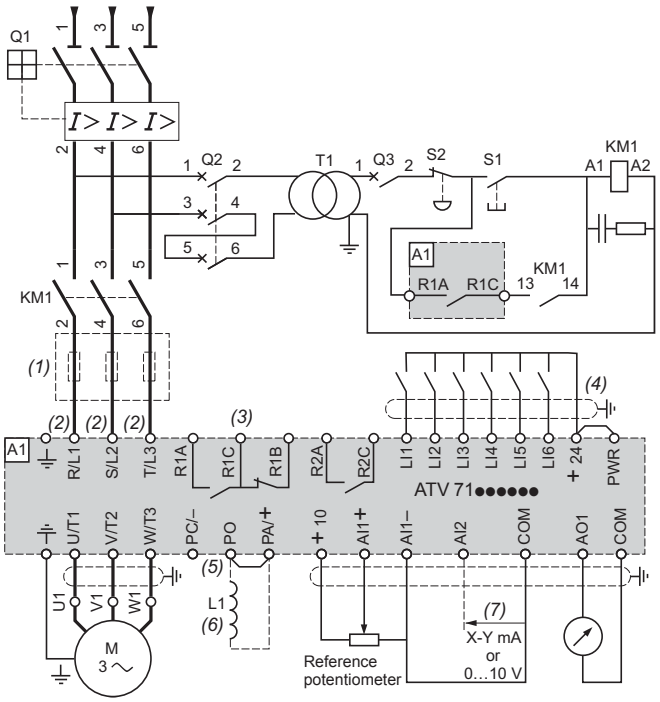
For preventive maintenance, the complete safety loop (starting from the thermal sensors of the ATEX motor up to the "Power Removal" safety function incorporated in the drive) must be tested at least once a year, in order to verify that, in the event of excessive temperature rise, the electrical power supply of the ATEX motor is always cut off automatically.

*(1) Please consult the ATEX guide, available on our website "www.telemecanique.com"*
*(2) Please refer to the "Safety solutions using Preventa" catalogue.*

## Schemes conforming to standards EN 954-1 category 1, IEC/EN 61508 capacity SIL1, in stopping category 0 according to IEC/EN 60204-1

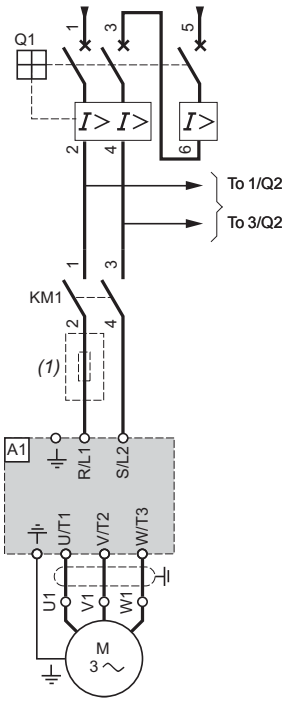
**ATV 71H●●●M3, ATV 71H●●●M3X, ATV 71●●●●N4, ATV 71H●●●Y, ATV 71P●●●N4Z**

**Three-phase power supply with upstream breaking via contactor**




**ATV 71H075M3…HU75M3**

**Power section for single-phase power supply**




***Note:*** *All terminals are located at the bottom of the drive. Fit interference suppressors on all inductive circuits near the drive or connected on the same circuit, such as relays, contactors, solenoid valves, fluorescent lighting, etc.*

**Components for use with the Altivar** (for a complete list of references, see our catalogue "Motor starter solutions. Control and protection components").

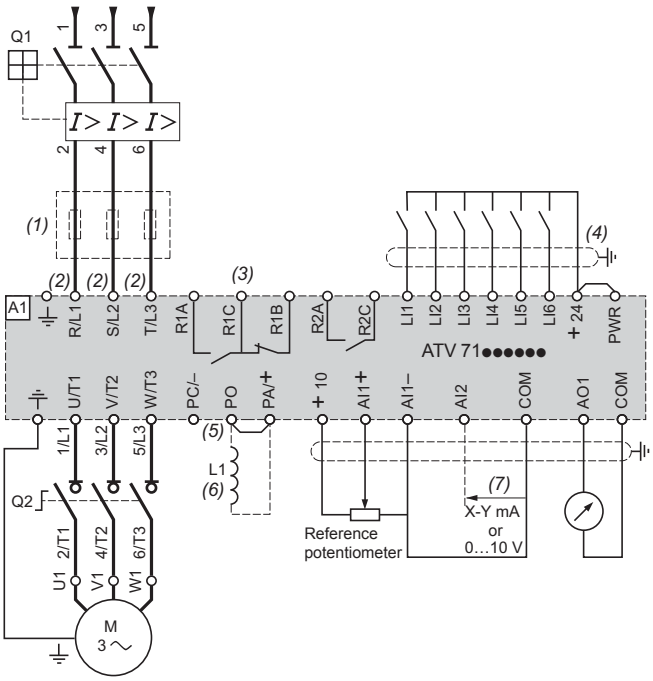
| Item | Description |
|---|---|
| **A1** | ATV 71 drive, see pages 22 to 25 |
| **KM1** | Contactor, see motor starters pages 242 to 249 |
| **L1** | DC choke, see page 155 |
| **Q1** | Circuit-breaker, see motor starters pages 242 to 249 |
| **Q2** | GV2 L rated at twice the nominal primary current of T1 |
| **Q3** | GB2 CB05 |
| **S1, S2** | XB4 B or XB5A pushbuttons |
| **T1** | 100 VA transformer 220 V secondary |

*(1) Line choke (single phase or three-phase); mandatory for ATV 71HU40M3…HU75M3 drives with a 200…240 V 50/60 Hz single-phase power supply and ATV 71HC11Y…HC63Y (except when a special transformer is used (12-pulse)). See page 160.*
*(2) For ATV 71HC40N4 drives combined with a 400 kW motor, ATV 71HC50N4 and ATV 71HC40Y…HC63Y, see page 226.*
*(3) Fault relay contacts. Used for remote signalling of the drive status.*
*(4) Connection of the common for the logic inputs depends on the positioning of the SW1 switch: see schemes on page 227.*
*(5) There is no PO terminal on ATV 71HC11Y…HC63Y drives.*
*(6) Optional DC choke for ATV 71H●●●M3, ATV 71HD11M3X…HD45M3X, ATV 71●075N4…●D75N4 and ATV 71P●●●N4Z. Connected in place of the strap between the PO and PA/+ terminals. For ATV 71HD55M3X, HD75M3X, ATV 71HD90N4…HC50N4 drives, the choke is supplied with the drive; the customer is responsible for connecting it.*
*(7) Software-configurable current (0…20 mA) or voltage (0…10 V) analog input.*

## Schemes conforming to standards EN 954-1 category 1, IEC/EN 61508 capacity SIL1, in stopping category 0 according to IEC/EN 60204-1 (continued)

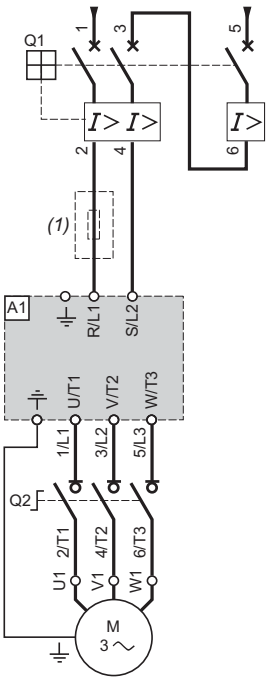
**ATV 71H●●●M3, ATV 71H●●●M3X, ATV 71●●●●N4, ATV 71H●●●Y, ATV 71P●●●N4Z**

**Three-phase power supply with downstream breaking via switch disconnector**




**ATV 71H075M3…HU75M3**

**Power section for single-phase power supply**




***Note:*** *All terminals are located at the bottom of the drive. Fit interference suppressors on all inductive circuits near the drive or connected on the same circuit, such as relays, contactors, solenoid valves, fluorescent lighting, etc.*

**Components for use with the Altivar** (for a complete list of references, see our catalogue "Motor starter solutions. Control and protection components").

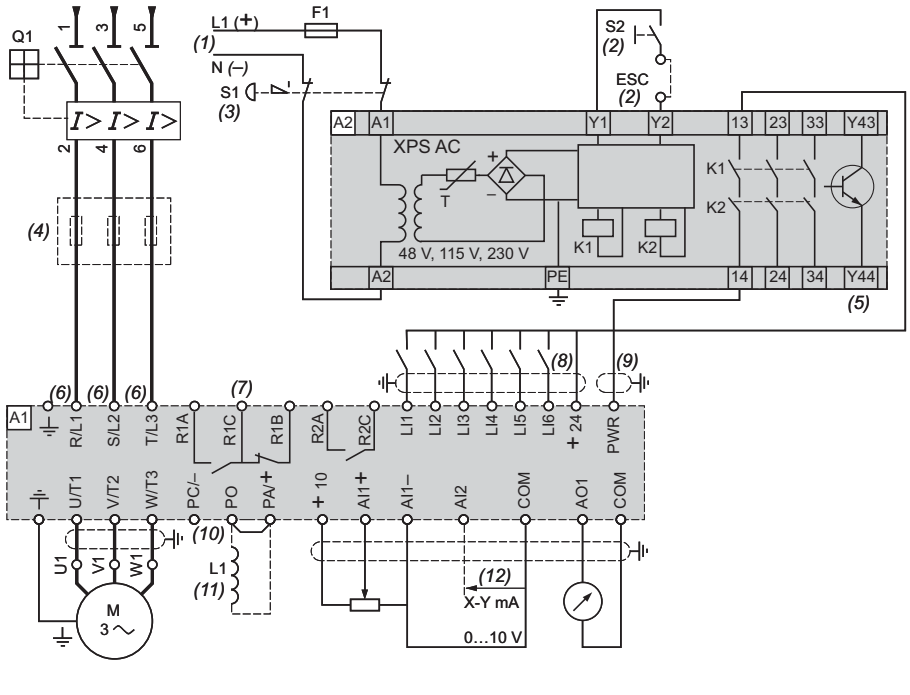
| Item | Description |
|---|---|
| **A1** | ATV 71 drive, see pages 22 to 25 |
| **L1** | DC choke, see page 155 |
| **Q1** | Circuit-breaker, see motor starters pages 242 to 249 |
| **Q2** | Switch disconnector (Vario) |

*(1) Line choke (single phase or three-phase), mandatory for ATV 71HU40M3…HU75M3 drives with a 200…240 V 50/60 Hz single-phase power supply and ATV 71HC11Y…HC63Y (except when a special transformer is used (12-pulse)). See page 160.*
*(2) For ATV 71HC40N4 drives combined with a 400 kW motor, ATV 71HC50N4 and ATV 71HC40Y…HC63Y, see page 226.*
*(3) Fault relay contacts. Used for remote signalling of the drive status.*
*(4) Connection of the common for the logic inputs depends on the positioning of the SW1 switch: see schemes on page 227.*
*(5) There is no PO terminal on ATV 71HC11Y…HC63Y drives.*
*(6) Optional DC choke for ATV 71H●●●M3, ATV 71HD11M3X…HD45M3X, ATV 71●075N4…●D75N4 and ATV 71P●●●N4Z. Connected in place of the strap between the PO and PA/+ terminals. For ATV 71HD55M3X, HD75M3X, ATV 71HD90N4…HC50N4 drives, the choke is supplied with the drive; the customer is responsible for connecting it.*
*(7) Software-configurable current (0…20 mA) or voltage (0…10 V) analog input.*

## Schemes conforming to standards EN 954-1 category 3, IEC/EN 61508 capacity SIL2, in stopping category 0 according to IEC/EN 60204-1

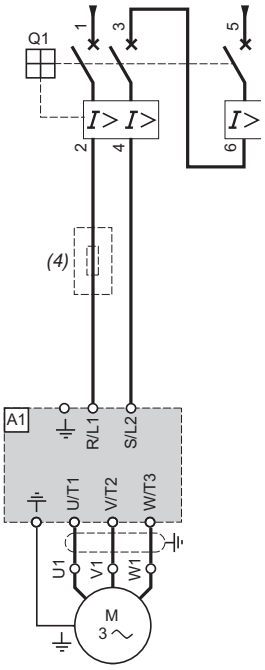
**ATV 71H●●●M3, ATV 71H●●●M3X, ATV 71●●●●N4, ATV 71H●●●Y, ATV 71P●●●N4Z**

**Three-phase power supply, low inertia machine, vertical movement**




**ATV 71H075M3…HU75M3**

**Power section for single-phase power supply**




***Note:*** *All terminals are located at the bottom of the drive. Fit interference suppressors on all inductive circuits near the drive or connected on the same circuit, such as relays, contactors, solenoid valves, fluorescent lighting, etc.*

**Components for use with the Altivar** (for a complete list of references, see our catalogues "Motor starter solutions. Control and protection components" and "Safety solutions using Preventa").

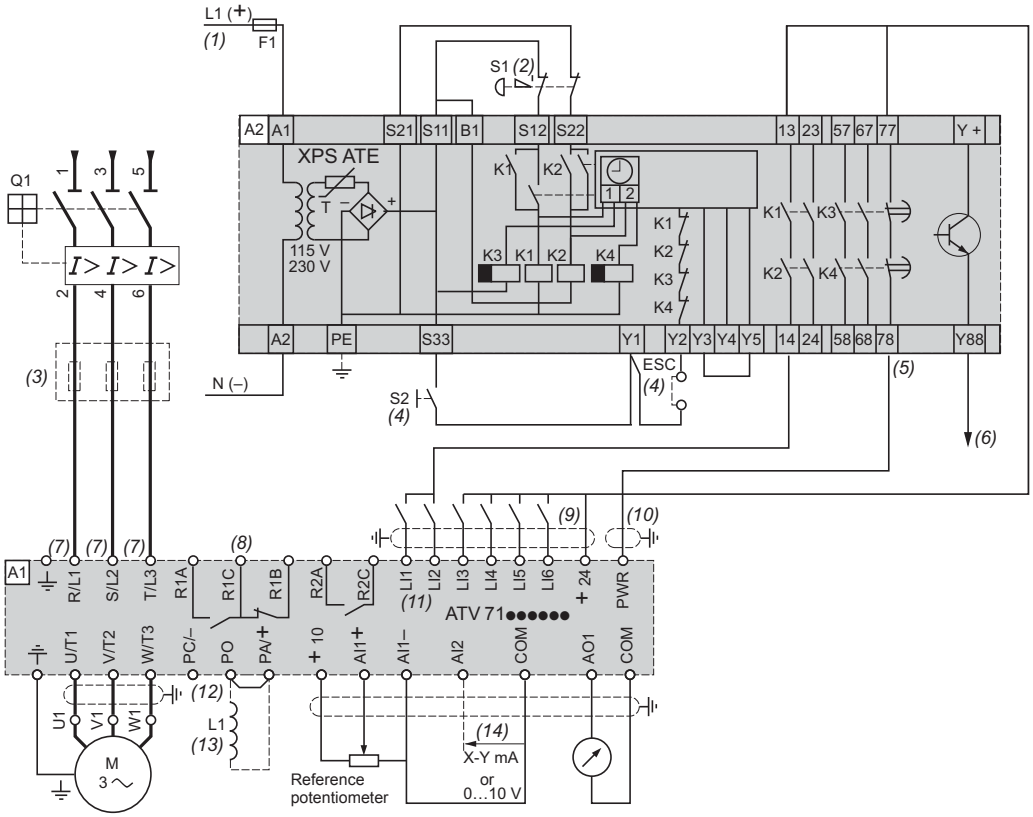
| Item | Description |
|---|---|
| **A1** | ATV 71 drive, see pages 22 to 25 |
| **A2** | Preventa XPS AC safety module for monitoring emergency stops and switches. One safety module can manage the "Power Removal" function for several drives on the same machine. In this case, each drive must connect its PWR terminal to its + 24 V via the safety contacts on the XPS AC module. These contacts are independent for each drive. |
| **F1** | Fuse W |
| **L1** | DC choke, see page 155 |
| **Q1** | Circuit-breaker, see motor starters pages 242 to 249 |
| **S1** | Emergency stop button with 2 contacts |
| **S2** | XB4 B or XB5 A pushbutton |

*(1) Power supply: 24 V ⎓ or ∿, 48 V ∿, 115 V ∿, 230 V ∿.*
*(2) S2: resets XPS AC module on power-up or after an emergency stop. ESC can be used to set external starting conditions.*
*(3) Requests freewheel stopping of the movement and activates the "Power Removal" safety function.*
*(4) Line choke (single phase or three-phase), mandatory for ATV 71HU40M3…HU75M3 drives with a 200…240 V 50/60 Hz single-phase power supply and ATV 71HC11Y…HC63Y (except when a special transformer is used (12-pulse)). See page 160.*
*(5) The logic output can be used to signal that the machine is in a safe stop state.*
*(6) For ATV 71HC40N4 drives combined with a 400 kW motor, ATV 71HC50N4 and ATV 71HC40Y…HC63Y, see page 226.*
*(7) Fault relay contacts. Used for remote signalling of the drive status.*
*(8) Connection of the common for the logic inputs depends on the positioning of the SW1 switch: see schemes on page 227.*
*(9) Standardized coaxial cable, type RG174/U according to MIL-C17 or KX3B according to NF C 93-550, external diameter 2.54 mm, maximum length 15 m. The cable shielding must be earthed.*
*(10) There is no PO terminal on ATV 71HC11Y…HC63Y drives.*
*(11) Optional DC choke for ATV 71H●●●M3, ATV 71HD11M3X…HD45M3X, ATV 71●075N4…●D75N4 and ATV 71P●●●N4Z. Connected in place of the strap between the PO and PA/+ terminals. For ATV 71HD55M3X, HD75M3X, ATV 71HD90N4…HC50N4 drives, the choke is supplied with the drive; the customer is responsible for connecting it.*
*(12) Software-configurable current (0…20 mA) or voltage (0…10 V) analog input.*

## Schemes conforming to standards EN 954-1 category 3, IEC/EN 61508 capacity SIL2, in stopping category 1 according to IEC/EN 60204-1

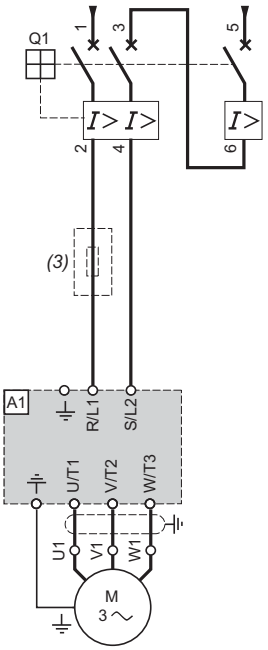
**ATV 71H●●●M3, ATV 71H●●●M3X, ATV 71H●●●N4, ATV 71H●●●Y, ATV 71P●●●N4Z**

**Three-phase power supply, high inertia machine**




**ATV 71H075M3…HU75M3**

**Power section for single-phase power supply**



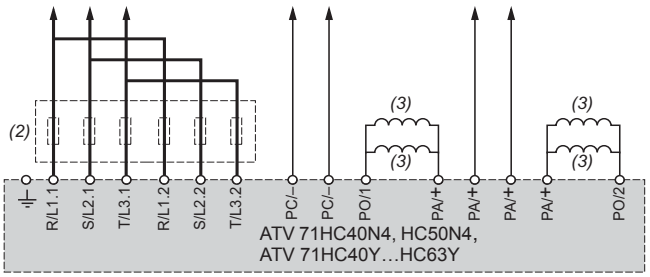

***Note:*** *All terminals are located at the bottom of the drive. Fit interference suppressors on all inductive circuits near the drive or connected on the same circuit, such as relays, contactors, solenoid valves, fluorescent lighting, etc.*

**Components for use with the Altivar** (for a complete list of references, see our catalogues "Motor starter solutions. Control and protection components" and "Safety solutions using Preventa").

| Item | Description |
|---|---|
| **A1** | ATV 71 drive, see pages 22 to 25 |
| **A2** *(5)* | Preventa XPS ATE safety module for monitoring emergency stops and switches. One safety module can manage the "Power Removal" safety function for several drives on the same machine. In this case the time delay must be adjusted on the drive controlling the motor that requires the longest stopping time. In addition, each drive must connect its PWR terminal to its + 24 V via the safety contacts on the XPS ATE module. These contacts are independent for each drive. |
| **F1** | Fuse |
| **L1** | DC choke, see page 155 |
| **Q1** | Circuit-breaker, see motor starters pages 242 to 249 |
| **S1** | Emergency stop button with 2 N/C contacts |
| **S2** | Run button |

*(1) Power supply: 24 V ⎓ or ∿, 115 V ∿, 230 V ∿.*
*(2) Requests controlled stopping of the movement and activates the "Power Removal" safety function.*
*(3) Line choke (single phase or three-phase), mandatory for ATV 71HU40M3…HU75M3 drives with a 200…240 V 50/60 Hz single-phase power supply and ATV 71HC11Y…HC63Y (except when a special transformer is used (12-pulse)). See page 160.*
*(4) S2: resets XPS ATE module on power-up or after an emergency stop. ESC can be used to set external starting conditions.*
*(5) For stopping times requiring more than 30 seconds in category 1, use a Preventa XPS AV safety module which can provide a maximum time delay of 300 seconds.*
*(6) The logic output can be used to signal that the machine is in a safe state.*
*(7) For ATV 71HC40N4 drives combined with a 400 kW motor, ATV 71HC50N4 and ATV 71HC40Y…HC63Y, see page 226.*
*(8) Fault relay contacts. Used for remote signalling of the drive status.*
*(9) Connection of the common for the logic inputs depends on the positioning of the SW1 switch: see schemes on page 227.*
*(10) Standardized coaxial cable, type RG174/U according to MIL-C17 or KX3B according to NF C 93-550, external diameter 2.54 mm, maximum length 15 m. The cable shielding must be earthed.*
*(11) Logic inputs LI1 and LI2 must be assigned to the direction of rotation: LI1 in the forward direction and LI2 in the reverse direction.*
*(12) There is no PO terminal on ATV 71HC11Y…HC63Y drives.*
*(13) Optional DC choke for ATV 71H●●●M3, ATV 71HD11M3X…HD45M3X, ATV 71●075N4…●D75N4 and ATV 71P●●●N4Z. Connected in place of the strap between the PO and PA/+ terminals. For ATV 71HD55M3X, HD75M3X, ATV 71HD90N4…HC50N4 drives, the choke is supplied with the drive; the customer is responsible for connecting it.*
*(14) Software-configurable current (0…20 mA) or voltage (0…10 V) analog input.*

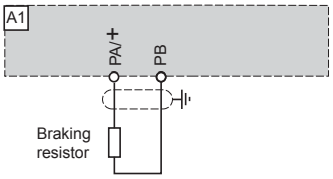
## Power terminal connections for ATV 71HC40N4 combined with a 400 kW motor, ATV 71HC50N4, ATV 71HC40Y… HC63Y



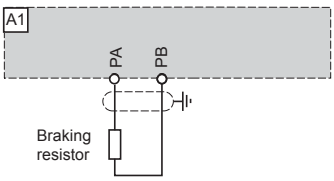

*(1) For control section connections, see pages 222 to 225*
*(2) Line chokes, see page 160 ; these are mandatory for ATV 71HC40Y…HC63Y, to be ordered separately.*
*(3) DC chokes supplied as standard with ATV 71HC40N4, HC50N4 drives. Not available for ATV 71HC40Y…HC63Y.*

## VW3 A7 7●● braking resistors or VW3 A7 8●● hoist resistors, VW3 A7 1●● braking units

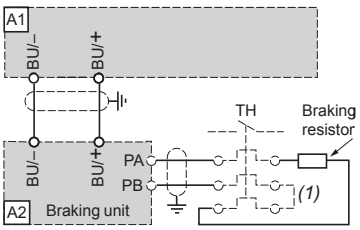
**ATV 71H●●●M3, ATV 71HD11M3X…HD45M3X, ATV 71H075N4…HD75N4, ATV 71HU22Y…HD90Y, ATV 71W●●●N4, ATV 71P●●●N4Z**




**ATV 71HD55M3X, HD75M3X, ATV 71HD90N4…HC16N4, ATV 71HC11Y…HC16Y**




**ATV 71HC20N4…HC50N4, ATV 71HC20Y…HC63Y**




| Components for use with the Altivar | |
|---|---|
| **Item** | **Description** |
| **A1** | ATV 71 drive, see pages 22 to 25 |
| **A2** | Braking unit, if using a braking resistor or a hoist resistor, for ATV 71HC20N4…HC50N4, and ATV 71HC20Y…HC63Y. See pages 134 and 135 |
| **Braking resistor** | See pages 136 and 138 |

*(1) A thermal overload relay can be added; its contact must then be integrated into the control circuit.*

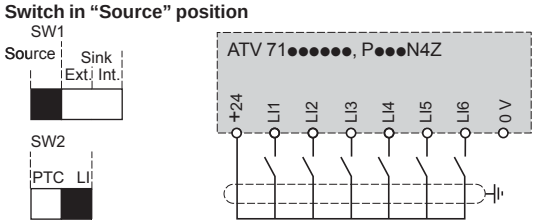
## Examples of recommended schemes

### Logic inputs

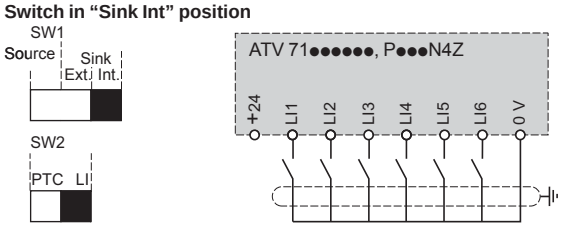
The SW1 switch is used to adapt operation of the logic inputs (LI) to the PLC output technology:
- Set the switch to Source (factory setting) if using PLC outputs with PNP transistors
- Set the switch to Sink Int. or Sink Ext. if using PLC outputs with NPN transistors

#### Internal power supply

**Switch in "Source" position**

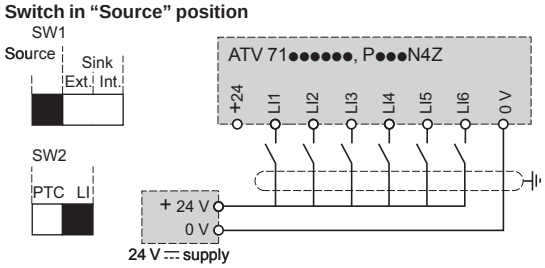



**Switch in "Sink Int" position**

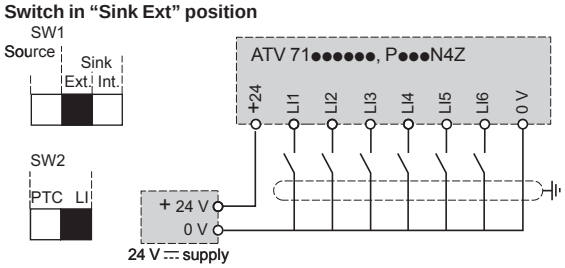



#### External power supply

**Switch in "Source" position**

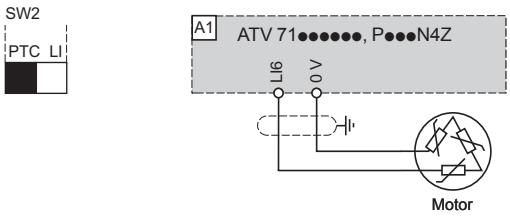



**Switch in "Sink Ext" position**

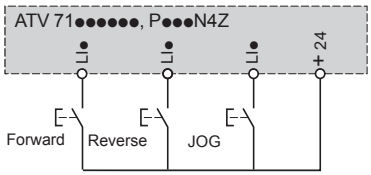



### Input for PTC probes

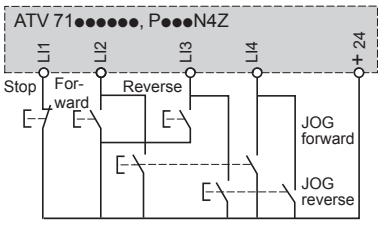
The SW2 switch is used to operate the LI6 input:
- As a logic input by setting the SW2 switch to LI (factory setting)
- Or for protecting the motor via PTC probes by setting the SW2 switch to PTC




### 2-wire control and jog operation (JOG)

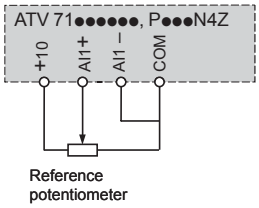



### 3-wire control and jog operation (JOG)



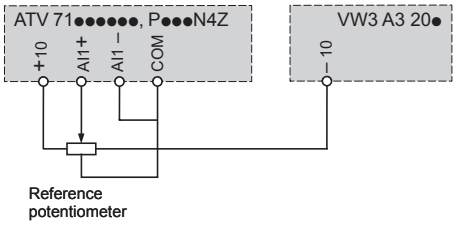
## Examples of recommended schemes (continued)

### Unipolar speed reference

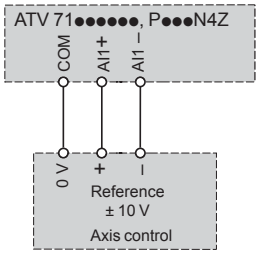



### Bipolar speed reference

Requires a VW3 A3 201 or VW3 A3 202 I/O extension card

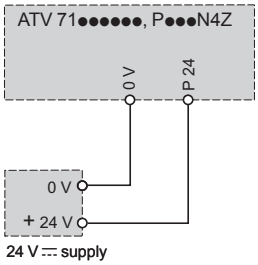



### Speed reference using axis control



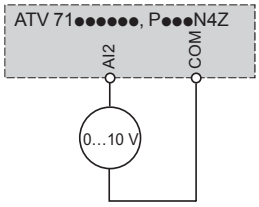

### Separate control power supply

The separate control card can be powered by an external 24 V ⎓ supply

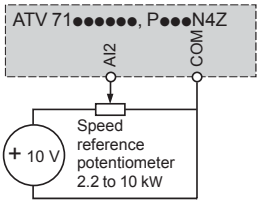



### Analog input configured for voltage

**External 0…10 V**

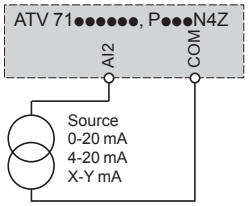



**External + 10 V**




### Analog input configured for current

**0-20 mA, 4-20 mA, X-Y mA**



## VW3 A3 201 and VW3 A3 202 I/O extension cards

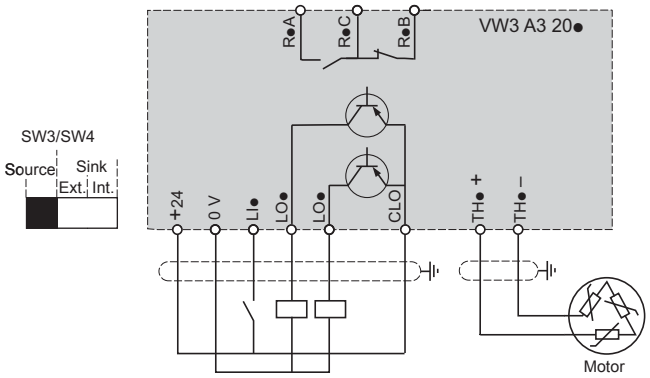
### Logic I/O

The SW3 or SW4 switch is used to adapt operation of the logic inputs (LI) to the PLC output technology:

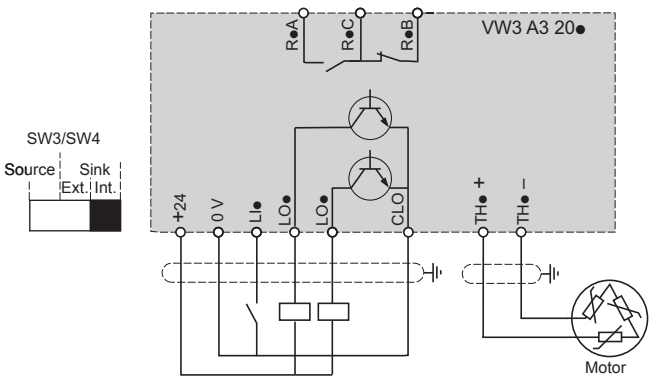
- Set the switch to Source (factory setting) if using PLC outputs with PNP transistors
- Set the switch to Sink Int. or Sink Ext. if using PLC outputs with NPN transistors

**Internal power supply**

**Switch in "Source" position**

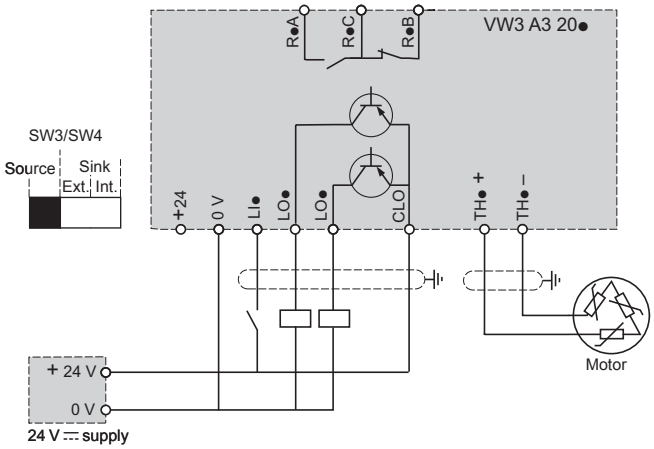



**Switch in "Sink Int" position**

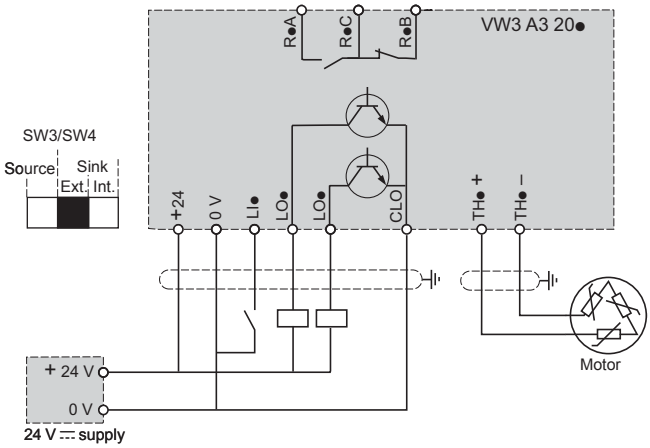



**External power supply**

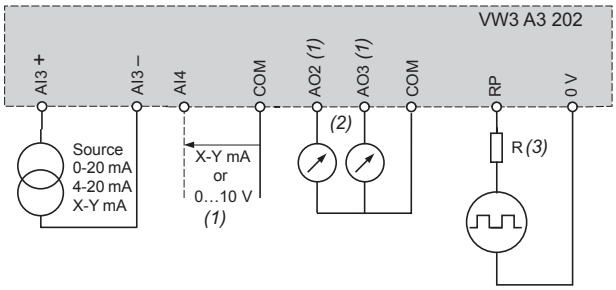
**Switch in "Source" position**




**Switch in "Sink Ext" position**




### Analog I/O (only on VW3 A3 202 extended I/O card)



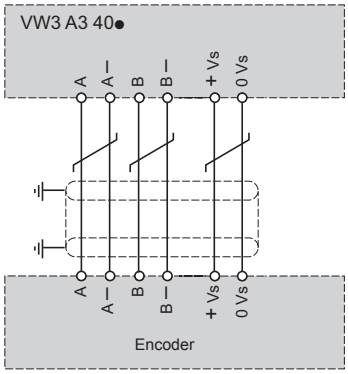

*(1) Software-configurable current (0-20 mA) or voltage (0…10 V) analog input.*
*(2) Software-configurable current (0-20 mA) or voltage (± 10 V or 0…10 V) analog outputs, independent selection possible for each output via switch.*
*(3) R: add a resistor if the input voltage of the pulse train is greater than 5 V.*
*Recommended values:*

| Input voltage<br>V | Resistance<br>Ω |
|---|---|
| 12 | 510 |
| 15 | 910 |
| 24 | 1300 |

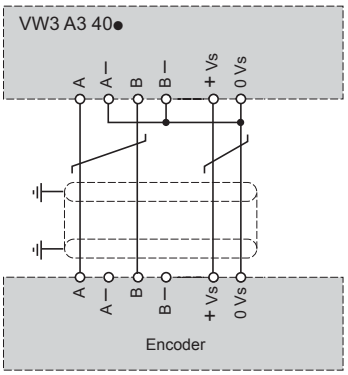
## VW3 A3 401 to VW3 A3 411 encoder interface cards

### Closed loop control

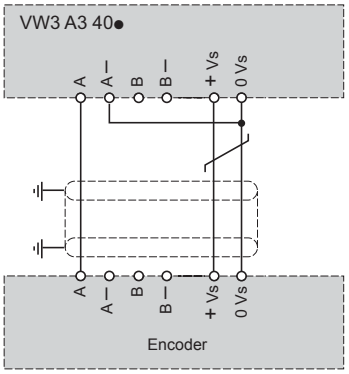
**Wiring of encoders VW3 A3 401…407**
**A, Ā, B, B̄ signals**



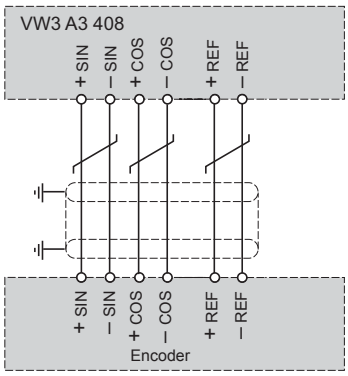

**Wiring of encoders VW3 A3 403…407**
**AB signals**



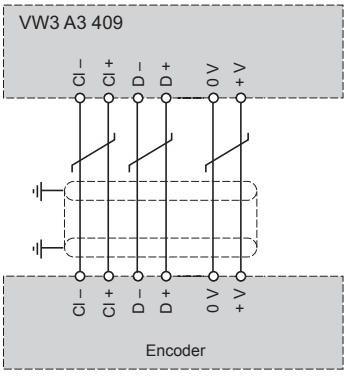

**Wiring of encoders VW3 A3 403…407**
**A signal**



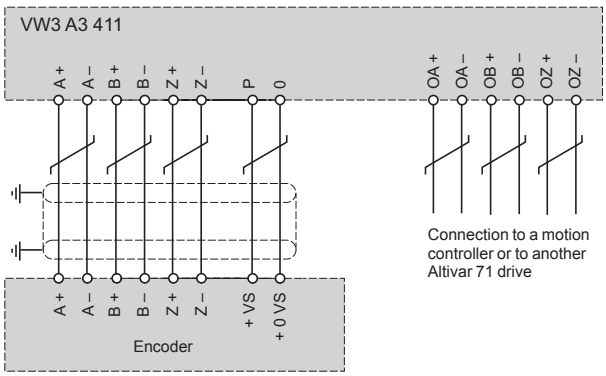

**Wiring of encoder VW3 A3 408**
**Resolver signals**




**Wiring of encoder VW3 A3 409**
**EnDat or SSI signals**

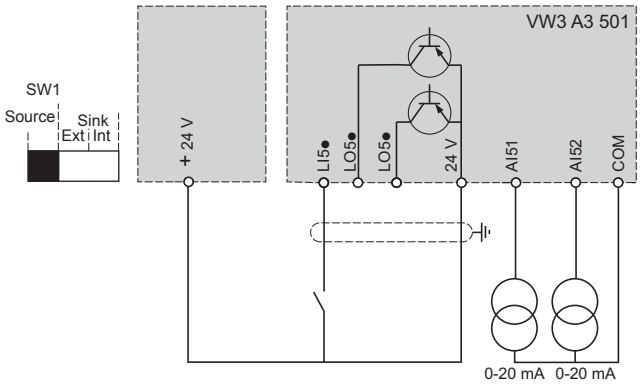



**Wiring of encoder VW3 A3 411**
**AĀ/AABB̄/ AABB̄ZZ̄ signals A**



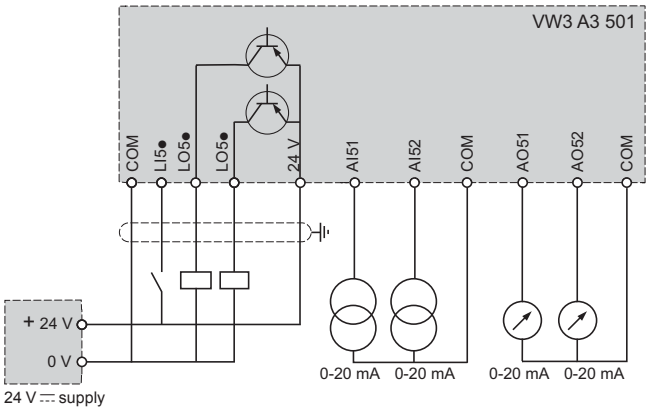
## VW3 A3 501 “Controller Inside” programmable card

### Card powered by the drive (1)



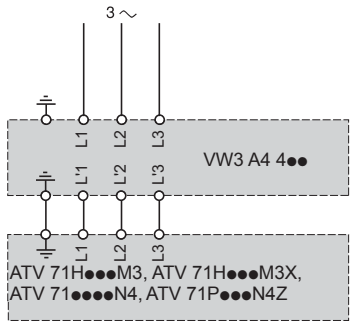

(1) Only if the power consumption is less than 200 mA; otherwise use an external power supply.

### Card powered by external power supply

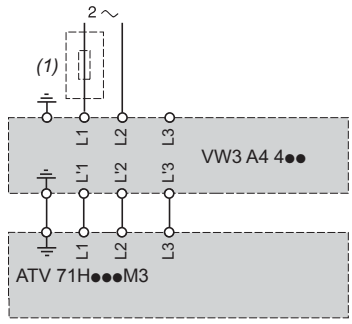



## VW3 A4 4●● additional EMC input filters

### Three-phase power supply, three-phase filter



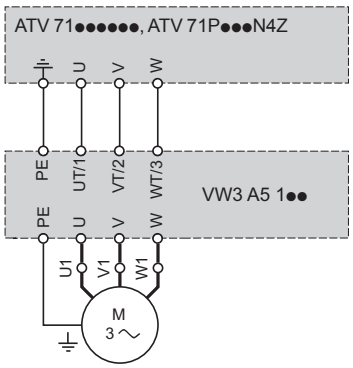

### Single-phase power supply, three-phase filter



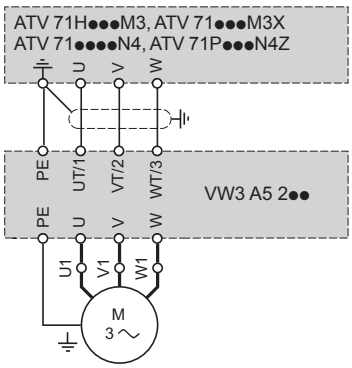

(1) Line choke mandatory for ATV 71HU40M3…HU75M3, see page 160

## Output filters

### VW3 A5 1●● motor chokes

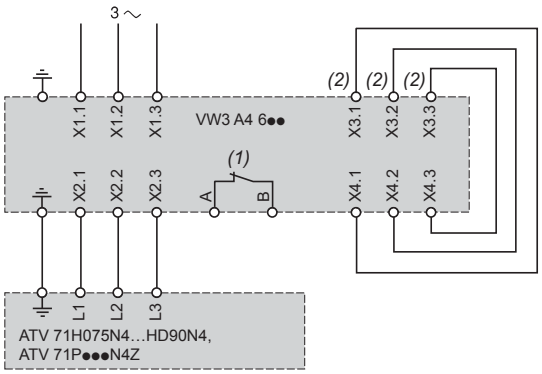



### VW3 A5 2●● sinus filters



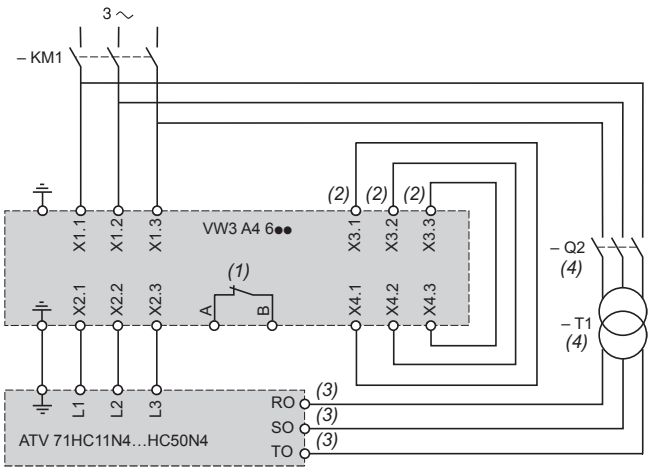
## VW3 A4 6●● passive filters

### Scheme with 1 passive filter for ATV 71H075N4…HD90N4 and ATV 71P●●●N4Z drives

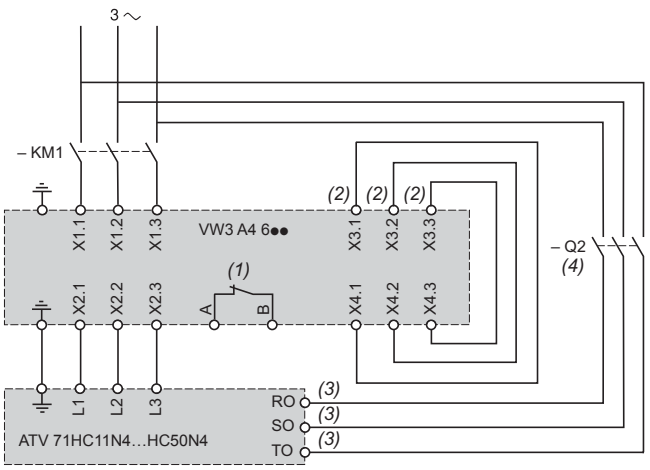



### Scheme with 1 passive filter for ATV 71HC11N4…HC50N4 drives

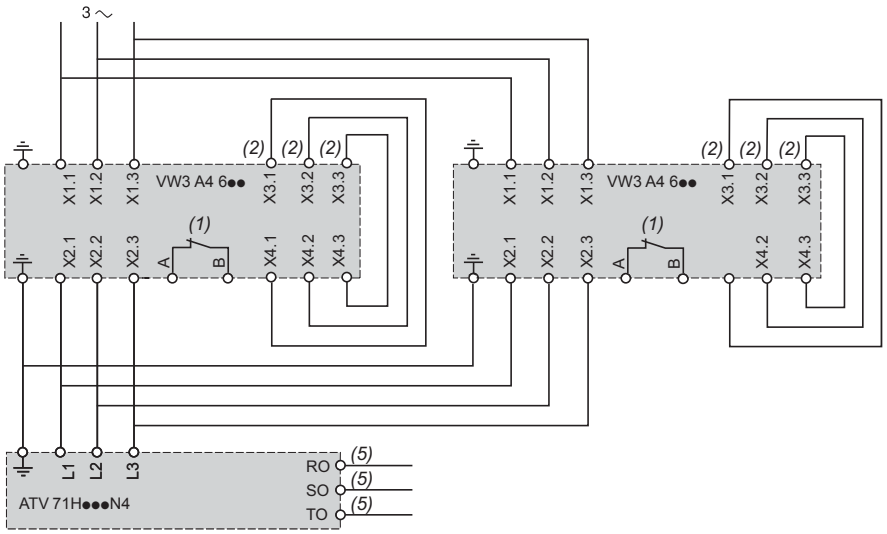
**Connection downstream of the line contactor**




**Connection upstream of the line contactor**



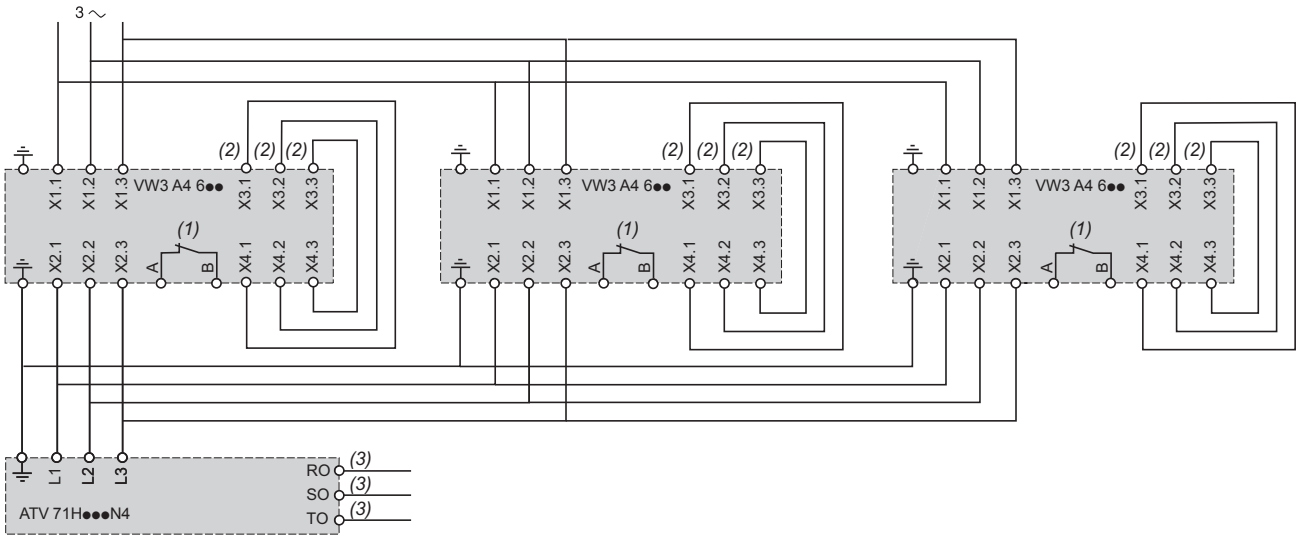

### Scheme with 2 passive filters for ATV 71H075N4…HD90N4 drives



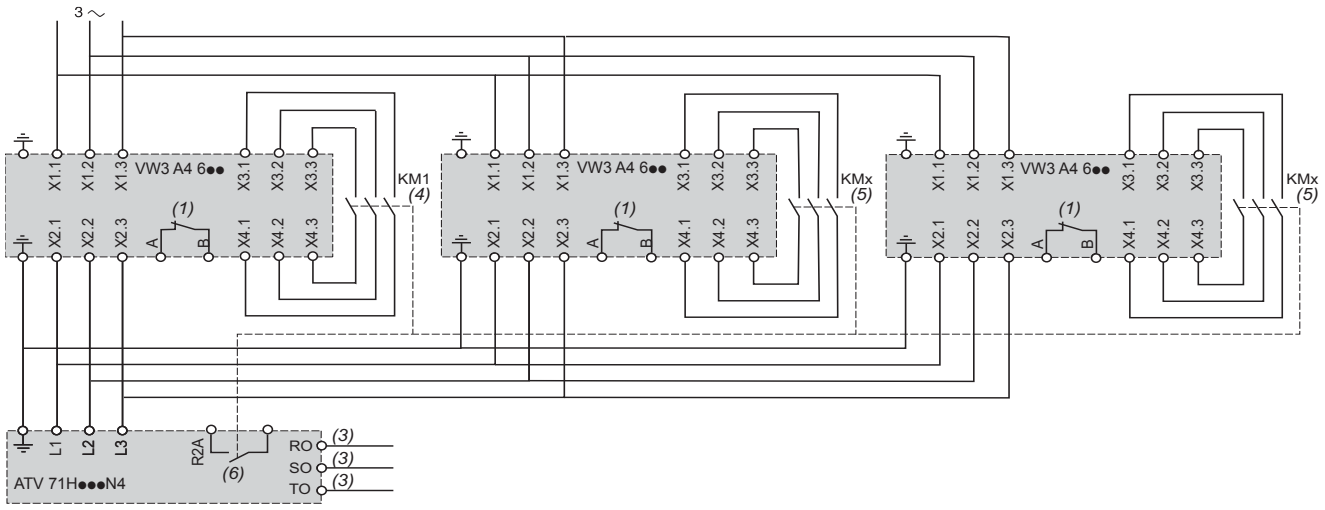

*(1) Contact for indicating the thermal state of the passive filter, to be connected in the safety circuit of the installation.*
*(2) Delivered wired.*
*(3) Fan external power supply.*
*(4) Q2: GV2 RT10 thermal magnetic motor circuit-breaker. T1: 400/400 V or 460/460 V transformer.*
*(5) For ATV 71HC11N4…HC50N4 drives, the external power supply for the fan is mandatory, see scheme above with one passive filter.*

## VW3 A4 6●● passive filters (continued)

### Scheme with 3 passive filters for ATV 71H075N4…HD90N4 drives

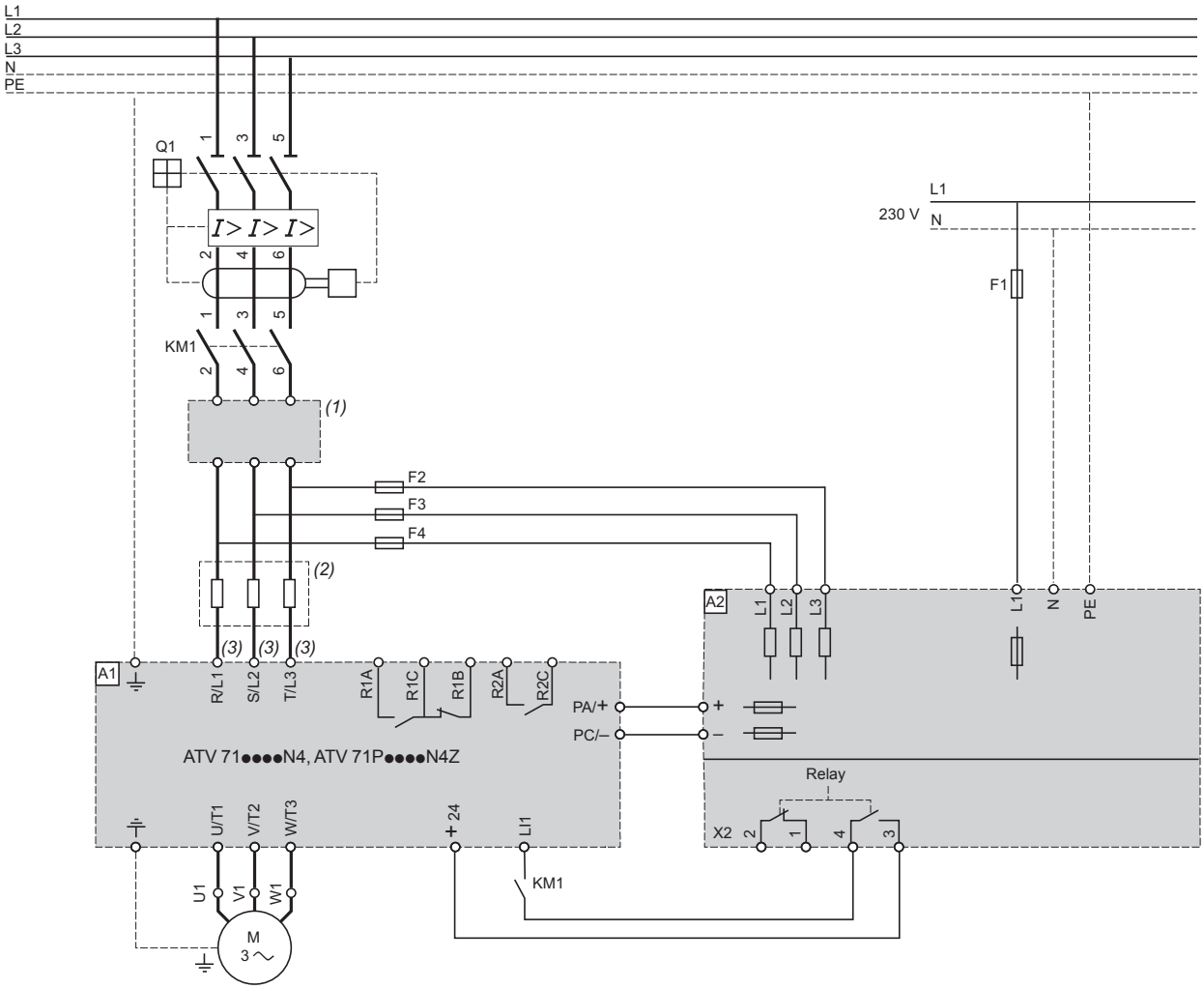



### Scheme for controlling the filter via the drive according to the load




*(1) Contact for indicating the thermal state of the passive filter, to be connected in the safety circuit of the installation.*
*(2) Delivered wired.*
*(3) For ATV 71HC11N4…HC50N4 drives, the external power supply for the fan is mandatory, see scheme on opposite page with one passive filter.*
*(4) KM1: category AC1 contactor sized at 50% of the drive nominal current (In).*
*(5) KMx: contactor type and sizing identical to KM1. It may be necessary to provide an intermediate relay to control the KMx contactors.*
*(6) The logic output at relay R2A must be assigned to the "Current threshold reached" (CtA) parameter.*

## Network braking unit



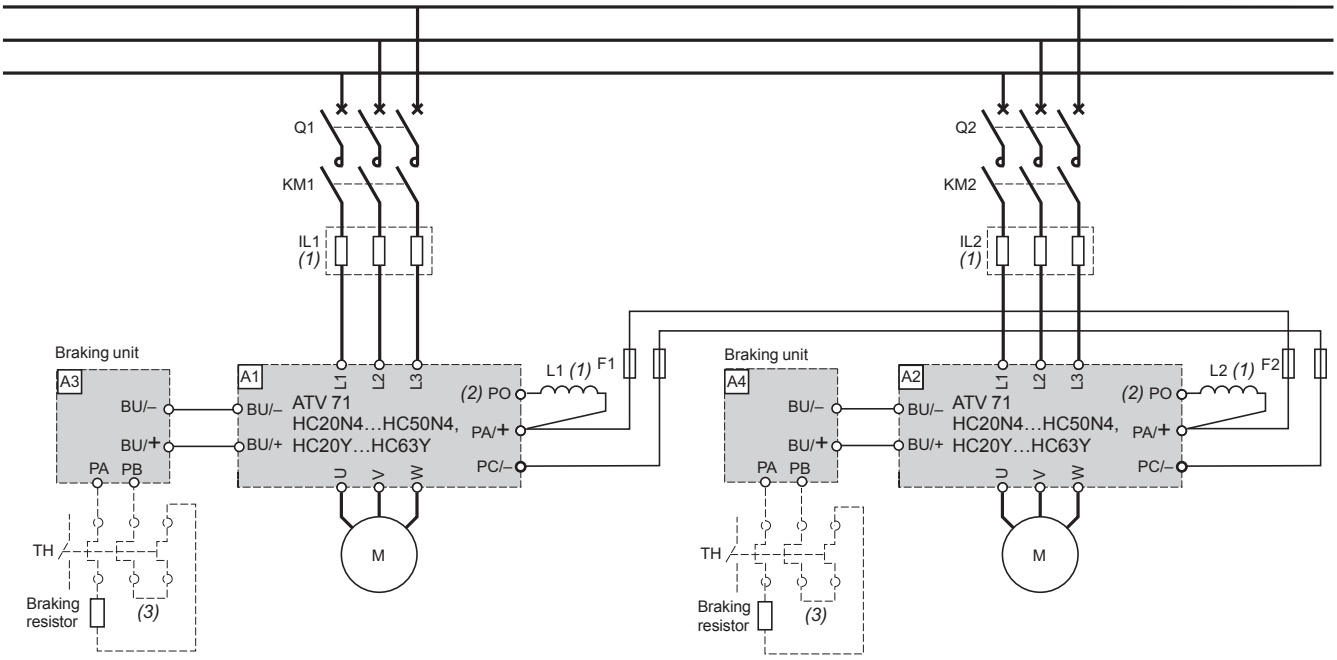

**Components for use with the Altivar** (for a complete list of references, see our catalogue “Motor starter solutions. Control and protection components”).

| Item | Description |
|---|---|
| **A1** | ATV 71 drive, see pages 23 and 24 |
| **A2** | Network braking unit, see page 149 |
| **F1** | 2 A fuse, 230 V ∼ |
| **F2…F4** | For fuses, see reference tables on page 149. |
| **Q1** | 300 mA earth fault circuit-breaker. Provides protection against earth leakage faults.<br>Rating: see motor starters on pages 244 to 247 |

*(1) Additional EMC input filter if necessary, see page 168.*
*(2) Line choke recommended, see page 160.*
*(3) For ATV 71HC40N4 drives combined with a 400 kW motor and ATV 71HC50N4, see page 226.*

## Drives combined with a braking unit and wired onto the same DC bus

### ATV 71HC20N4...HC50N4, ATV 71 HC20Y...HC63Y

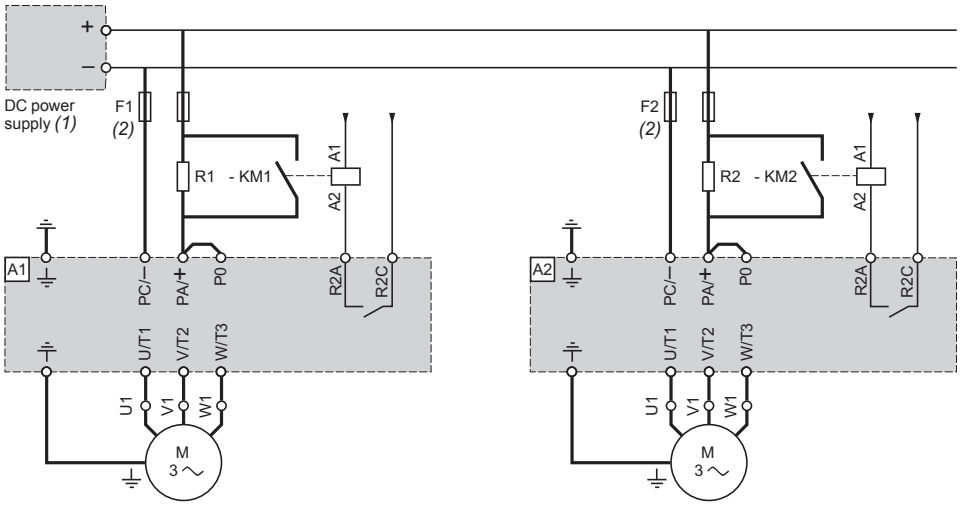



| Item | Description |
|---|---|
| **A1, A2** | ATV 71 drives, see pages 23 and 25. |
| **A3, A4** | Braking units, see pages 134 and 135. |
| **F1, F2, F3** | Fast-acting semi-conductor fuses, see page 239.<br>The function of the fuses is to protect the DC bus wiring in the event of a drive short-circuit. |
| **IL1, IL2** *(1)* | Mandatory line chokes for ATV 71HC20Y…HC63Y drives; to be ordered separately, see page 160. |
| **KM1, KM2** | Line contactors.<br>Rating: see motor starters on pages 244 to 249. |
| **L1, L2** *(1)* | Mandatory DC chokes for ATV 71HC20N4…HC63N4 drives; supplied as standard with these drives.<br>Not used for ATV 71HC20Y…HC63Y drives. These drives require the presence of line chokes (IL●) |
| **Q1, Q2** | Circuit-breakers.<br>Rating: see motor starters on pages 244 to 249. |

*(1) The use of line chokes or DC chokes depends on the drive type, see table above.*
*(2) There is no PO terminal on ATV 71HC20Y…HC63Y drives.*
*(3) A thermal overload relay can be added; its contact must then be integrated into the control circuit.*

## Drives powered by external DC power supply

### ATV 71HD18M3X…HD45M3X, ATV 71●D22N4…●D75N4, ATV 71●U22Y…HD90Y



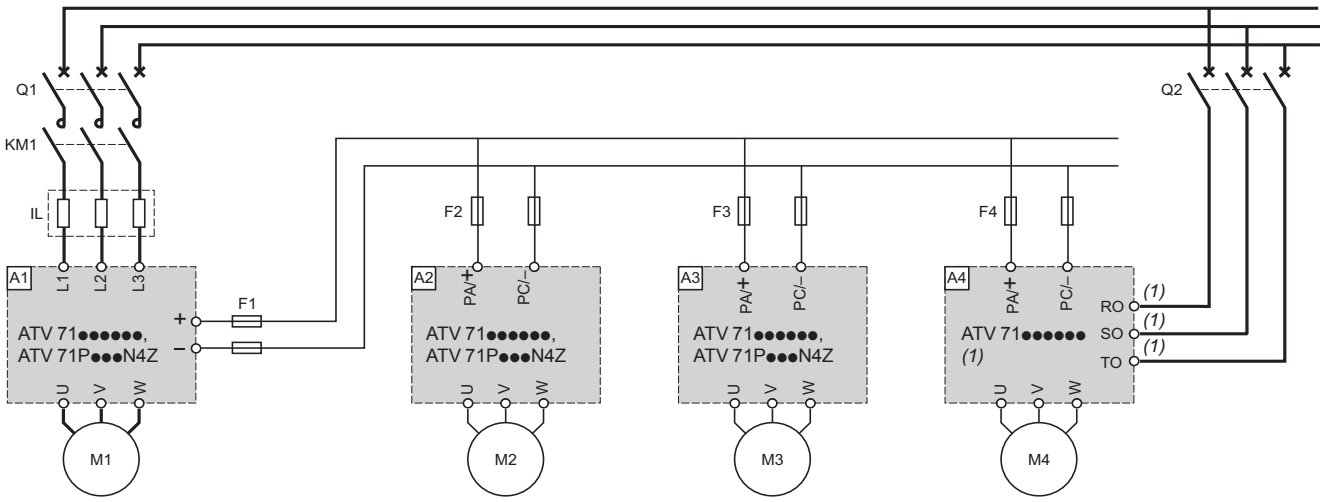

| For drives A1, A2 | Precharge resistors R1, R2 | | Contactors (3) KM1, KM2 |
|---|---|---|---|
| | Value | Reference | |
| | Ω | | |
| ATV 71HD18M3X | 5 | VW3 A7 707 | LC1 D32●● |
| ATV 71HD22M3X | 5 | VW3 A7 707 | LC1 D40●● |
| ATV 71HD30M3X | 5 | VW3 A7 707 | LC1 D65●● |
| ATV 71HD37M3X | 5 | VW3 A7 707 | LC1 D80●● |
| ATV 71HD45M3X | 5 | VW3 A7 707 | LC1 D80●● |
| ATV 71HD22N4, WD22N4 | 5 | VW3 A7 707 | LC1 D25●● |
| ATV 71HD30N4, WD30N4 | 5 | VW3 A7 707 | LC1 D32●● |
| ATV 71HD37N4, WD37N4 | 5 | VW3 A7 707 | LC1 D38●● |
| ATV 71HD45N4, WD45N4 | 5 | VW3 A7 707 | LC1 D40●● |
| ATV 71HD55N4, WD55N4 | 5 | VW3 A7 707 | LC1 D50●● |
| ATV 71HD75N4, WD75N4 | 5 | VW3 A7 707 | LC1 D80●● |
| ATV 71HU22Y | 8 | VW3 A7 706 | LC1 D09●● |
| ATV 71HU30Y | 8 | VW3 A7 706 | LC1 D09●● |
| ATV 71HU40Y | 8 | VW3 A7 706 | LC1 D12●● |
| ATV 71HU55Y | 8 | VW3 A7 706 | LC1 D12●● |
| ATV 71HU75Y | 8 | VW3 A7 706 | LC1 D18●● |
| ATV 71HD11Y | 8 | VW3 A7 706 | LC1 D18●● |
| ATV 71HD15Y | 8 | VW3 A7 706 | LC1 D25●● |
| ATV 71HD18Y | 8 | VW3 A7 706 | LC1 D32●● |
| ATV 71HD22Y | 8 | VW3 A7 706 | LC1 D32●● |
| ATV 71HD30Y | 8 | VW3 A7 706 | LC1 D40●● |
| ATV 71HD37Y | 8 | VW3 A7 706 | LC1 D40●● |
| ATV 71HD45Y | 8 | VW3 A7 706 | LC1 D65●● |
| ATV 71HD55Y | 8 | VW3 A7 706 | LC1 D65●● |
| ATV 71HD75Y | 8 | VW3 A7 706 | LC1 D80●● |
| ATV 71HD90Y | 8 | VW3 A7 706 | LC1 D80●● |

*(1) DC power supply not included.*
*(2) Fast-acting semi-conductor fuses, see page 239. The function of the fuses is to protect the DC bus wiring in the event of a drive short-circuit.*
*(3) See our catalogue "Motor starter solutions. Control and protection components".*

***Note:** ATV 71H●●●M3, ATV 71HD11M3X, HD15M3X, ATV 71●075N4…●D18N4 and ATV 71P●●●N4Z drives have an integrated pre-charge circuit. This is used to connect the DC power supply directly to the drive without the need for an external pre-charge circuit.*

## Connection schemes for several drives in parallel on the DC bus

### Drives with different ratings

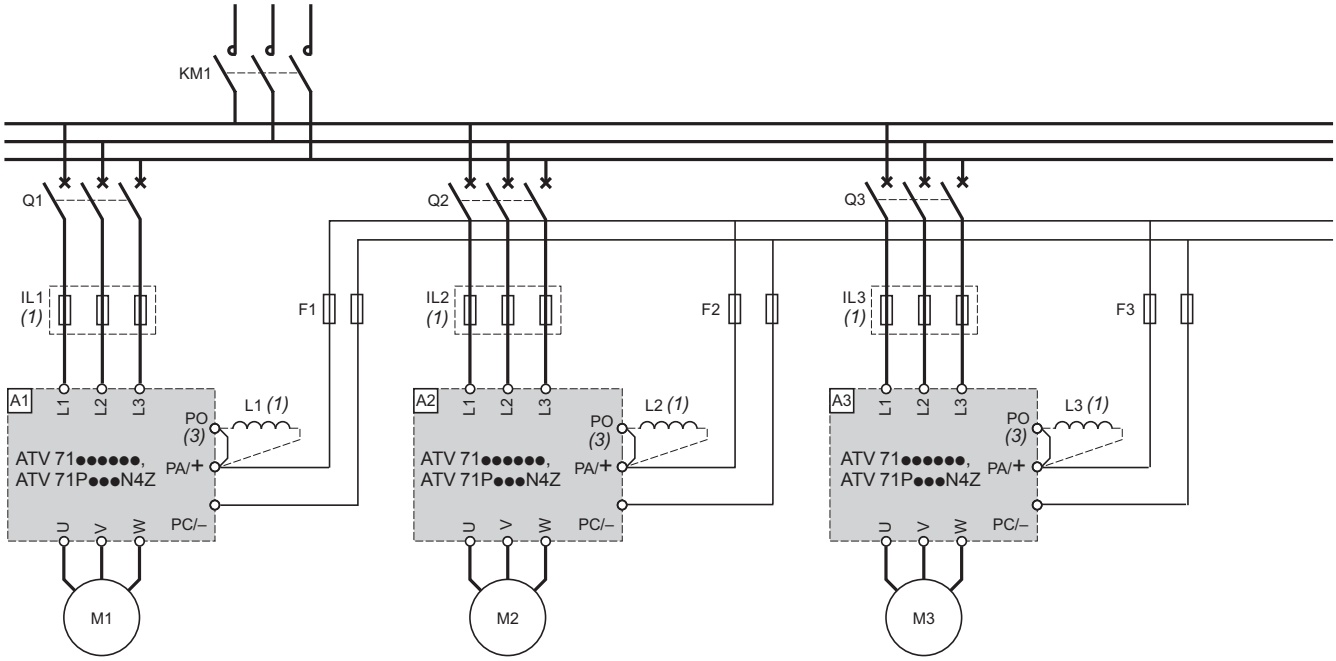



| Item | Description |
|---|---|
| **A1** | ATV 71 drive, see pages 22 to 25.<br>Drive power = ∑ motor power ratings M1 + M2 + M3 + M4 + … |
| **A2, A3, A4** | ATV 71 drives powered by the DC bus. They must be protected using fast-acting semi-conductor fuses. Contactors on the DC circuit are ineffective as the switching action may cause the fuses to blow owing to the high load current. |
| **F1** | Fast-acting semi-conductor fuses, see page 239. Drive A1 powered by the AC supply with an output bus.<br>The function of the fuses is to protect the internal diode bridge in the event of a short-circuit on the external DC bus. |
| **F2, F3, F4** | Fast-acting semi-conductor fuses, see page 239. Drives A2, A3 and A4 are powered by their DC bus and are not connected to the AC input.<br>The function of the fuses is to protect the DC bus wiring in the event of a drive short-circuit. |
| **IL** | Mandatory line chokes for ATV 71HC20Y…HC63Y drives; to be ordered separately, see page 160. |
| **KM1** | Line contactors.<br>Rating: see motor starters on pages 243 to 249. |
| **Q1** | Circuit-breakers.<br>Rating: see motor starters on pages 243 to 249. |

*(1) For ATV 71HD55M3X, HD75M3X and ATV 71HD90N4…HC50N4 drives, provide the fan power supply connection.*

## Connection schemes for several drives in parallel on the DC bus (continued)

### Drives with equivalent ratings




| Item | Description |
|---|---|
| **A1, A2, A3** | ATV 71 drives, see pages 22 to 25.<br>The power difference between the drives connected in parallel must not exceed one rating. |
| **F1, F2, F3** | Fast-acting semi-conductor fuses, see page 239. Drives A1, A2 and A3 powered by the AC supply with an output bus.<br>The function of the fuses is to protect the internal diode bridge in the event of a short-circuit on the external DC bus. |
| **IL1, IL2, IL3** *(1)* | Mandatory line chokes for ATV 71H●●●Y drives; to be ordered separately, see page 160. |
| **KM1** | When using a common line contactor, all the Altivar 71 drive load circuits operate in parallel and cannot therefore be overloaded. |
| **L1, L2, L3** *(1)* | Mandatory DC chokes for ATV 71H●●●M3, ATV 71H●●●M3X, ATV 71●●●●N4 and ATV 71P●●●N4Z drives; to be ordered separately (see page 155) except for drives ATV 71HD55M3X, HD75M3X and ATV 71HD90N4…HC50N4 which are supplied as standard with a DC choke.<br>Not used for ATV 71H●●●Y drives. These drives require the presence of line chokes (IL●). |
| **Q1, Q2, Q3** | Circuit-breakers on the line supply side to protect drives against overloads. Use trip contacts on the “external fault” logic input or the line contactor. The line contactor must only be activated if all three circuit-breakers are closed, as otherwise there is a risk of damage to the drives. |

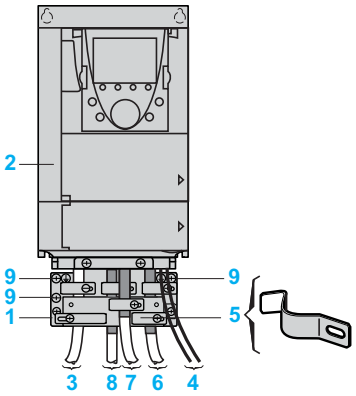
*(1) The use of line chokes or DC chokes depends on the drive type, see table above.*
*(2) There is no PO terminal on ATV 71HC11Y…HC63Y drives.*

## Size of DC bus fuses (F1, F2, F3 and F4) depending on the drive rating

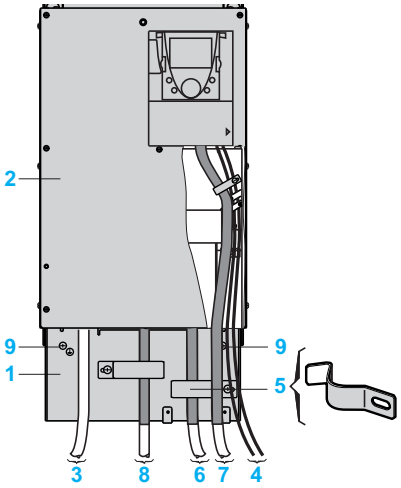
| For drives | Fast-acting semi-conductor fuses *(1)* |
|---|---|
| | A |
| ATV 71H037M3…HU15M3 | 25 |
| ATV 71HU22M3…HU40M3 | 50 |
| ATV 71HU55M3, HU75M3 | 100 |
| ATV 71HD11M3X…HD18M3X | 160 |
| ATV 71HD22M3X, HD30M3X | 250 |
| ATV 71HD37M3X, HD45M3X | 350 |
| ATV 71HD55M3X | 500 |
| ATV 71HD75M3X | 630 |
| ATV 71H075N4…HU22N4<br>ATV 71W075N4…WU22N4<br>ATV 71P075N4Z…PU22N4Z | 25 |
| ATV 71HU30N4, HU40N4<br>ATV 71WU30N4, WU40N4<br>ATV 71PU30N4Z, PU40N4Z | 50 |
| ATV 71HU55N4…HD11N4<br>ATV 71WU55N4…WD11N4<br>ATV 71PU55N4Z, PU75N4Z | 80 |
| ATV 71HD15N4…HD22N4<br>ATV 71WD15N4…WD22N4 | 100 |
| ATV 71HD30N4, HD37N4<br>ATV 71WD30N4, WD37N4 | 160 |
| ATV 71HD45N4<br>ATV 71WD45N4 | 200 |
| ATV 71HD55N4<br>ATV 71WD55N4 | 250 |
| ATV 71HD75N4<br>ATV 71WD75N4 | 350 |
| ATV 71HD90N4 | 315 |
| ATV 71HC11N4, HC13N4 | 400 |
| ATV 71HC16N4 | 500 |
| ATV 71HC20N4 | 630 |
| ATV 71HC25N4, HC28N4 | 800 |
| ATV 71HC31N4 | 1000 |
| ATV 71HC40N4, HC50N4 | 1250 |
| ATV 71HU22Y…HU55Y | 25 |
| ATV 71HU75Y…HD15Y | 40 |
| ATV 71HD18Y…HD30Y | 63 |
| ATV 71HD37Y…HD55Y | 125 |
| ATV 71HD75Y, HD90Y | 200 |
| ATV 71HC11Y | 250 |
| ATV 71HC13Y | 315 |
| ATV 71HC16Y | 350 |
| ATV 71HC20Y | 450 |
| ATV 71HC25Y | 630 |
| ATV 71HC31Y | 800 |
| ATV 71HC40Y | 900 |
| ATV 71HC50Y | 1250 |
| ATV 71HC63Y | 1500 |

*(1) Nominal voltage of fast-acting semi-conductor fuse:*

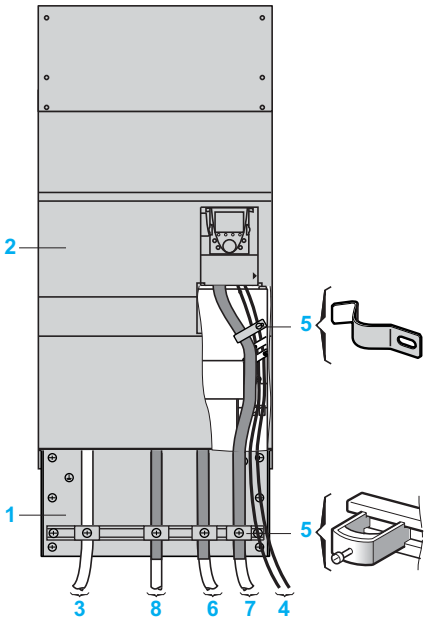
| Line supply voltage | Nominal voltage of fast-acting semi-conductor fuse |
|---|---|
| V ∼ | V |
| 230, 400 | 690 |
| 440, 460, 480 | 800 |
| 500, 600, 690 | 1000 |




*ATV 71H●●●M3, ATV 71HD11M3X, HD15M3X, ATV 71H075N4…HD18N4, ATV 71P075N4Z…PD11N4Z*




*ATV 71HD18M3X…HD45M3X, ATV 71HD22N4…HD75N4 ATV 71HU22Y…HD90Y*




*ATV 71HD55M3X, HD75M3X, ATV 71HD90N4…HC50N4 ATV 71HC11Y…HC63Y*

## Connections for ensuring conformity to EMC standards

### Principle

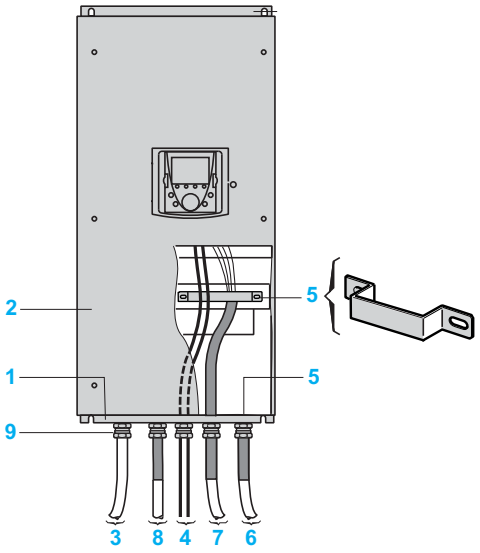
■ Earths between drive, motor and cable shielding must have “high frequency” equipotentiality.
■ Use shielded cables with shielding connected to earth over 360° at both ends for the motor cable, the braking resistor cable and the control-signalling cables. Conduit or metal ducting can be used for part of the shielding length provided that there is no break in the continuity of the earth connections.
■ Ensure maximum separation between the power supply cable (line supply) and the motor cable.

### Installation diagram for ATV 71H●●●M3, ATV 71H●●●M3X, ATV 71H●●●N4, ATV 71H●●●Y and ATV 71P●●●N4Z drives

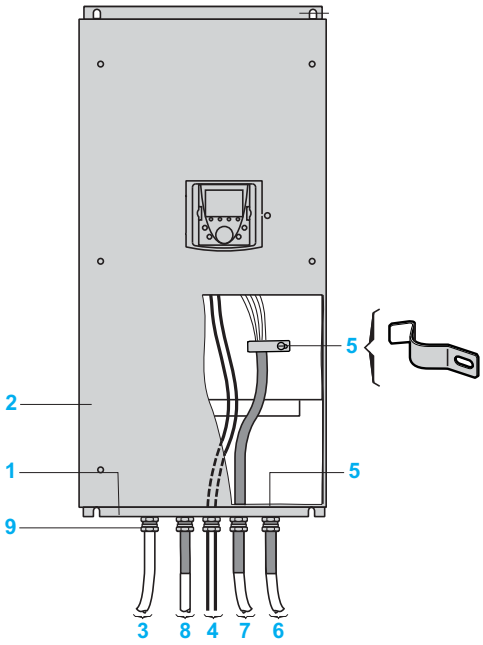
1 Steel plate *(1)*, to be mounted on the drive (earthed casing).
2 Altivar 71 UL Type 1/IP 20 drive.
3 Unshielded power supply wires or cable.
4 Unshielded wires for the output of the fault relay contacts.
5 Attach and earth the shielding of cables 6, 7 and 8 as close as possible to the drive:
- Strip the cable to expose the shielding
- Attach the cable to the plate 1 by tightening the clamp on the stripped part of the shielding
The shielding must be clamped tightly enough to the metal sheet to ensure good contact.
6 Shielded cable for connecting the motor
7 Shielded cable for connecting the control-signal section.
For applications requiring several conductors, use cables with a small cross-section (0.5 $mm^2$).
8 Shielded cable for connecting the braking resistor.
6, 7, 8, the shielding must be connected to earth at both ends.
The shielding must be continuous, and if intermediate terminals are used, they must be placed in EMC shielded metal boxes.
9 Earth screw.

***Note:*** *The HF equipotential earth connection between the drive, motor and cable shielding does not remove the need to connect the PE conductors (green-yellow) to the appropriate terminals on each unit.*
*If using an additional EMC input filter, it should be mounted beside or beneath the drive, depending on the rating, and connected directly to the line supply via an unshielded cable. Link 3 on the drive is then made by the filter output cable.*

*(1) Plate supplied for ATV 71H●●●M3, ATV 71HD11M3X…HD45M3X, ATV 71H075N4… HD75N4, ATV 71HU22Y…HD90Y and ATV 71P075N4Z…PD11N4Z drives.*
*For ATV 71HD55M3X, HD75M3X, ATV 71HD90N4…HC28N4 and ATV 71HC11Y…HC31Y drives, the plate is supplied with the UL Type 1 conformity kit or the IP 31 conformity kit.*
*For ATV 71HC31N4…HC50N4 and ATV 71HC40Y…HC63Y drives, the plate is supplied with the IP 31 conformity kit.*
*These kits must be ordered separately, see pages 32 and 33.*




*ATV 71W075N4…WD22N4*




*ATV 71WD30N4…WD75N4*

## Connections for ensuring conformity to EMC standards (continued)

**Installation diagram for ATV 71W●●●N4 drives**

1 Steel plate mounted on the drive (earthed casing).
2 Altivar 71 UL Type 12/IP 54 drive.
3 Unshielded power supply wires or cable.
4 Unshielded wires for the output of the fault relay contacts.
5 Attach and earth the shielding of cables 6, 7 and 8 as close as possible to the drive:
- Strip the cable to expose the shielding
- Fit the shielded cable in the cable gland 9 ensuring it is fully in contact through 360°
- Fold back the shielding and clamp it between the ring and body of the cable gland.

Depending on the rating, the shielding of the cable 7 can be earthed using a cable gland 9, a clamp 5 or a cable clip 5.
The shielding must be clamped tightly enough to the metal sheet to ensure good contact.
6 Shielded cable for connecting the motor
7 Shielded cable for connecting the control-signal section.
For applications requiring several conductors, use cables with a small cross-section (0.5 $mm^2$).
8 Shielded cable for connecting the braking resistor.
6, 7, 8, the shielding must be connected to earth at both ends.
The shielding must be continuous, and if intermediate terminals are used, they must be placed in EMC shielded metal boxes.
9 Metal cable gland (not supplied) for cables 6, 7 and 8.
Standard cable gland (not supplied) for cables 3 and 4.

***Note:*** *The HF equipotential earth connection between the drive, motor and cable shielding does not remove the need to connect the PE conductors (green-yellow) to the appropriate terminals on each unit.*
*If using an additional EMC input filter, it should be mounted beside the drive and connected directly to the line supply via an unshielded cable. Link 3 on the drive is then made by the filter output cable.*

# Variable speed drives
## Altivar 71
## Motor starters: supply voltage 200…240 V

DF533387-16-M



103282_14-M



PF107477-28-M



*GV2 L20*
*+*
*LC1 D25●●*
*+*
*ATV 71HU22M3*

## Applications

Circuit-breaker/contactor/drive combinations can be used to ensure continuous service of the installation with optimum safety.
The type of circuit-breaker/contactor coordination selected can reduce maintenance costs in the event of a motor short-circuit by minimizing the time required to make the necessary repairs and the cost of replacement equipment. The suggested combinations provide type 1 or type 2 coordination depending on the drive rating.

**Type 2 coordination**: A motor short-circuit will not damage the device or affect its settings. The motor starter should be able to operate once the electrical fault has been removed. The electrical isolation provided by the circuit-breaker will not be affected by the short-circuit. Welding of the contactor contacts is permissible if they can be separated easily.

**Type 1 coordination**: The electrical isolation provided by the circuit-breaker will not be affected by the incident and no other elements apart from the contactor are damaged as a result of the motor short-circuit.

The drive controls the motor, provides protection against short-circuits between the drive and the motor and protects the motor cable against overloads. The overload protection is provided by the drive's motor thermal protection. If this protection is removed, external thermal protection should be provided.
Before restarting the installation, the cause of the trip must be removed.

## Motor starters for UL Type 1/IP 20 drives

| Motor Power *(1)* | | Drive Reference | Circuit-breaker Reference *(2)* | Rating | Im | Line contactor Reference *(3) (4)* |
|---|---|---|---|---|---|---|
| **kW** | ***HP*** | | | **A** | **A** | |
| **Single-phase supply voltage 200…240 V 50/60 Hz. Type 2 coordination** | | | | | | |
| 0.37 | *0.5* | **ATV 71H075M3** | **GV2 L10** | 6.3 | – | **LC1 D18●●** |
| 0.75 | *1* | **ATV 71HU15M3** | **GV2 L14** | 10 | – | **LC1 D18●●** |
| 1.5 | *2* | **ATV 71HU22M3** | **GV2 L20** | 18 | – | **LC1 D25●●** |
| 2.2 | *3* | **ATV 71HU30M3** | **GV2 L22** | 25 | – | **LC1 D25●●** |
| 3 | – | **ATV 71HU40M3** *(5)* | **GV2 L22** | 25 | – | **LC1 D25●●** |
| 4 | *5* | **ATV 71HU55M3** *(5)* | **GV3 L40** | 40 | – | **LC1 D40●●** |
| 5.5 | *7.5* | **ATV 71HU75M3** *(5)* | **GV3 L50** | 50 | – | **LC1 D50●●** |

*(1) Standard power ratings for 230 V 50/60 Hz 4-pole motors.*
*The values expressed in HP conform to the NEC (National Electrical Code).*
*(2) Breaking capacity of circuit-breakers according to standard IEC 60947-2:*

| Circuit-breaker | Icu (kA) for 240 V |
|---|---|
| **GV2 L** | 50 |
| **GV3 L** | 100 |

*(3) Composition of contactors:*
*LC1 D18 to LC1 D50: 3 poles + 1 "N/O" auxiliary contact and 1 "N/C" auxiliary contact.*
*(4) Replace ●● with the control circuit voltage reference indicated in the table below:*

| | Volts ∿ | 24 | 48 | 110 | 220 | 230 | 240 |
|---|---|---|---|---|---|---|---|
| **LC1 D** | 50 Hz | **B5** | **E5** | **F5** | **M5** | **P5** | **U5** |
| | 60 Hz | **B6** | **E6** | **F6** | **M6** | **–** | **U6** |
| | 50/60 Hz | **B7** | **E7** | **F7** | **M7** | **P7** | **U7** |

*For other voltages available between 24 V and 660 V, or a DC control circuit, please consult your Regional Sales Office.*
*(5) A line choke must be added, see page 160.*

# Variable speed drives
Altivar 71
Motor starters: supply voltage 200…240 V

DF533367-16-M



103282_14-M



PF105778-29-M



*GV2 L20*
*+*
*LC1 D25●●*
*+*
*ATV 71HU30M3*

## Motor starters for UL Type 1/IP 20 drives

| Motor Power *(1)* | | Drive Reference | Circuit-breaker Reference *(2)* | Rating | Im | Line contactor Reference *(3) (4)* |
|---|---|---|---|---|---|---|
| kW | HP | | | A | A | |
| **Three-phase supply voltage 200…240 V 50/60 Hz. Type 2 coordination** | | | | | | |
| 0.37 | *0.5* | **ATV 71H037M3** | **GV2 L08** | 4 | – | **LC1 D09●●** |
| 0.75 | *1* | **ATV 71H075M3** | **GV2 L14** | 10 | – | **LC1 D09●●** |
| 1.5 | *2* | **ATV 71HU15M3** | **GV2 L14** | 10 | – | **LC1 D18●●** |
| 2.2 | *3* | **ATV 71HU22M3** | **GV2 L16** | 14 | – | **LC1 D18●●** |
| 3 | – | **ATV 71HU30M3** | **GV2 L20** | 18 | – | **LC1 D25●●** |
| 4 | *5* | **ATV 71HU40M3** | **GV2 L22** | 25 | – | **LC1 D25●●** |
| 5.5 | *7.5* | **ATV 71HU55M3** | **GV3 L40** | 40 | – | **LC1 D40●●** |
| 7.5 | *10* | **ATV 71HU75M3** | **GV3 L50** | 50 | – | **LC1 D50●●** |
| 11 | *15* | **ATV 71HD11M3X** | **GV3 L65** | 65 | – | **LC1 D65●●** |
| 15 | *20* | **ATV 71HD15M3X** | **NS100NMA80** | 80 | 480 | **LC1 D65●●** |
| 18.5 | *25* | **ATV 71HD18M3X** | **NS100NMA100** | 100 | 600 | **LC1 D80●●** |
| 22 | *30* | **ATV 71HD22M3X** | **NS100NMA100** | 100 | 600 | **LC1 D80●●** |
| 30 | *40* | **ATV 71HD30M3X** | **NS160NMA150** | 150 | 1350 | **LC1 D115●●** |
| 37 | *50* | **ATV 71HD37M3X** | **NS160NMA150** | 150 | 1350 | **LC1 D150●●** |
| 45 | *60* | **ATV 71HD45M3X** | **NS250NMA220** | 220 | 1980 | **LC1 D150●●** |
| 55 | *75* | **ATV 71HD55M3X** | **NS250NMA220** | 220 | 1980 | **LC1 F225●●** |
| 75 | *100* | **ATV 71HD75M3X** | **NS400NMA320** | 320 | 1920 | **LC1 F265●●** |

*(1) Standard power ratings for 230 V 50/60 Hz 4-pole motors.*
*The values expressed in HP conform to the NEC (National Electrical Code).*
*(2) NS●●●NMA: products sold under the Merlin Gerin brand.*
*Breaking capacity of circuit-breakers according to standard IEC 60947-2:*

| Circuit-breaker | Icu (kA) for 240 V |
|---|---|
| **GV2 L08…L20, GV3 L40…L65** | 100 |
| **GV2 L22** | 50 |
| **NS●●●NMA** | 85 |

*(3) Composition of contactors:*
*LC1 D09 to LC1 D150: 3 poles + 1 "N/O" auxiliary contact and 1 "N/C" auxiliary contact.*
*LC1 F●●●: 3 poles. To add auxiliary contacts or other accessories, please consult our specialist catalogue "Motor starter solutions. Control and protection components".*
*(4) Replace ●● with the control circuit voltage reference indicated in the table below:*

| | Volts ∼ | 24 | 48 | 110 | 220 | 230 | 240 |
|---|---|---|---|---|---|---|---|
| **LC1 D** | 50 Hz | **B5** | **E5** | **F5** | **M5** | **P5** | **U5** |
| | 60 Hz | **B6** | **E6** | **F6** | **M6** | – | **U6** |
| | 50/60 Hz | **B7** | **E7** | **F7** | **M7** | **P7** | **U7** |
| **LC1 F225** | 50 Hz (LX1 coil) | **B5** | **E5** | **F5** | **M5** | **P5** | **U5** |
| | 60 Hz (LX1 coil) | – | **E6** | **F6** | **M6** | – | **U6** |
| | 40…400 Hz (LX9 coil) | – | **E7** | **F7** | **M7** | **P7** | **U7** |
| **LC1 F265** | 40…400 Hz (LX1 coil) | **B7** | **E7** | **F7** | **M7** | **P7** | **U7** |

*For other voltages available between 24 V and 660 V, or a DC control circuit, please consult your Regional Sales Office.*

# Variable speed drives
Altivar 71
Motor starters: supply voltage 380…415 V

DF533345-20-M



105517-13-M



PF107476-32-M



*NS160●MA150*
*+*
*LC1 D115●●*
*+*
*ATV 71HD45N4*

## Motor starters for UL Type 1/IP 20 drives

| Motor Power *(1)* | | Drive Reference | Circuit-breaker Reference *(2)* | Rating | Im | Line contactor Reference *(3) (4)* |
|---|---|---|---|---|---|---|
| kW | *HP* | | | A | A | |
| **Three-phase supply voltage 380…415 V 50/60 Hz. Type 2 coordination** | | | | | | |
| 0.75 | *1* | **ATV 71H075N4** | **GV2 L08** | 4 | – | **LC1 D18●●** |
| 1.5 | *2* | **ATV 71HU15N4** | **GV2 L10** | 6.3 | – | **LC1 D18●●** |
| 2.2 | *3* | **ATV 71HU22N4** | **GV2 L14** | 10 | – | **LC1 D18●●** |
| 3 | – | **ATV 71HU30N4** | **GV2 L16** | 14 | – | **LC1 D18●●** |
| 4 | *5* | **ATV 71HU40N4** | **GV2 L16** | 14 | – | **LC1 D18●●** |
| 5.5 | *7.5* | **ATV 71HU55N4** | **GV2 L22** | 25 | – | **LC1 D25●●** |
| 7.5 | *10* | **ATV 71HU75N4** | **GV3 L32** | 32 | – | **LC1 D40●●** |
| 11 | *15* | **ATV 71HD11N4** | **GV3 L40** | 40 | – | **LC1 D40●●** |
| 15 | *20* | **ATV 71HD15N4** | **GV3 L50** | 50 | – | **LC1 D50●●** |
| 18.5 | *25* | **ATV 71HD18N4** | **GV3 L50** | 50 | – | **LC1 D50●●** |
| 22 | *30* | **ATV 71HD22N4** | **GV3 L65** | 65 | – | **LC1 D65●●** |
| 30 | *40* | **ATV 71HD30N4** | **NS80HMA80** | 80 | 480 | **LC1 D65●●** |
| 37 | *50* | **ATV 71HD37N4** | **NS100●MA100** | 100 | 800 | **LC1 D80●●** |
| 45 | *60* | **ATV 71HD45N4** | **NS160●MA150** | 150 | 1350 | **LC1 D115●●** |
| 55 | *75* | **ATV 71HD55N4** | **NS160●MA150** | 150 | 1350 | **LC1 D115●●** |
| 75 | *100* | **ATV 71HD75N4** | **NS250●MA220** | 220 | 1980 | **LC1 F185●●** |
| 90 | *125* | **ATV 71HD90N4** | **NS250●MA220** | 220 | 1980 | **LC1 F185●●** |
| 110 | *150* | **ATV 71HC11N4** | **NS250●MA220** | 220 | 1980 | **LC1 F185●●** |
| 132 | *200* | **ATV 71HC13N4** | **NS400●MA320** | 320 | 1920 | **LC1 F265●●** |
| 160 | *250* | **ATV 71HC16N4** | **NS400●MA320** | 320 | 1920 | **LC1 F265●●** |
| 200 | *300* | **ATV 71HC20N4** | **NS400●MA320** | 320 | 1920 | **LC1 F400●●** |
| 220 | *350* | **ATV 71HC25N4** | **NS630●MAE500** | 500 | 3000 | **LC1 F400●●** |
| 250 | *400* | **ATV 71HC25N4** | **NS630●MAE500** | 500 | 3000 | **LC1 F500●●** |
| 280 | *450* | **ATV 71HC28N4** | **NS630●MAE500** | 500 | 3000 | **LC1 F500●●** |
| 315 | *500* | **ATV 71HC31N4** | **NS630●MAE500** | 500 | 3000 | **LC1 F500●●** |
| **Three-phase supply voltage 380…415 V 50/60 Hz. Type 1 coordination** | | | | | | |
| 355 | – | **ATV 71HC40N4** | **NS800 MicroLogic 2 or 5 (LR OFF)** | 800 | 1600 | **LC1 F630●●** |
| 400 | *600* | **ATV 71HC40N4** | **NS800 MicroLogic 2 or 5 (LR OFF)** | 800 | 1600 | **LC1 F630●●** |
| 500 | *700* | **ATV 71HC50N4** | **NS1000 MicroLogic 2 or 5 (LR OFF)** | 1000 | 2000 | **LC1 F800●●** |

*(1) Standard power ratings for 400 V 50/60 Hz 4-pole motors.*
*The values expressed in HP conform to the NEC (National Electrical Code).*
*(2) NS80HMA, NS●●●●, NS800, NS1000: products sold under the Merlin Gerin brand.*
*For references to be completed, replace the dot with the letter corresponding to the circuit-breaker breaking performance (N, H, L).*
*Breaking capacity of circuit-breakers according to standard IEC 60947-2:*

| Circuit-breaker | Icu (kA) for 400 V | | | |
|---|---|---|---|---|
| | | N | H | L |
| **GV2 L08…L14, GV3 L32** | 100 | – | – | – |
| **GV2 L16, L22, GV3 L40…L65** | 50 | – | – | – |
| **NS80HMA** | 70 | – | – | – |
| **NS100●MA** | – | 25 | 70 | 150 |
| **NS160●MA, NS250●MA** | – | 36 | 70 | 150 |
| **NS400●, NS630●, NS800, NS1000** | – | 45 | 70 | 150 |

*(3) Composition of contactors:*
*LC1 D18 to LC1 D150: 3 poles + 1 "N/O" auxiliary contact and 1 "N/C" auxiliary contact.*
*LC1 F●●●: 3 poles. To add auxiliary contacts or other accessories, please consult our specialist catalogue "Motor starter solutions. Control and protection components".*
*(4) Replace ●● with the control circuit voltage reference indicated in the table below:*

| | Volts ∿ | 24 | 48 | 110 | 220 | 230 | 240 |
|---|---|---|---|---|---|---|---|
| **LC1 D** | 50 Hz | **B5** | **E5** | **F5** | **M5** | **P5** | **U5** |
| | 60 Hz | **B6** | **E6** | **F6** | **M6** | **–** | **U6** |
| | 50/60 Hz | **B7** | **E7** | **F7** | **M7** | **P7** | **U7** |
| **LC1 F185** | 50 Hz (LX1 coil) | **B5** | **E5** | **F5** | **M5** | **P5** | **U5** |
| | 60 Hz (LX1 coil) | **–** | **E6** | **F6** | **M6** | **–** | **U6** |
| | 40…400 Hz (LX9 coil) | **–** | **E7** | **F7** | **M7** | **P7** | **U7** |
| **LC1 F265** | 40…400 Hz (LX1 coil) | **B7** | **E7** | **F7** | **M7** | **P7** | **U7** |
| **LC1 F400…F630** | 40…400 Hz (LX1 coil) | **–** | **E7** | **F7** | **M7** | **P7** | **U7** |
| **LC1 F800** | 40…400 Hz (LX1 coil) | **–** | **–** | **FE7** | **P7** | **P7** | **P7** |

*For other voltages available between 24 V and 660 V, or a DC control circuit, please consult your Regional Sales Office.*

# Variable speed drives
Altivar 71
Motor starters: supply voltage 440…480 V

DF534573



105517-13-M



107469-33-M



*NS160●MA150*
*+*
*LC1 D115●●*
*+*
*ATV 71HD75N4*

## Motor starters for UL Type 1/IP 20 drives

| Motor Power *(1)* | | Drive Reference | Circuit-breaker Reference *(2)* | Rating | Im | Line contactor Reference *(3) (4)* |
|---|---|---|---|---|---|---|
| kW | *HP* | | | A | A | |
| **Three-phase supply voltage 440…480 V 50/60 Hz. Type 2 coordination** | | | | | | |
| 0.75 | *1* | **ATV 71H075N4** | **GV2 L08** | 4 | – | **LC1 D18●●** |
| 1.5 | *2* | **ATV 71HU15N4** | **GV2 L10** | 6.3 | – | **LC1 D18●●** |
| 2.2 | *3* | **ATV 71HU22N4** | **GV2 L14** | 10 | – | **LC1 D18●●** |
| 3 | – | **ATV 71HU30N4** | **GV2 L14** | 10 | – | **LC1 D18●●** |
| 4 | *5* | **ATV 71HU40N4** | **GV2 L16** | 14 | – | **LC1 D18●●** |
| 5.5 | *7.5* | **ATV 71HU55N4** | **GV2 L22** | 25 | – | **LC1 D25●●** |
| 7.5 | *10* | **ATV 71HU75N4** | **GV3 L32** | 32 | – | **LC1 D40●●** |
| 11 | *15* | **ATV 71HD11N4** | **GV3 L40** | 40 | – | **LC1 D40●●** |
| 15 | *20* | **ATV 71HD15N4** | **GV3 L50** | 50 | – | **LC1 D50●●** |
| 18.5 | *25* | **ATV 71HD18N4** | **GV3 L50** | 50 | – | **LC1 D50●●** |
| 22 | *30* | **ATV 71HD22N4** | **GV3 L50** | 50 | – | **LC1 D65●●** |
| 30 | *40* | **ATV 71HD30N4** | **GV3 L65** | 65 | – | **LC1 D65●●** |
| 37 | *50* | **ATV 71HD37N4** | **NS100●MA100** | 100 | 600 | **LC1 D80●●** |
| 45 | *60* | **ATV 71HD45N4** | **NS160●MA100** | 100 | 600 | **LC1 D115●●** |
| 55 | *75* | **ATV 71HD55N4** | **NS160●MA150** | 150 | 1350 | **LC1 D115●●** |
| 75 | *100* | **ATV 71HD75N4** | **NS160●MA150** | 150 | 1350 | **LC1 D115●●** |
| 90 | *125* | **ATV 71HD90N4** | **NS160●MA150** | 150 | 1350 | **LC1 D115●●** |
| 110 | *150* | **ATV 71HC11N4** | **NS250●MA220** | 220 | 1980 | **LC1 F185●●** |
| 132 | *200* | **ATV 71HC13N4** | **NS250●MA220** | 220 | 1980 | **LC1 F225●●** |
| 160 | *250* | **ATV 71HC16N4** | **NS400●MA320** | 320 | 1920 | **LC1 F265●●** |
| 200 | *300* | **ATV 71HC20N4** | **NS400●MA320** | 320 | 1920 | **LC1 F330●●** |
| 220 | *350* | **ATV 71HC25N4** | **NS400●MA320** | 320 | 1920 | **LC1 F400●●** |
| 250 | *400* | **ATV 71HC25N4** | **NS630●MAE500** | 500 | 3000 | **LC1 F400●●** |
| 280 | *450* | **ATV 71HC28N4** | **NS630●MAE500** | 500 | 3000 | **LC1 F500●●** |
| 315 | *500* | **ATV 71HC31N4** | **NS630●MAE500** | 500 | 3000 | **LC1 F500●●** |
| 355 | – | **ATV 71HC40N4** | **NS630●MAE500** | 500 | 3000 | **LC1 F630●●** |
| **Three-phase supply voltage 440…480 V 50/60 Hz. Type 1 coordination** | | | | | | |
| 400 | *600* | **ATV 71HC40N4** | **NS800 MicroLogic 2 or 5 (LR OFF)** | 800 | 1600 | **LC1 F630●●** |
| 500 | *700* | **ATV 71HC50N4** | **NS1000 MicroLogic 2 or 5 (LR OFF)** | 1000 | 2000 | **LC1 F800●●** |

*(1) Standard power ratings for 400 V 50/60 Hz 4-pole motors.*
*The values expressed in HP conform to the NEC (National Electrical Code).*
*(2) NS●●●●, NS800, NS1000: products sold under the Merlin Gerin brand.*
*For references to be completed, replace the dot with the letter corresponding to the circuit-breaker breaking performance (N, H, L).*
*Breaking capacity of circuit-breakers according to standard IEC 60947-2:*

| Circuit-breaker | Icu (kA) for 440 V | | | |
|---|---|---|---|---|
| | | N | H | L |
| **GV2 L08, GV2 L10, GV3 L32** | 100 | – | – | – |
| **GV2 L14…GV2 L22** | 20 | – | – | – |
| **GV3 L40…L65** | 50 | – | – | – |
| **NS100●MA** | – | 25 | 65 | 130 |
| **NS160●MA, NS250●MA** | – | 35 | 65 | 130 |
| **NS400●, NS630●** | – | 42 | 65 | 130 |
| **NS800, NS1000** | – | 50 | 65 | 130 |

*(3) Composition of contactors:*
*LC1 D18 to LC1 D115: 3 poles + 1 "N/O" auxiliary contact and 1 "N/C" auxiliary contact.*
*LC1 F●●●: 3 poles. To add auxiliary contacts or other accessories, please consult our specialist catalogue "Motor starter solutions. Control and protection components".*
*(4) Replace ●● with the control circuit voltage reference indicated in the table below:*

| | Volts ∿ | 24 | 48 | 110 | 220 | 230 | 240 |
|---|---|---|---|---|---|---|---|
| **LC1 D** | 50 Hz | **B5** | **E5** | **F5** | **M5** | **P5** | **U5** |
| | 60 Hz | **B6** | **E6** | **F6** | **M6** | – | **U6** |
| | 50/60 Hz | **B7** | **E7** | **F7** | **M7** | **P7** | **U7** |
| **LC1 F185** | 50 Hz (LX1 coil) | **B5** | **E5** | **F5** | **M5** | **P5** | **U5** |
| | 60 Hz (LX1 coil) | – | **E6** | **F6** | **M6** | – | **U6** |
| | 40…400 Hz (LX9 coil) | – | **E7** | **F7** | **M7** | **P7** | **U7** |
| **LC1 F265, F330** | 40…400 Hz (LX1 coil) | **B7** | **E7** | **F7** | **M7** | **P7** | **U7** |
| **LC1 F400…F630** | 40…400 Hz (LX1 coil) | – | **E7** | **F7** | **M7** | **P7** | **U7** |
| **LC1 F800** | 40…400 Hz (LX1 coil) | – | – | **FE7** | **P7** | **P7** | **P7** |

*For other voltages available between 24 V and 660 V, or a DC control circuit, please consult your Regional Sales Office.*

# Variable speed drives
Altivar 71
Motor starters: supply voltage 380…480 V

DF533345-20-M



105517-13-M



PF107482-32-M



*NS160●MA150*
*+*
*LC1 D115●●*
*+*
*ATV 71WD55N4*

## Motor starters for UL Type 12/IP 54 drives

| Motor Power *(1)* | | Drive Reference | Circuit-breaker Reference *(2)* | Rating | Im | Line contactor Reference *(3) (4)* |
|---|---|---|---|---|---|---|
| kW | *HP* | | | A | A | |
| **Three-phase supply voltage 380…415 V 50/60 Hz. Type 2 coordination** | | | | | | |
| 0.75 | *1* | **ATV 71W075N4** | **GV2 L08** | 4 | – | **LC1 D18●●** |
| 1.5 | *2* | **ATV 71WU15N4** | **GV2 L10** | 6.3 | – | **LC1 D18●●** |
| 2.2 | *3* | **ATV 71WU22N4** | **GV2 L14** | 10 | – | **LC1 D18●●** |
| 3 | *–* | **ATV 71WU30N4** | **GV2 L16** | 14 | – | **LC1 D18●●** |
| 4 | *5* | **ATV 71WU40N4** | **GV2 L16** | 14 | – | **LC1 D18●●** |
| 5.5 | *7.5* | **ATV 71WU55N4** | **GV2 L22** | 25 | – | **LC1 D25●●** |
| 7.5 | *10* | **ATV 71WU75N4** | **GV3 L32** | 32 | – | **LC1 D40●●** |
| 11 | *15* | **ATV 71WD11N4** | **GV3 L40** | 40 | – | **LC1 D40●●** |
| 15 | *20* | **ATV 71WD15N4** | **GV3 L50** | 50 | – | **LC1 D50●●** |
| 18.5 | *25* | **ATV 71WD18N4** | **GV3 L50** | 50 | – | **LC1 D50●●** |
| 22 | *30* | **ATV 71WD22N4** | **GV3 L65** | 65 | – | **LC1 D65●●** |
| 30 | *40* | **ATV 71WD30N4** | **NS80HMA80** | 80 | 480 | **LC1 D65●●** |
| 37 | *50* | **ATV 71WD37N4** | **NS100●MA100** | 100 | 800 | **LC1 D80●●** |
| 45 | *60* | **ATV 71WD45N4** | **NS160●MA150** | 150 | 1350 | **LC1 D115●●** |
| 55 | *75* | **ATV 71WD55N4** | **NS160●MA150** | 150 | 1350 | **LC1 D115●●** |
| 75 | *100* | **ATV 71WD75N4** | **NS250●MA150** | 150 | 1350 | **LC1 D150●●** |
| **Three-phase supply voltage 440…480 V 50/60 Hz. Type 2 coordination** | | | | | | |
| 0.75 | *1* | **ATV 71W075N4** | **GV2 L08** | 4 | – | **LC1 D18●●** |
| 1.5 | *2* | **ATV 71WU15N4** | **GV2 L10** | 6.3 | – | **LC1 D18●●** |
| 2.2 | *3* | **ATV 71WU22N4** | **GV2 L14** | 10 | – | **LC1 D18●●** |
| 3 | *–* | **ATV 71WU30N4** | **GV2 L14** | 10 | – | **LC1 D18●●** |
| 4 | *5* | **ATV 71WU40N4** | **GV2 L16** | 14 | – | **LC1 D18●●** |
| 5.5 | *7.5* | **ATV 71WU55N4** | **GV2 L22** | 25 | – | **LC1 D25●●** |
| 7.5 | *10* | **ATV 71WU75N4** | **GV3 L32** | 32 | – | **LC1 D40●●** |
| 11 | *15* | **ATV 71WD11N4** | **GV3 L40** | 40 | – | **LC1 D40●●** |
| 15 | *20* | **ATV 71WD15N4** | **GV3 L50** | 50 | – | **LC1 D50●●** |
| 18.5 | *25* | **ATV 71WD18N4** | **GV3 L50** | 50 | – | **LC1 D50●●** |
| 22 | *30* | **ATV 71WD22N4** | **GV3 L65** | 65 | – | **LC1 D65●●** |
| 30 | *40* | **ATV 71WD30N4** | **NS100●MA100** | 100 | 600 | **LC1 D65●●** |
| 37 | *50* | **ATV 71WD37N4** | **NS100●MA100** | 100 | 600 | **LC1 D80●●** |
| 45 | *60* | **ATV 71WD45N4** | **NS160●MA100** | 100 | 600 | **LC1 D115●●** |
| 55 | *75* | **ATV 71WD55N4** | **NS160●MA150** | 150 | 1350 | **LC1 D115●●** |
| 75 | *100* | **ATV 71WD75N4** | **NS160●MA150** | 150 | 1350 | **LC1 D115●●** |

*(1) Standard power ratings for 400 V 50/60 Hz 4-pole motors.*
*The values expressed in HP conform to the NEC (National Electrical Code).*
*(2) NS80HMA●●, NS●●●●MA: products sold under the Merlin Gerin brand.*
*For references to be completed, replace the dot with the letter corresponding to the circuit-breaker breaking performance (N, H, L).*
*Breaking capacity of circuit-breakers according to standard IEC 60947-2:*

| Circuit-breaker | Icu (kA) for 400 V | | | |
|---|---|---|---|---|
| | | N | H | L |
| **GV2 L08…L14, GV3 L32** | 100 | – | – | – |
| **GV2 L16, L22, GV3 L40…L65** | 50 | – | – | – |
| **NS80HMA** | 70 | – | – | – |
| **NS100●MA** | – | 25 | 70 | 150 |
| **NS160●MA, NS250●MA** | – | 36 | 70 | 150 |
| **Circuit-breaker** | **Icu (kA) for 440 V** | | | |
| | | **N** | **H** | **L** |
| **GV2 L08, GV2 L10, GV3 L32** | 100 | – | – | – |
| **GV2 L14…L22** | 20 | – | – | – |
| **GV3 L40…L65** | 50 | | | |
| **NS100●MA** | – | 25 | 65 | 130 |
| **NS160●MA** | – | 35 | 65 | 130 |

*(3) Composition of contactors:*
*LC1 D18 to LC1 D150: 3 poles + 1 "N/O" auxiliary contact and 1 "N/C" auxiliary contact.*
*(4) Replace ●● with the control circuit voltage reference indicated in the table below:*

| | Volts ∼ | 24 | 48 | 110 | 220 | 230 | 240 |
|---|---|---|---|---|---|---|---|
| **LC1 D** | 50 Hz | **B5** | **E5** | **F5** | **M5** | **P5** | **U5** |
| | 60 Hz | **B6** | **E6** | **F6** | **M6** | **–** | **U6** |
| | 50/60 Hz | **B7** | **E7** | **F7** | **M7** | **P7** | **U7** |

*For other voltages available between 24 V and 660 V, or a DC control circuit, please consult your Regional Sales Office.*

# Variable speed drives
## Altivar 71
Motor starters: supply voltage 380…480 V

DF535086-16-M



103279-14-M



PF107481-28-M



*GV2 L16*
*+*
*LC1 D18●●*
*+*
*ATV 71PU40N4Z*

### Motor starters for UL Type 1/IP 20 drives on base plates

| Motor Power *(1)* | | Drive Reference | Circuit-breaker Reference *(2)* | Rating | Im | Line contactor Reference *(3) (4)* |
|---|---|---|---|---|---|---|
| kW | *HP* | | | A | A | |
| **Three-phase supply voltage 380…415 V 50/60 Hz. Type 2 coordination** | | | | | | |
| 0.75 | *1* | **ATV 71P075N4Z** | **GV2 L08** | 4 | – | **LC1 D18●●** |
| 1.5 | *2* | **ATV 71PU15N4Z** | **GV2 L10** | 6.3 | – | **LC1 D18●●** |
| 2.2 | *3* | **ATV 71PU22N4Z** | **GV2 L14** | 10 | – | **LC1 D18●●** |
| 3 | – | **ATV 71PU30N4Z** | **GV2 L16** | 14 | – | **LC1 D18●●** |
| 4 | *5* | **ATV 71PU40N4Z** | **GV2 L16** | 14 | – | **LC1 D18●●** |
| 5.5 | *7.5* | **ATV 71PU55N4Z** | **GV2 L22** | 25 | – | **LC1 D25●●** |
| 7.5 | *10* | **ATV 71PU75N4Z** | **GV3 L32** | 32 | – | **LC1 D40●●** |
| **Three-phase supply voltage 440…480 V 50/60 Hz. Type 2 coordination** | | | | | | |
| 0.75 | *1* | **ATV 71P075N4Z** | **GV2 L08** | 4 | – | **LC1 D18●●** |
| 1.5 | *2* | **ATV 71PU15N4Z** | **GV2 L10** | 6.3 | – | **LC1 D18●●** |
| 2.2 | *3* | **ATV 71PU22N4Z** | **GV2 L14** | 10 | – | **LC1 D18●●** |
| 3 | – | **ATV 71PU30N4Z** | **GV2 L14** | 10 | – | **LC1 D18●●** |
| 4 | *5* | **ATV 71PU40N4Z** | **GV2 L16** | 14 | – | **LC1 D18●●** |
| 5.5 | *7.5* | **ATV 71PU55N4Z** | **GV2 L22** | 25 | – | **LC1 D25●●** |
| 7.5 | *10* | **ATV 71PU75N4Z** | **GV3 L32** | 32 | – | **LC1 D40●●** |

*(1) Standard power ratings for 400 V 50/60 Hz 4-pole motors.*
*The values expressed in HP conform to the NEC (National Electrical Code).*
*(2) Breaking capacity of circuit-breakers according to standard IEC 60947-2:*

| Circuit-breaker | Icu (kA) for 400 V | | | |
|---|---|---|---|---|
| | | N | H | L |
| **GV2 L08...L14, GV3 L32** | 100 | – | – | – |
| **GV2 L16, L22** | 50 | – | – | – |

*(3) Composition of contactors:*
*LC1 D18 to LC1 D40: 3 poles + 1 "N/O" auxiliary contact and 1 "N/C" auxiliary contact.*
*(4) Replace ●● with the control circuit voltage reference indicated in the table below:*

| | Volts ∿ | 24 | 48 | 110 | 220 | 230 | 240 |
|---|---|---|---|---|---|---|---|
| **LC1 D** | 50 Hz | **B5** | **E5** | **F5** | **M5** | **P5** | **U5** |
| | 60 Hz | **B6** | **E6** | **F6** | **M6** | – | **U6** |
| | 50/60 Hz | **B7** | **E7** | **F7** | **M7** | **P7** | **U7** |

*For other voltages available between 24 V and 660 V, or a DC control circuit, please consult your Regional Sales Office.*

# Variable speed drives
Altivar 71
Motor starters: supply voltage 690 V

DF535086-16-M



103282-14-M



107537-26-M



*GV2 L16*
*+*
*LC1 D25●●*
*+*
*ATV 71HU75Y*

## Motor starters for UL Type 1/IP 20 drives

| Motor | Drive | Circuit-breaker | | | Line contactor |
|---|---|---|---|---|---|
| Power *(1)* | Reference | Reference *(2)* | Rating | Im | Reference *(3) (4)* |
| kW | | | A | A | |
| **Three-phase supply voltage 690 V 50 Hz. Type 2 coordination** | | | | | |
| 2.2 | **ATV 71HU22Y** | **GV2 L10** | 6.3 | – | **LC1 D25●●** |
| 3 | **ATV 71HU30Y** | **GV2 L10** | 6.3 | – | **LC1 D25●●** |
| 4 | **ATV 71HU40Y** | **GV2 L14** | 10 | – | **LC1 D25●●** |
| 5.5 | **ATV 71HU55Y** | **GV2 L14** | 10 | – | **LC1 D25●●** |
| 7.5 | **ATV 71HU75Y** | **GV2 L16** | 14 | – | **LC1 D25●●** |
| 11 | **ATV 71HD11Y** | **GV2 L20** | 18 | – | **LC1 D40●●** |
| 15 | **ATV 71HD15Y** | **GV2 L22** | 25 | – | **LC1 D40●●** |
| 18.5 | **ATV 71HD18Y** | **GV3 L25** | 25 | – | **LC1 D40●●** |
| 22 | **ATV 71HD22Y** | **GV3 L32** | 32 | – | **LC1 D65●●** |
| 30 | **ATV 71HD30Y** | **GV3 L40** | 40 | – | **LC1 D80●●** |
| 37 | **ATV 71HD37Y** | **GV3 L50** | 50 | – | **LC1 D80●●** |
| 45 | **ATV 71HD45Y** | **GV3 L65** | 65 | – | **LC1 D80●●** |
| 55 | **ATV 71HD55Y** | **NS100LMA100** | 100 | 1100 | **LC1 D80●●** |
| 75 | **ATV 71HD75Y** | **NS100LMA100** | 100 | 1100 | **LC1 D95●●** |
| 90 | **ATV 71HD90Y** | **NS400LMA320** | 320 | 2880 | **LC1 F265●●** |
| 110 | **ATV 71HC11Y** | **NS400LMA320** | 320 | 2880 | **LC1 F265●●** |
| 132 | **ATV 71HC13Y** | **NS400LMA320** | 320 | 2880 | **LC1 F265●●** |
| 160 | **ATV 71HC16Y** | **NS400LMA320** | 320 | 2880 | **LC1 F265●●** |
| 200 | **ATV 71HC20Y** | **NS400LMA320** | 320 | 2880 | **LC1 F330●●** |

*(1) Standard power ratings for 690 V 50 Hz 4-pole motors.*
*(2) NS●●●LMA: products sold under the Merlin Gerin brand.*
*Breaking capacity of circuit-breakers according to standard IEC 60947-2:*

| Circuit-breaker | Icu (kA) for 690 V |
|---|---|
| **GV2 L10…L22, GV3 L25, L32** | 4 |
| **GV3 L40…L65** | 5 |
| **NS●●●LMA** | 75 |

*(3) Composition of contactors:*
*LC1 D●●: 3 poles + 1 "N/O" auxiliary contact and 1 "N/C" auxiliary contact.*
*LC1 F●●●: 3 poles. To add auxiliary contacts or other accessories, please consult our specialist catalogue "Motor starter solutions. Control and protection components".*
*(4) Replace ●● with the control circuit voltage reference indicated in the table below:*

| | Volts ∼ | 24 | 48 | 110 | 220 | 230 | 240 |
|---|---|---|---|---|---|---|---|
| **LC1 D** | 50 Hz | **B5** | **E5** | **F5** | **M5** | **P5** | **U5** |
| | 60 Hz | **B6** | **E6** | **F6** | **M6** | – | **U6** |
| | 50/60 Hz | **B7** | **E7** | **F7** | **M7** | **P7** | **U7** |
| **LC1 F** | 40…400 Hz (LX1 coil) | **B7** | **E7** | **F7** | **M7** | **P7** | **U7** |

*For other voltages available between 24 V and 660 V, or a DC control circuit, please consult your Regional Sales Office.*

# Variable speed drives
Altivar 71
Motor starters: supply voltage 690 V

PF048286



## Motor starters for UL Type 1/IP 20 drives

| Motor | Drive | Circuit-breaker | | | Line contactor |
|---|---|---|---|---|---|
| Power *(1)* | Reference | Reference *(2)* | Rating | Im | Reference *(3) (4)* |
| kW | | | A | A | |
| **Three-phase supply voltage 690 V 50 Hz. Type 1 coordination** | | | | | |
| 250 | **ATV 71HC25Y** | **NS630LMA500** | 500 | – | **LC1 F400●●** |
| 315 | **ATV 71HC31Y** | **NS630LMA500** | 500 | – | **LC1 F500●●** |
| 400 | **ATV 71HC40Y** | **NS630LMA500** | 500 | – | **LC1 F630●●** |
| 500 | **ATV 71HC50Y** | **NS630L MicroLogic 5** | 630 | – | **LC1 BL33●●** |
| 630 | **ATV 71HC63Y** | **NS630L MicroLogic 5** | 630 | – | **LC1 BL33●●** |

*(1) Standard power ratings for 690 V 50 Hz 4-pole motors.*
*(2) NS630L: products sold under the Merlin Gerin brand.*
*Breaking capacity of circuit-breakers according to standard IEC 60947-2:*

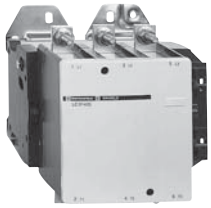
| Circuit-breaker | Icu (kA) for 690 V |
|---|---|
| **NS630L** | 75 |

*(3) Composition of contactors:*
*LC1 F●●●: 3 poles. To add auxiliary contacts or other accessories, please consult our specialist catalogue "Motor starter solutions. Control and protection components".*
*LC1 BL●●: 3 poles. To add auxiliary contacts or other accessories, please consult our specialist catalogue "Motor starter solutions. Control and protection components".*
*(4) Replace ●● with the control circuit voltage reference indicated in the table below:*

| | Volts ∿ | 24 | 48 | 110 | 220 | 230 | 240 |
|---|---|---|---|---|---|---|---|
| **LC1 F** | 40…400 Hz (LX1 coil) | – | **E7** | **F7** | **M7** | **P7** | **U7** |
| **LC1 BL** | 50…400 Hz (WB1 coil) | – | – | **F** | **M** | **P** | **U** |

*For other voltages available between 24 V and 660 V, or a DC control circuit, please consult your Regional Sales Office.*

PF105715



PF107540



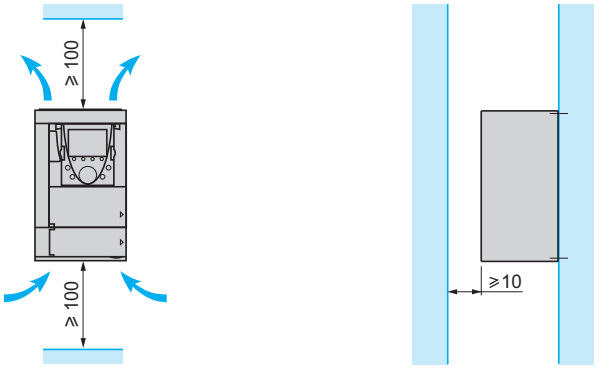
*NS630LMA500*
*+*
*LC1 F400*
*+*
*ATV 71HC25Y*

# Variable speed drives
Altivar 71
UL Type 1/IP 20 drives

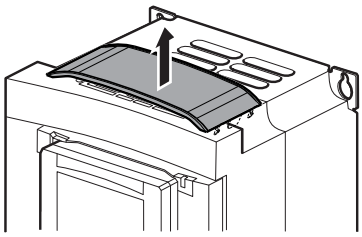
## Mounting recommendations

Depending on the conditions in which the drive is to be used, its installation will require certain precautions and the use of appropriate accessories.
Install the unit vertically:
- Avoid placing it close to heating elements
- Leave sufficient free space to ensure that the air required for cooling purposes can circulate from the bottom to the top of the unit.

**ATV 71H●●●M3, ATV 71HD11M3X…HD45M3X, ATV 71H075N4…HD75N4, ATV 71HU22Y…HD90Y, ATV 71P075N4Z…PD11N4Z**

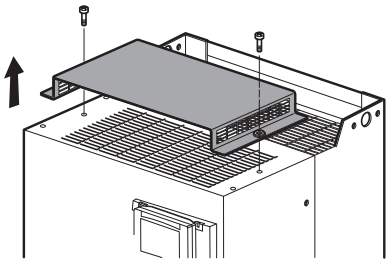



522085



*Removing the protective blanking cover for:*
***ATV 71H●●●M3, ATV 71HD11M3X, HD15M3X, ATV 71H075N4…HD18N4, ATV 71P075N4Z…PD11N4Z***

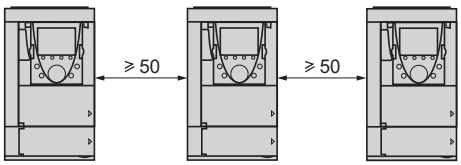
564510



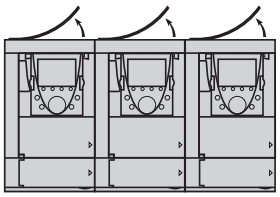
*Removing the protective blanking cover for:*
***ATV 71HD18M3X…HD45M3X, ATV 71HD22N4…HD75N4, ATV 71HU22Y…HD90Y***

## Mounting types

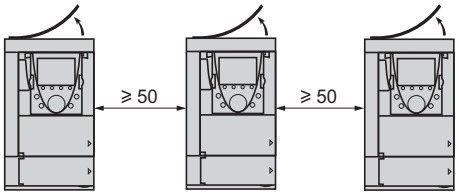
### ■ Type A mounting




### ■ Type B mounting



### ■ Type C mounting




By removing the protective blanking cover from the top of the drive, the degree of protection for the drive becomes IP 20.
The protective blanking cover may vary according to the drive model, see drawings opposite.

***Note:*** *The protective blanking cover must be removed from ATV 71P●●●N4Z drives when they are mounted in a dust and damp proof enclosure.*

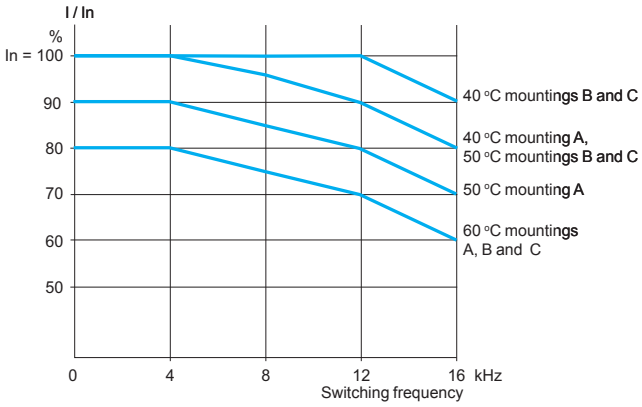
## Mounting recommendations (continued)

### Derating curves for ATV 71H●●●M3, ATV 71HD11M3X...HD45M3X, ATV 71H075N4...HD75N4, ATV 71P075N4Z...PD11N4Z

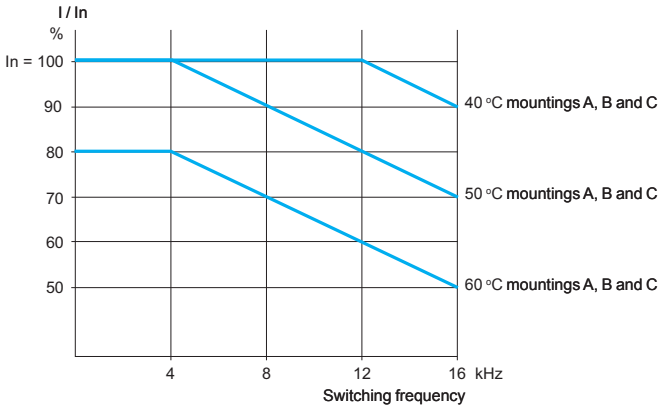
The derating curves for the drive nominal current (In) depend on the temperature, the switching frequency and the mounting type.

For intermediate temperatures (e.g. 55°C), interpolate between 2 curves.

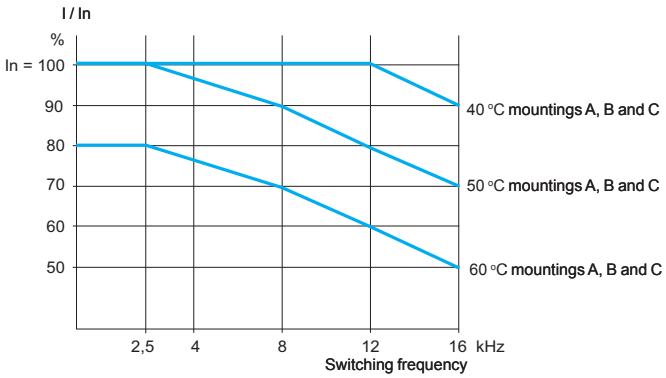
**ATV 71H037M3...HD15M3X, ATV 71H075N4...HD18N4, ATV 71P075N4Z...PD11N4Z**




**ATV 71HD22N4, HD30N4 *(1)***




**ATV 71HD18M3X...HD45M3X, ATV 71HD37N4...HD75N4 *(1)***

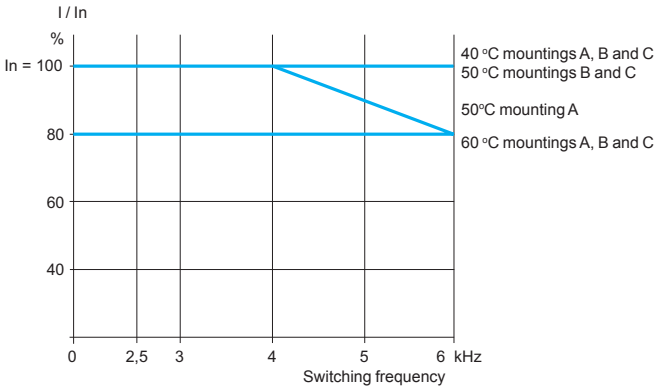



*(1) Above 50°C, ATV 71HD18M3X…HD45M3X and ATV 71HD22N4…HD75N4 drives should be fitted with a control card fan kit. See page 27.*

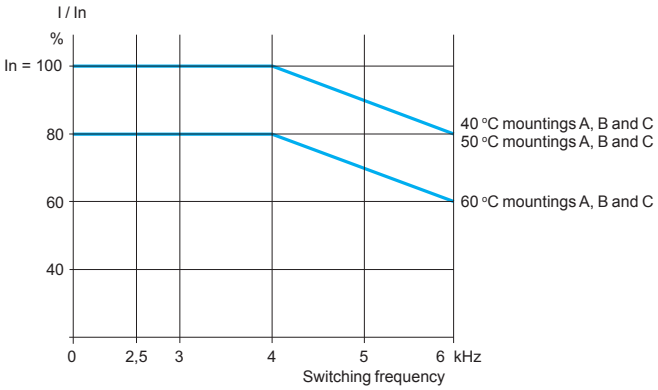
## Mounting recommendations (continued)

### Derating curves for ATV 71HU22Y…HD90Y

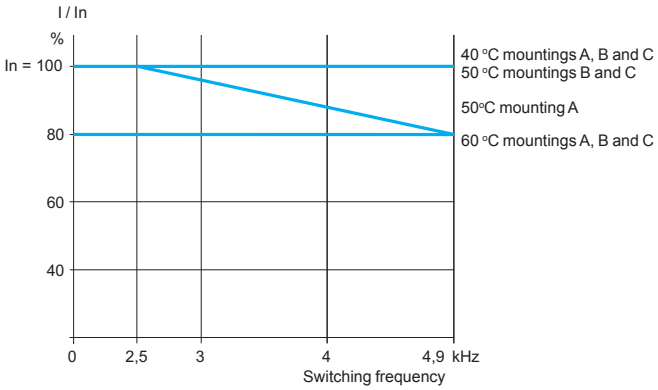
**ATV 71HU22Y…HD15Y** *(1)*



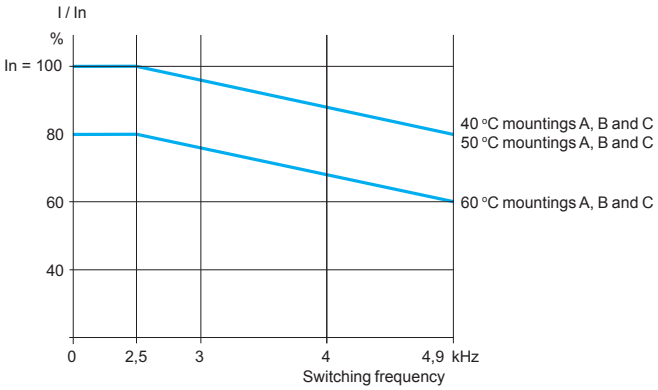

**ATV 71HD18Y…HD30Y** *(1)*




**ATV 71HD37Y…HD55Y** *(1)*



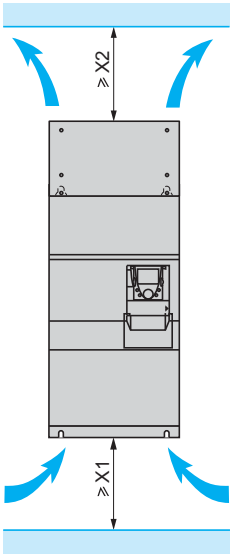

**ATV 71HD75Y, ATV 71HD90Y** *(1)*

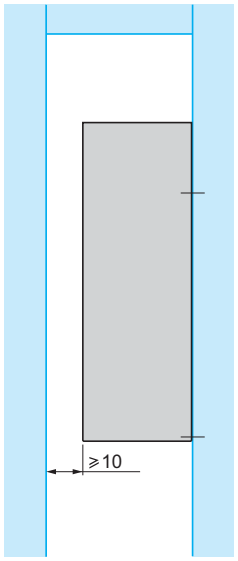



*(1) Above 50°C, ATV 71HU22Y…HD90Y drives should be fitted with a control card fan kit. See page 27.*

## Mounting recommendations (continued)

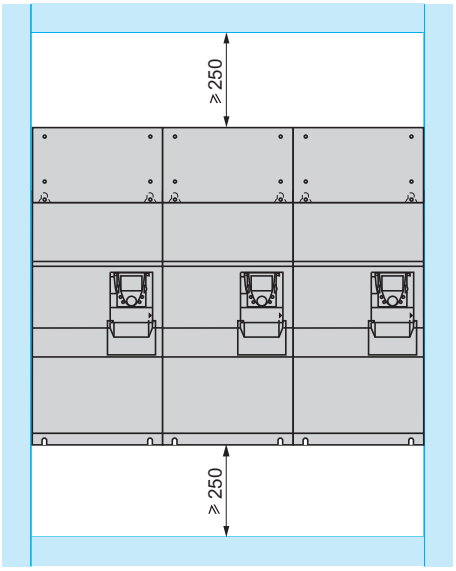
**ATV 71HD55M3X, HD75M3X, ATV 71HD90N4…HC50N4, ATV 71HC11Y…HC63Y**

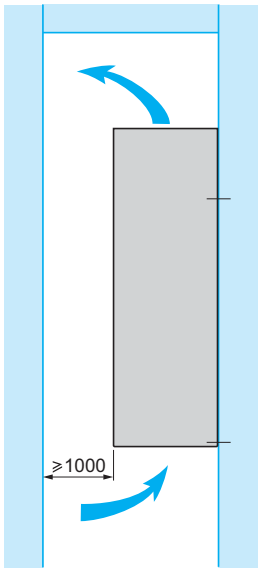



| ATV 71H | X1 | X2 |
|---|---|---|
| D55M3X, D75M3X D90N4 | 100 | 100 |
| C11N4…C16N4, C11Y…C16Y | 150 | 150 |
| C20N4…C28N4, C20Y…C31Y | 150 | 200 |
| C31N4, C40N4 | 250 | 300 |
| C50N4, C40Y…C63Y | 250 | 400 |

These drives can be mounted side by side, observing the following mounting recommendations:



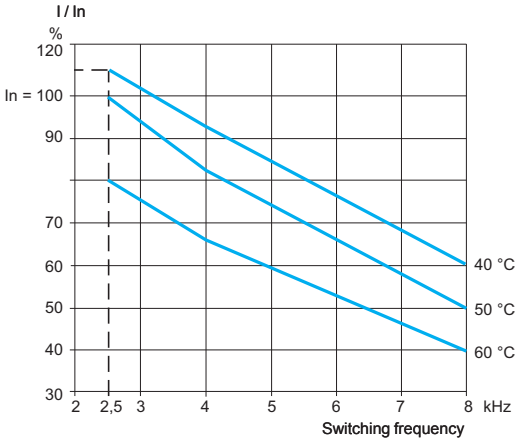
## Mounting recommendations (continued)

### Derating curves for ATV 71HD55MX, HD75MX, ATV 71HD90N4...HC13N4

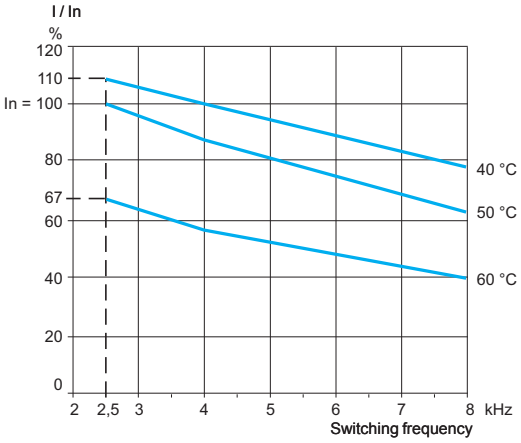
The derating curves for the drive nominal current (In) depend on the temperature, the switching frequency and the mounting type.

For intermediate temperatures (e.g. 55°C), interpolate between 2 curves.

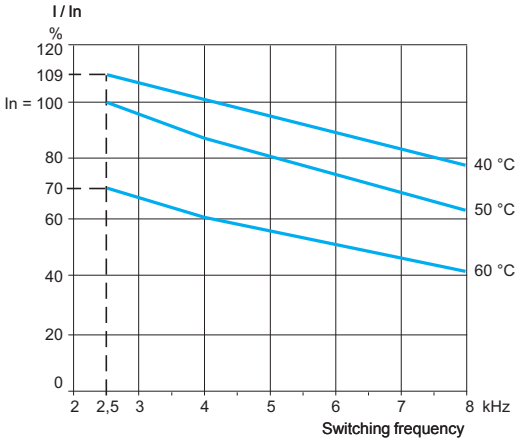
**ATV 71HD55M3X, HD75M3X**



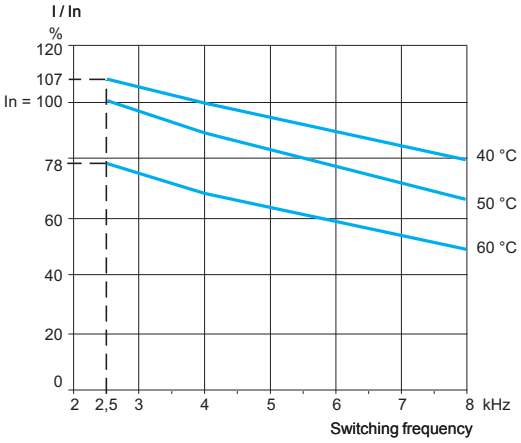

**ATV 71HD90N4**




**ATV 71HC11N4**



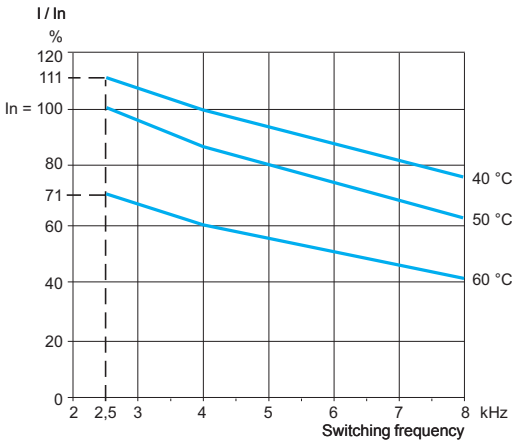

**ATV 71HC13N4**



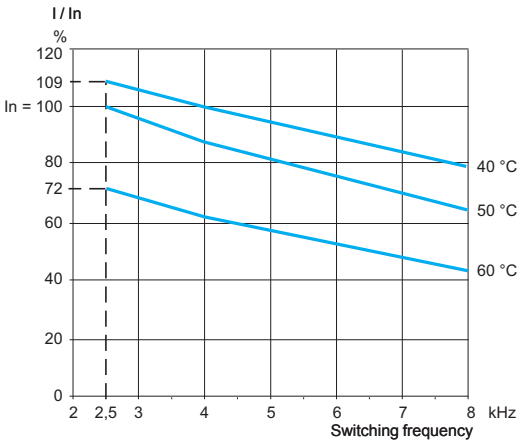
## Mounting recommendations (continued)

### Derating curves for ATV 71HC16N4...HC31N4

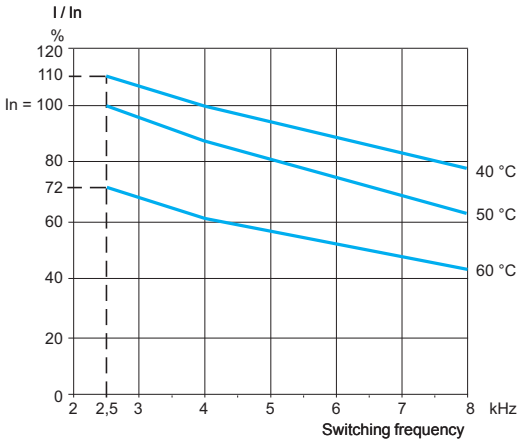
**ATV 71HC16N4**



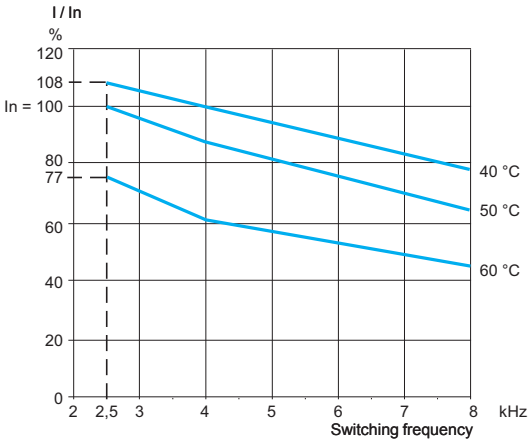

**ATV 71HC20N4**



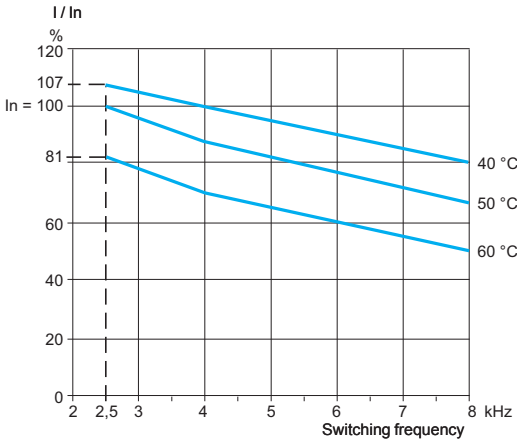

**ATV 71HC25N4 combined with a 220 kW motor**



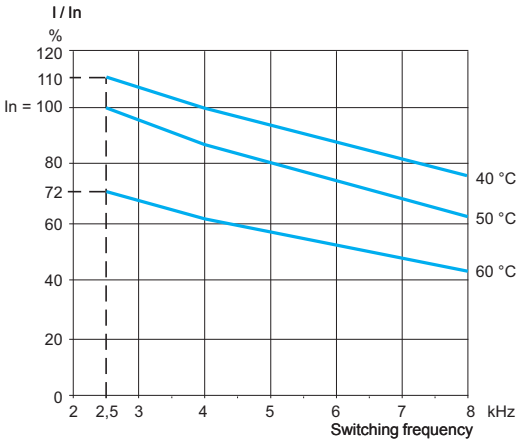

**ATV 71HC25N4 combined with a 250 kW motor**




**ATV 71HC28N4**



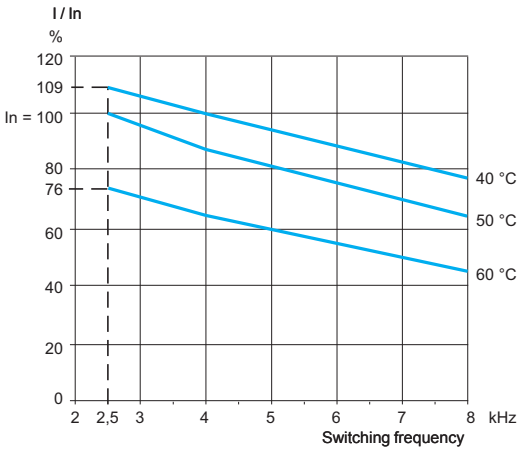

**ATV 71HC31N4**



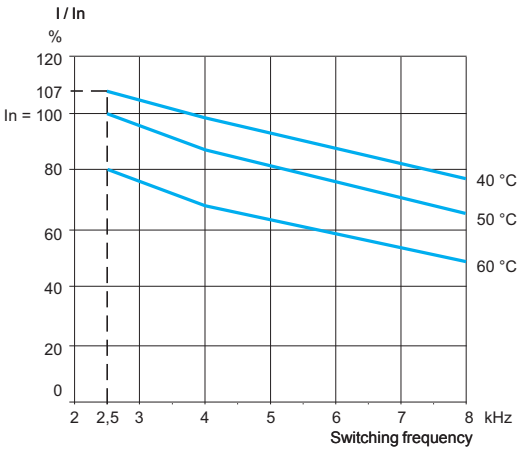
## Mounting recommendations (continued)

### Derating curves for ATV 71HC40N4, HC50N4

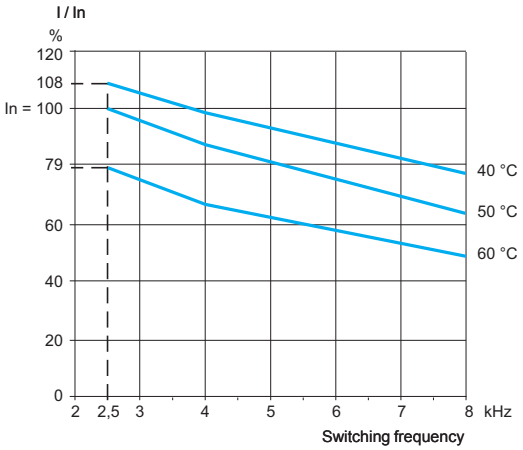
**ATV 71HC40N4 combined with a 355 kW motor**




**ATV 71HC40N4 combined with a 400 kW motor**



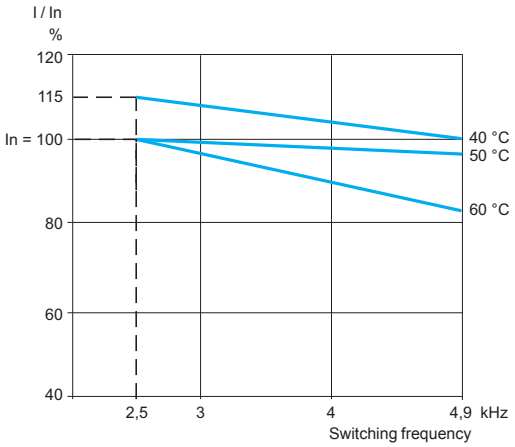

**ATV 71HC50N4**



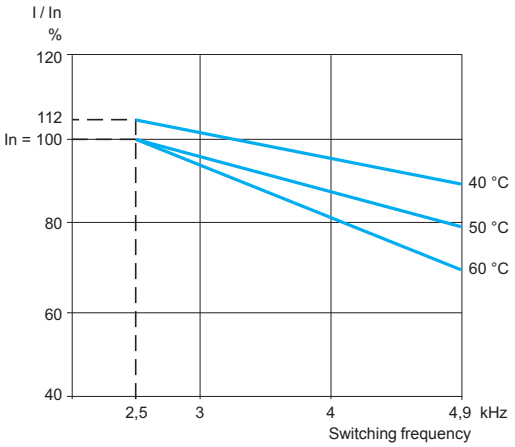
## Mounting recommendations (continued)

### Derating curves for ATV 71HC11Y…HC31Y

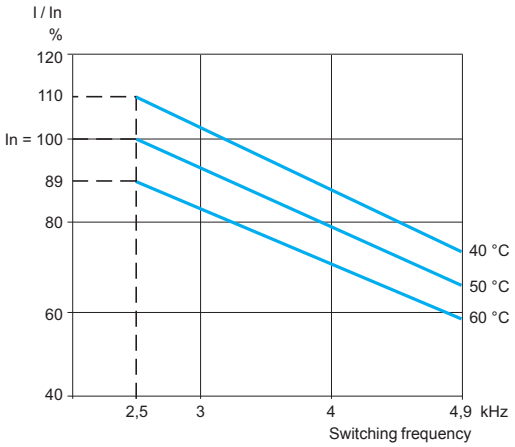
**ATV 71HC11Y**



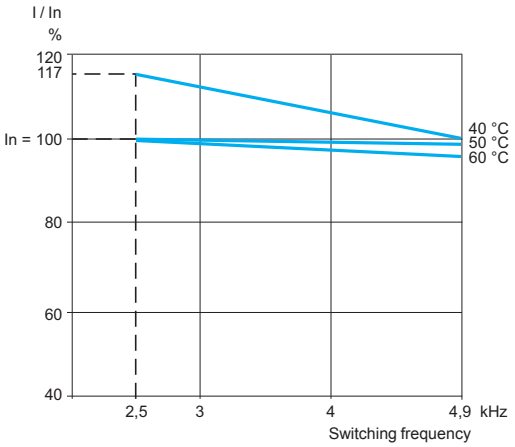

**ATV 71HC13Y**



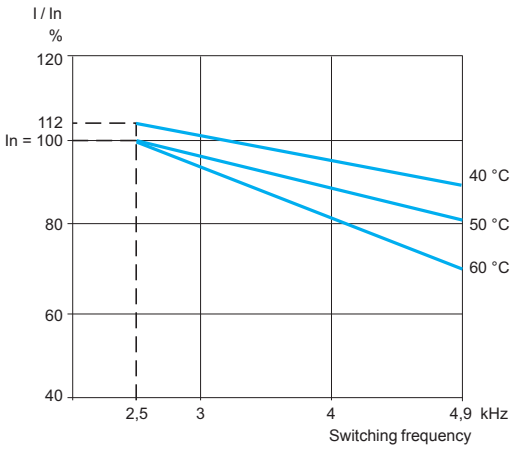

**ATV 71HC16Y**



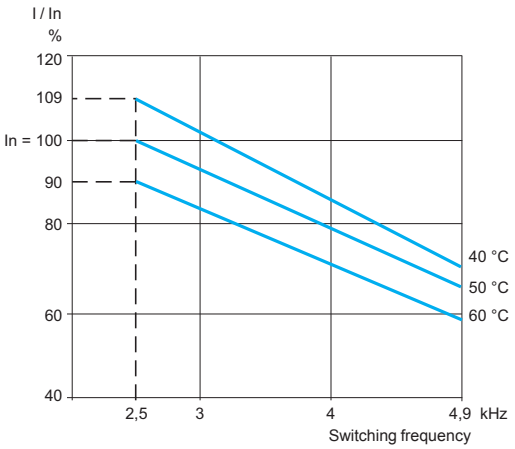

**ATV 71HC20Y**




**ATV 71HC25Y**



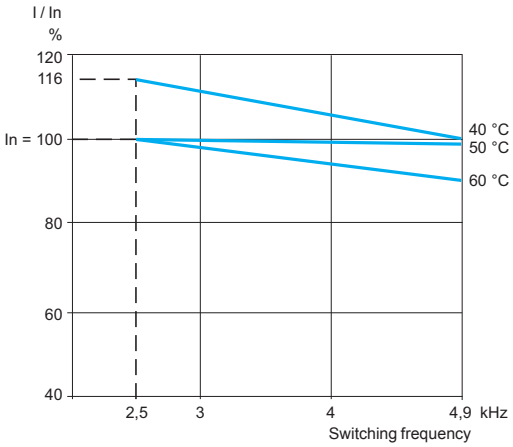

**ATV 71HC31Y**



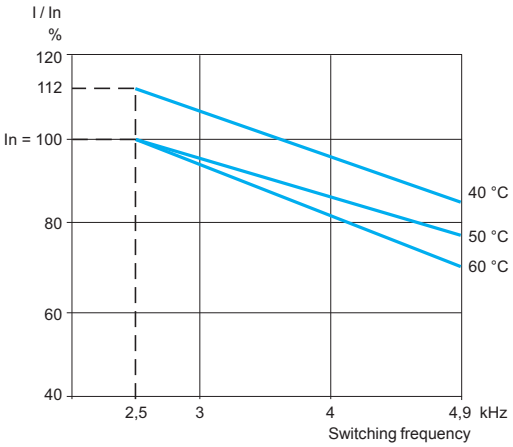
## Mounting recommendations (continued)

### Derating curves for ATV 71HC40Y…HC63Y

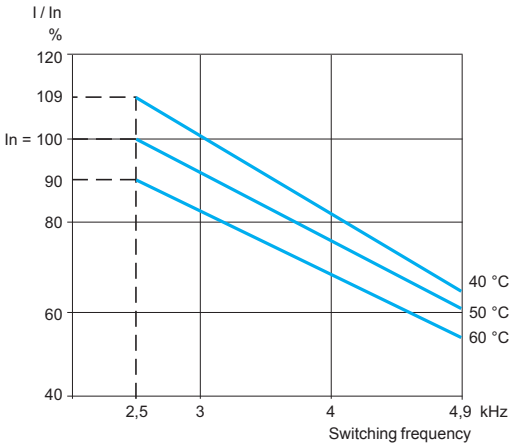
**ATV 71HC40Y**

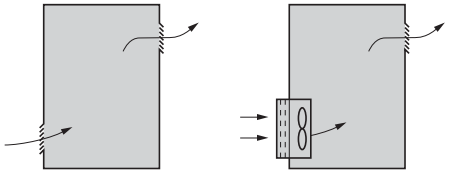



**ATV 71HC50Y**




**ATV 71HC63Y**





## Specific recommendations for mounting ATV 71H●●●M3, ATV 71H●●●M3X, ATV 71H●●●N4 and ATV 71H●●●Y drives in enclosures

Follow the mounting recommendations described on pages 250 to 258.
To ensure proper air circulation in the drive:

- Fit ventilation grilles
- Ensure that there is sufficient ventilation. If there is not, install a forced ventilation unit with a filter. The openings and/or fans must provide a flow rate at least equal to that of the drive fans, see page 261)
- Use special filters with IP 54 protection
- Remove the blanking cover from the top of the drive, see page 250

## Power dissipated inside the enclosure

| For drives | Dissipated power *(1)* | |
|---|---|---|
| | **Mounted in the enclosure** (power section inside the enclosure) | **Dust and damp proof flush-mounted** (power section outside the enclosure) |
| | W | W |
| **Three-phase supply voltage: 200…240 V 50/60 Hz** | | |
| **ATV 71H037M3** | 46 | 25 |
| **ATV 71H075M3** | 66 | 27 |
| **ATV 71HU15M3** | 101 | 30 |
| **ATV 71HU22M3** | 122 | 38 |
| **ATV 71HU30M3** | 154 | 38 |
| **ATV 71HU40M3** | 191 | 41 |
| **ATV 71HU55M3** | 293 | 59 |
| **ATV 71HU75M3** | 363 | 67 |
| **ATV 71HD11M3X** | 566 | 80 |
| **ATV 71HD15M3X** | 620 | 84 |
| **ATV 71HD18M3X** | 657 | 114 |
| **ATV 71HD22M3X** | 766 | 124 |
| **ATV 71HD30M3X** | 980 | 144 |
| **ATV 71HD37M3X** | 1154 | 161 |
| **ATV 71HD45M3X** | 1366 | 180 |
| **ATV 71HD55M3X** | 1715 | 154 |
| **ATV 71HD75M3X** | 2204 | 154 |
| **Three-phase supply voltage: 380…480 V 50/60 Hz** | | |
| **ATV 71H075N4** | 44 | 26 |
| **ATV 71HU15N4** | 64 | 28 |
| **ATV 71HU22N4** | 87 | 30 |
| **ATV 71HU30N4** | 114 | 35 |
| **ATV 71HU40N4** | 144 | 40 |
| **ATV 71HU55N4** | 185 | 50 |
| **ATV 71HU75N4** | 217 | 55 |
| **ATV 71HD11N4** | 320 | 65 |
| **ATV 71HD15N4** | 392 | 85 |
| **ATV 71HD18N4** | 486 | 86 |
| **ATV 71HD22N4** | 574 | 110 |
| **ATV 71HD30N4** | 799 | 133 |
| **ATV 71HD37N4** | 861 | 137 |
| **ATV 71HD45N4** | 1060 | 165 |
| **ATV 71HD55N4** | 1210 | 178 |
| **ATV 71HD75N4** | 1720 | 225 |
| **ATV 71HD90N4** | 2403 | 237 |
| **ATV 71HC11N4** | 2726 | 261 |
| **ATV 71HC13N4** | 3191 | 296 |
| **ATV 71HC16N4** | 3812 | 350 |
| **ATV 71HC20N4** | 4930 | 493 |
| **ATV 71HC25N4** | 5873 | 586 |
| **ATV 71HC28N4** | 6829 | 658 |
| **ATV 71HC31N4** | 7454 | 772 |
| **ATV 71HC40N4** | 9291 | 935 |
| **ATV 71HC50N4** | 11345 | 1116 |

*(1) This value is given for operation at nominal load and for a switching frequency of 2.5 or 4 kHz depending on the rating.*
*Add 7 W to this value for each additional option card.*

## Power dissipated inside the enclosure (continued)

| For drives | Dissipated power *(1)* | |
|---|---|---|
| | **Mounted in the enclosure** (power section inside the enclosure) | **Dust and damp proof flush-mounted** (power section outside the enclosure) |
| | **W** | **W** |
| **Three-phase supply voltage: 500…690 V 50/60 Hz** | | |
| **ATV 71HU22Y** | 111 | 71 |
| **ATV 71HU30Y** | 119 | 71 |
| **ATV 71HU40Y** | 136 | 73 |
| **ATV 71HU55Y** | 158 | 75 |
| **ATV 71HU75Y** | 182 | 77 |
| **ATV 71HD11Y** | 227 | 81 |
| **ATV 71HD15Y** | 300 | 87 |
| **ATV 71HD18Y** | 386 | 94 |
| **ATV 71HD22Y** | 463 | 100 |
| **ATV 71HD30Y** | 556 | 108 |
| **ATV 71HD37Y** | 716 | 120 |
| **ATV 71HD45Y** | 911 | 133 |
| **ATV 71HD55Y** | 1087 | 144 |
| **ATV 71HD75Y** | 1545 | 158 |
| **ATV 71HD90Y** | 1947 | 179 |
| **ATV 71HC11Y** | 2320 | 169 |
| **ATV 71HC13Y** | 2739 | 179 |
| **ATV 71HC16Y** | 3271 | 196 |
| **ATV 71HC20Y** | 4005 | 267 |
| **ATV 71HC25Y** | 5142 | 311 |
| **ATV 71HC31Y** | 6293 | 363 |
| **ATV 71HC40Y** | 7596 | 471 |
| **ATV 71HC50Y** | 9614 | 554 |
| **ATV 71HC63Y** | 11921 | 658 |

*(1) This value is given for operation at nominal load and for a switching frequency of 2.5 or 4 kHz depending on the rating.*
*Add 7 W to this value for each additional option card.*

**Fan flow rate depending on the drive rating**

| For drives | Flow rate m³/hour |
|---|---|
| ATV 71H037M3...HU15M3 | 17 |
| ATV 71HU22M3...HU40M3 | 56 |
| ATV 71HU55M3 | 112 |
| ATV 71HU75M3 | 163 |
| ATV 71HD11M3X, HD15M3X | 252 |
| ATV 71HD18M3X, HD22M3X | 203 |
| ATV 71HD30M3X...HD45M3X | 406 |
| ATV 71HD55M3X | 402 |
| ATV 71HD75M3X | 774 |
| ATV 71H075N4...HU22N4 | 17 |
| ATV 71HU30N4, HU40N4 | 56 |
| ATV 71HU55N4, HU75N4 | 112 |
| ATV 71HD11N4 | 163 |
| ATV 71HD15N4, HD18N4 | 252 |
| ATV 71HD22N4 ... HD37N4 | 203 |
| ATV 71HD45N4...HD75N4 | 406 |
| ATV 71HD90N4 | 402 |
| ATV 71HC11N4 | 774 |
| ATV 71HC13N4 | 745 |
| ATV 71HC16N4 | 860 |
| ATV 71HC20N4...HC28N4 | 1260 |
| ATV 71HC31N4, HC40N4 | 2100 |
| ATV 71HC50N4 | 2400 |
| ATV 71HU22Y...HD30Y | 330 |
| ATV 71HD37Y...HD90Y | 406 |
| ATV 71HC11Y...HC16Y | 600 |
| ATV 71HC20Y...HC31Y | 1200 |
| ATV 71HC40Y...HC63Y | 2400 |

**Dust and damp proof metal enclosure (IP 54 degree of protection)**

The drive must be mounted in a dust and damp proof enclosure in certain environmental conditions: dust, corrosive gases, high humidity with risk of condensation and dripping water, splashing liquid, etc.
This enables the drive to be used in an enclosure where the maximum internal temperature reaches 50°C.

## Calculating the dimensions of the enclosure

**Maximum thermal resistance Rth (°C/W)**

$$Rth = \frac{\theta - \theta e}{P}$$

$\theta$ = maximum temperature inside enclosure in °C
$\theta e$ = maximum external temperature in °C
P = total power dissipated in the enclosure in W

Power dissipated by drive: see page 259 (mounting in an enclosure or flush-mounting in an enclosure).
Add the power dissipated by the other equipment components.

**Useful heat dissipation surface of enclosure S (m²)**

(sides + top + front panel if wall-mounted)

$$S = \frac{K}{Rth}$$

K = thermal resistance per m² of the enclosure

For a metal enclosure:
- K = 0.12 with internal fan
- K = 0.15 without fan

***Note:*** *Do not use insulated enclosures, as they have a poor level of conductivity.*

# Variable speed drives
## Altivar 71
UL Type 1/IP 20 drives on base plates

## Specific recommendations for mounting drives on base plates in a dust and damp proof enclosure or on a machine frame

Follow the mounting recommendations described on pages 250 and 251.

## Power dissipated inside the enclosure

| For drives | Dissipated power *(1)* | |
|---|---|---|
| | Mounted in the enclosure with no fan *(2)* | Mounted in the enclosure with a fan |
| | W | W |
| **Three-phase supply voltage: 380…480 V 50/60 Hz** | | |
| **ATV 71P075N4Z** | 26 | 39 |
| **ATV 71PU15N4Z** | 28 | 41 |
| **ATV 71PU22N4Z** | 30 | 43 |
| **ATV 71PU30N4Z** | 35 | 65 |
| **ATV 71PU40N4Z** | 37 | 67 |
| **ATV 71PU55N4Z** | 40 | 95 |
| **ATV 71PU75N4Z** | 40 | 95 |
| **ATV 71PD11N4Z** | 50 | 115 |

## Specific recommendations for mounting in a dust and damp proof enclosure *(3)*

Drives on base plates can be mounted in a dust and damp proof enclosure in accordance with the following specific recommendations:
- External ambient temperature (heatsink side, see page 31): - 10…+ 40°C
- Temperature inside the enclosure: + 50°C for a switching frequency of 4 kHz, or + 40°C for a switching frequency of 12 kHz
- Remove the blanking cover from the top of the drive, see page 250.

## Specific recommendations for mounting on a machine frame *(3)*

Drives on base plates can also be mounted on a machine frame in accordance with the following specific recommendations:
- Ambient temperature: - 10…+ 40°C
- Thermal resistance (Rth) of the frame less than or equal to the thermal resistance of the kit for mounting in a dust and damp proof enclosure VW3 A9 80●, see page 31
- Aluminium machine frame; mounting on iron frame not recommended
- Support area machined on the frame, to give a surface smoothness of 100 µm and unevenness of 3.2 µm maximum
- Drive mounted in the centre of the support with a minimum thickness and a minimum cooling area, exposed to the open air (see table below)

| For drives | Switching frequency | Minimum area | | Minimum thickness |
|---|---|---|---|---|
| | | With DC choke | With fan | |
| | | $m^2$ | $m^2$ | mm |
| **ATV 71P075N4Z …PU22N4Z** | 4 kHz | – | – | 20 |
| | 12 kHz | 0.60 | 0.70 | 20 |
| **ATV 71PU30N4Z, PU40N4Z** | 4 kHz | 1.50 | – | 20 |
| | 12 kHz | 2.00 | 1.50 | 20 |
| **ATV 71PU55N4Z, PU75N4Z** | 4 kHz | 3.50 | 3.00 | 20 |
| | 12 kHz | 5.40 | 5.00 | 20 |

*(1) This value is given for operation at nominal load and for a switching frequency of 4 Hz. Add 7 W to this value for each additional option card.*
*(2) Add the dissipation of the DC choke, see page 155.*
*(3) For ATV 71PD11N4Z drive, please contact your Regional Sales Office.*

## Definition of thermal resistance

**Thermal resistance Rth of the frame or the cold plate (°C/W)**

| For drives | Maximum Rth (°C/W) |
|---|---|
| **ATV 71P075N4Z** | 0.65 |
| **ATV 71PU15N4Z** | 0.36 |
| **ATV 71PU22N4Z** | 0.24 |
| **ATV 71PU30N4Z** | 0.21 |
| **ATV 71PU40N4Z** | 0.15 |
| **ATV 71PU55N4Z** | 0.03 |
| **ATV 71PU75N4Z** | 0.02 |
| **ATV 71PD11N4Z** | 0.015 |

### Mounting several drives on the same frame or the same cold plate

Determine the equivalent thermal resistance (Rthe) for all the drives:

$$\frac{1}{Rthe} = \frac{1}{Rth1} + \frac{1}{Rth2} + \frac{1}{Rth3} + \ldots + \frac{1}{Rthn}$$

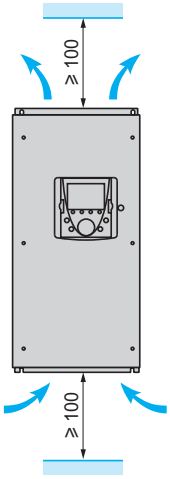
### Calculation example with three drives of 0.75 kW, 1.5 kW and 2.2 kW

$$\frac{1}{Rth} = \frac{1}{0.65} + \frac{1}{0.36} + \frac{1}{0.24}$$ i.e. Rth = 0.12°C/W

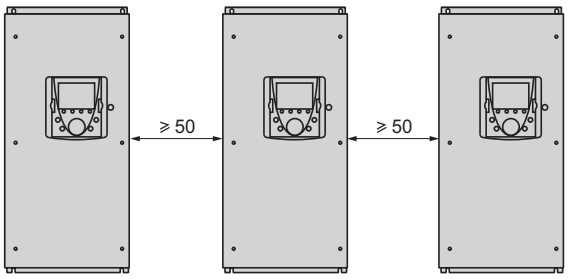
## Mounting recommendations

Depending on the conditions in which the drive is to be used, its installation will require certain precautions and the use of appropriate accessories.
Install the unit vertically:
- Avoid placing it close to heating elements
- Leave sufficient free space to ensure that the air required for cooling purposes can circulate from the bottom to the top of the unit.

**ATV 71W●●●N4**



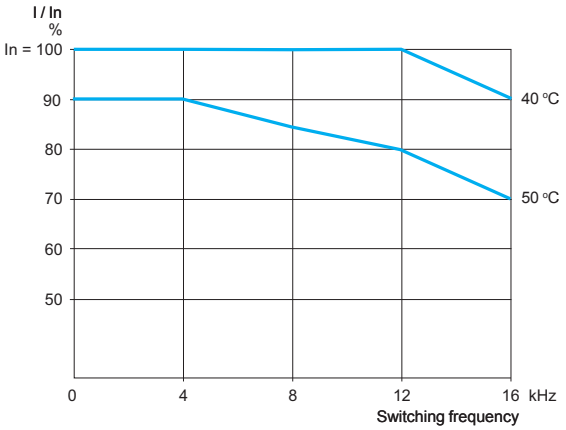

**Mounting**



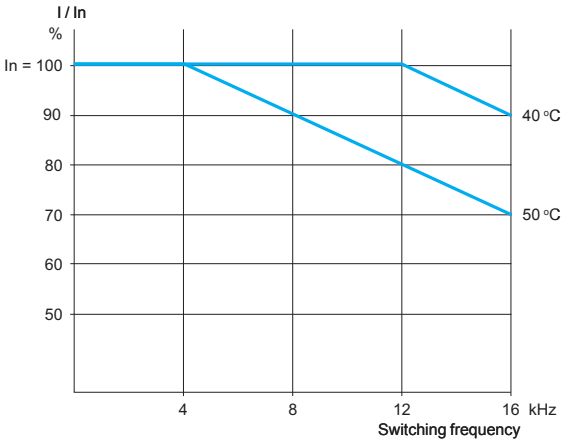
## Mounting recommendations (continued)

### Derating curves for ATV 71W075N4...WD75N4

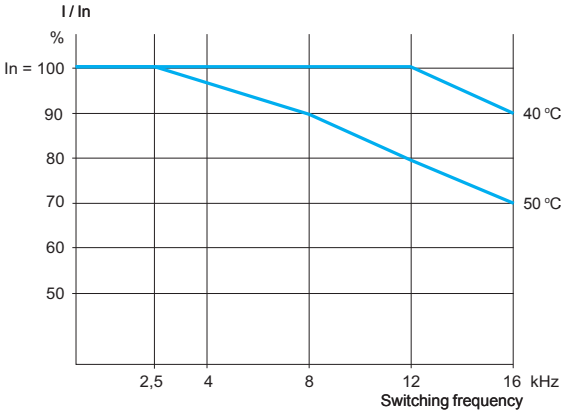
**ATV 71W075N4...WD18N4**




**ATV 71WD22N4, WD30N4**




**ATV 71WD37N4...WD75N4**



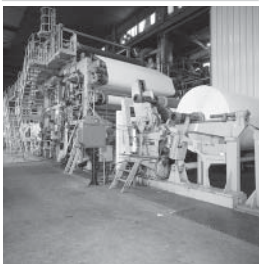
# Variable speed drives
Altivar 71

## Compatible combinations of functions and applications

| Applications | Hoisting | Lift | Material handling |
|---|---|---|---|
| **Machines** | **Cranes, overhead cranes, gantries (vertical hoisting, translation, slewing), lifting platforms** | **Retrofit lifts up to 1.2 ms** | **Palletizers/depalletizers, carton packers, labelling machines, conveyors, roller tables** |
| |  |  |  |
| **Motor control functions** | | | |
| Flux vector control with and without sensor | ■ | ■ | ■ |
| 2-point vector control | ■ | | |
| Synchronous motor without speed feedback | | | |
| Synchronous motor with speed feedback | | ■ | ■ |
| ENA system | | | |
| Voltage/frequency ratio | | | ■ |
| Output frequency 1600 Hz | | | |
| Motor overvoltage limiting | ■ | ■ | ■ |
| **Application functions** | | | |
| Differential bipolar reference | ■ | | ■ |
| Reference delinearization (magnifying glass effect) | ■ | | ■ |
| Frequency control input | | | |
| Operations on references (summing, subtraction, multiplication) | | | ■ |
| Brake control | ■ | ■ | ■ |
| Brake feedback via contact | ■ | | |
| High-speed hoisting | ■ | | |
| Load measurement | ■ | ■ | |
| Load sharing | ■ | | ■ |
| Slack sling | ■ | | |
| Limit switch management | ■ | ■ | ■ |
| S ramp | ■ | ■ | ■ |
| Current limiting | | | |
| Output contactor command | | ■ | |
| Integrity check of output contactor | | ■ | |
| Rescue following power failure | | ■ | |
| Stop on thermal alarm | | ■ | |
| Torque control | | | ■ |
| Torque limit | | | ■ |
| Motor fluxing | ■ | | ■ |
| Parameter set switching | ■ | ■ | ■ |
| Motor switching | ■ | | ■ |
| Position control via limit switches | | | ■ |
| Uncontrolled output cut | | | ■ |
| Torque or current limit detection | | | ■ |
| PID regulator | | | |
| Auto/man. | | | |
| Reference saving | | | |
| +/- speed, single-action button | | | |
| +/- speed, double-action button | ■ | | |
| +/- speed around a reference | | | |
| Traverse control | | | |
| Automatic catching of a spinning load with speed detection (catch on the fly) | | | |
| Undervoltage management | | | |
| Fastest possible stop | | | |

■ **Frequent or necessary use**

**(For other functions that can be used for all applications, see pages 278 to 299)**

| Packing | Textiles | Wood | High inertia | Process |
|---|---|---|---|---|
| **Palletizers/depalletizers, carton packers, labelling machines** | **Weaving looms, carding frames, washing machines, spinners, drawing frames** | **Automatic lathes, saws, milling** | **Centrifuges, mixers, unbalanced machines (beam pumps, presses)** | **Sectional production lines (speed < 500 m/min) Example: building materials** |
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# Variable speed drives
Altivar 71

## Summary of functions


### Remote graphic display terminal functions

| | |
|---|---|
| Description | page 270 |
| Navigation | page 271 |
| Password | page 271 |

### Integrated 7-segment display terminal

| | |
|---|---|
| Presentation | page 272 |

### Start-up

| | |
|---|---|
| Simply Start menu | page 272 |
| Programming using macro-configurations | page 273 |
| MONITORING menu | page 274 |

### Configuration and settings

| | |
|---|---|
| Presentation | page 274 |

### Operation

| | |
|---|---|
| Presentation | page 274 |

### Maintenance, diagnostics

| | |
|---|---|
| Response to faults or alarms | page 275 |
| Fault log and help | page 275 |
| IDENTIFICATION menu | page 275 |
| Test functions | page 275 |
| Oscilloscope function | page 275 |

### Controlling the drive

| | |
|---|---|
| Via the drive I/O | page 276 |
| Via the remote graphic display terminal | page 276 |
| Via a communication network | page 277 |

### Application functions

| | |
|---|---|
| 2-wire control | |
| - State detection | page 278 |
| - Transition detection | page 278 |
| - Forward operation as priority | page 278 |
| 3-wire control | page 278 |
| Phase rotation | page 278 |
| Ramps | |
| - Time | page 278 |
| - Profile (linear, S, U or customized) | page 279 |
| - Switching | page 279 |
| - Automatic adaptation | page 279 |
| Preset speeds | page 280 |
| Jog operation | page 280 |
| Limiting low speed operating time | page 280 |
| Motor control type | |
| - Flux vector control with sensor | page 281 |
| - Sensorless flux vector control | page 281 |
| - 2-point vector Control | page 281 |
| - Voltage/frequency ratio | page 281 |
| - ENA system | page 281 |
| - Synchronous motor | page 281 |
| Using an incremental encoder | page 282 |
| Encoder tests | page 282 |
| Limiting motor overvoltage | page 282 |
| Auto-tuning | page 282 |
| Switching frequency, noise reduction | page 282 |
| Motor fluxing | page 282 |
| Brake control | |
| - Movement type | page 283 |
| - Brake feedback via contact | page 283 |
| - Brake release pulse | page 283 |
| - Brake engage on reversal of operating direction | page 283 |
| - Brake engage request time delay | page 283 |
| - Automatic DC injection | page 283 |

## Summary of functions (continued)

### Application functions (continued)


| | |
|---|---|
| Limit switch management | page 283 |
| Slack sling | page 283 |
| High-speed hoisting | page 284 |
| External weight measurement | page 285 |
| Load sharing | page 285 |
| Output contactor | |
| - Control | page 285 |
| - Integrity check | page 285 |
| Stop on thermal alarm | page 285 |
| Evacuation following power failure | page 285 |
| Uncontrolled output cut | page 286 |
| +/- speed | |
| - Single action buttons | page 286 |
| - Double action buttons | page 286 |
| - Reference saving | page 287 |
| - Around a reference | page 287 |
| Spooling | |
| - Traverse control | page 287 |
| - Counter wobble | page 288 |
| Automatic catching of a spinning load with speed detection | page 288 |
| Undervoltage management | page 289 |
| Braking balance | page 289 |
| Braking resistor thermal protection | page 289 |
| Parameter set switching | page 289 |
| Motor or configuration switching | page 289 |
| Positioning on limit switches | page 290 |
| Short and long cam operation | page 290 |
| Reference switching | page 291 |
| Operations on the references | |
| - Summing inputs | page 291 |
| - Subtraction inputs | page 291 |
| - Multiplication inputs | page 291 |
| PID regulator | |
| - Preset PID references | page 292 |
| - Predictive speed reference | page 292 |
| - Auto/man | page 292 |
| Torque control | page 293 |
| Torque limit | page 294 |
| Torque or current limit detection | page 294 |
| Current limit | page 294 |
| Reference saving | page 295 |
| Stop types | |
| - Freewheel stop | page 295 |
| - Fast stop | page 295 |
| - Fastest possible stop | page 295 |
| - DC injection stop | page 295 |
| Motor thermal protection | page 296 |
| Drive thermal protection | page 296 |
| IGBT thermal protection | page 296 |
| Configuring the drive's fault response | page 297 |
| Resetting resettable faults | page 297 |
| General reset (disables all faults) | page 297 |
| Automatic restart | page 298 |
| PTC probe protection | page 298 |
| IGBT testing | page 298 |
| Resetting operating time to zero | page 298 |
| External fault | page 298 |
| Line contactor control | page 299 |
| Forced local mode | page 299 |




## Remote graphic display terminal functions

This display terminal is attached to the front of the drive. It includes the integrated 7-segment display terminal for drives supplied without a graphic display terminal or for ATV 71HU22Y…HC63Y drives.

■ **Description**

□ **Description of graphic display terminal**

1 Graphic display unit:
- 8 lines, 240 x 160 pixels
- large digit display that can be read from 5 m away
- bar chart display

2 Assignable function keys F1, F2, F3, F4:
- dialogue functions: direct access, help screens, navigation
- application functions: Local/Remote, preset speed

3 STOP/RESET key: local control of motor stopping/fault clearing

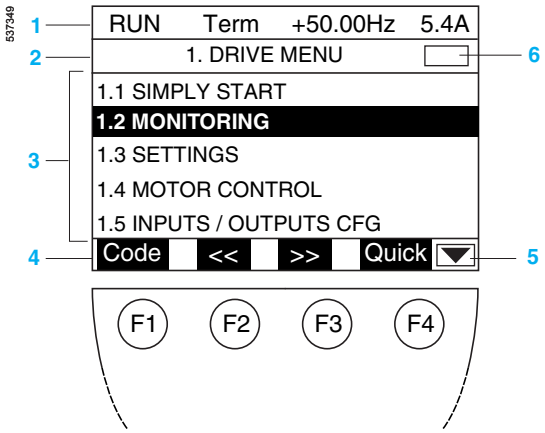
4 RUN key: local control of motor operation

5 Navigation button:
- Press to save the current value (ENT)
- Turn ± to increase or decrease the value, go to the next or previous line

6 FWD/REV key: reverses the direction of rotation of the motor

7 ESC key: aborts a value, parameter or menu to return to the previous option

***Note:*** *keys 3, 4 and 6 can be used to control the drive directly.*




□ **Description of graphic display unit**

1 Display line. Its content can be configured; the factory settings show:
- the drive status (e.g. RUN)
- the active control channel (e.g. “Term”: terminals)
- the frequency reference
- the current in the motor

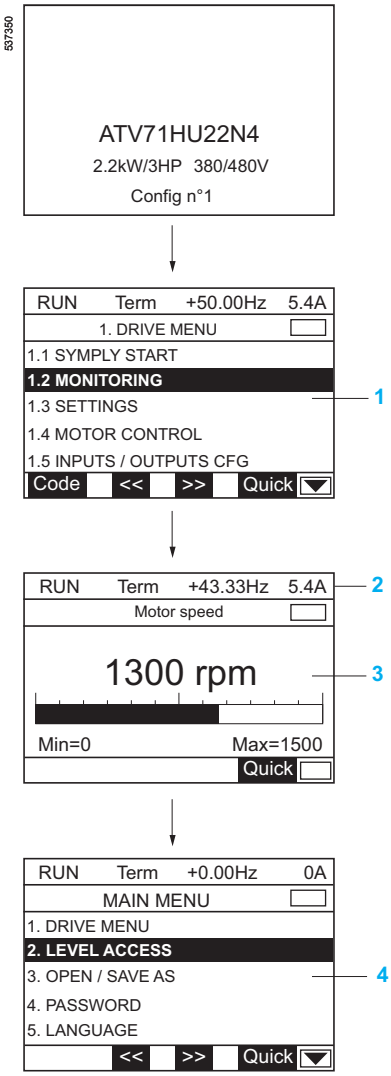
2 Menu line. Indicates the current menu or submenu.

3 Area displaying menus, submenus, parameters, values, bar charts, in the form of a scrolling window, with a maximum of 5 lines.
The line or value selected using the navigation button is displayed in reverse video (see example opposite).

4 Section displaying the functions assigned to the F1 to F4 keys and aligned with them, for example:
- >>: Horizontal scrolling to the right, or proceeding to the next menu or submenu, or, in the case of a value, decreasing the value, displayed in reverse video (see example opposite).
- <<: Horizontal scrolling to the left, or proceeding to the next menu or submenu, or, in the case of a value, increasing the value, displayed in reverse video
- Quick: Rapid access to a parameter from any screen when the Quick function is displayed above the F4 key
- HELP: Contextual help
- Code: Displays the selected parameter code
- Other functions (application functions) can be assigned to these keys via the 1.6 COMMAND menu.

5 ▭ : Means that this display window does not scroll further down.
▼ : Means that this display window can scroll further down.

6 ▲ : Means that this display window can scroll further up.
▭ : Means that this display window does not scroll further up.




## Remote graphic display terminal functions (continued)

■ **Navigation: accessing menus and parameters**

**Structure of main menus:**

1 Drive menu:

| Menu type | Function |
|---|---|
| 1.1 SIMPLY START | Simplified menu for a quick start |
| 1.2 MONITORING | Displays current values for motor, inputs/outputs and communication (command words, status words, etc.) |
| 1.3 SETTINGS | Accesses the adjustment parameters, which can be modified during operation |
| 1.4 MOTOR CONTROL | Accesses the motor parameters, including adjustment of motor control profiles |
| 1.5 INPUTS/OUTPUTS CFG | Configures the I/O and transforms signals |
| 1.6 COMMAND | Configures the command and reference channels |
| 1.7 APPLICATION FUNCT. | Configures the application functions (preset speeds, PID regulator, etc.) |
| 1.8 FAULT MANAGEMENT | Configures the fault management process |
| 1.9 COMMUNICATION | Configures the communication networks |
| 1.10 DIAGNOSTICS | Provides diagnostics for motor and drive, integrated test procedures, fault log |
| 1.11 IDENTIFICATION | Identifies the drive and the internal options |
| 1.12 FACTORY SETTINGS | Restores factory settings (completely or by parameter group) |
| 1.13 USER MENU | Accesses the parameters selected by the user |
| 1.14 PROGRAMMABLE CARD | Accesses the parameters for the Controller Inside programmable card |

2 Display line

3 Display screen: Displays values in the form of bar charts or digital values, depending on the extent of customization.

4 Main menu:

| Menu type | Function |
|---|---|
| 1. DRIVE MENU | See above (1 Drive menu) |
| 2. ACCESS LEVEL | 4 access levels: basic, limited, advanced, expert |
| 3. OPEN/SAVE AS | Transfers files between the graphic display terminal and the drive |
| 4. PASSWORD | Provides password protection for the configuration |
| 5. LANGUAGE | Choice of 6 languages available (English, German, Spanish, French, Italian and Chinese) |
| 6. MONITORING CONFIG. | Customizes the display line 2 and the display screen 3 (bar charts, digital values) |
| 7. DISPLAY CONFIG. | Configures how parameters are displayed: customization, selection for User menu, visibility, accessibility |

■ **Password**

Altivar 71 drives allow individual parameters to be selected for password protection. Rights can be set for save operations and for loading the configuration.

## Integrated 7-segment display terminal

ATV 71●●●●M3, ATV 71HD11M3X, HD15M3X,
ATV 71H075N4…HD75N4 drives can be supplied without a graphic display terminal. In this case, they are equipped with an integrated 7-segment display terminal.

ATV 71P●●●N4Z drives are equipped as standard with an integrated 7-segment display terminal.

ATV 71HU22Y…HC63Y drives are equipped as standard with an integrated 7-segment display terminal as well as the remote graphic display terminal.

The integrated 7-segment display terminal can be used to:
□ Display status and faults
□ Access and modify parameters

## Start-up

The Altivar 71 drive is supplied ready for use for most applications.
When the drive is switched on, the menus for setting the language and access level appear automatically.

537352

| RUN | Term | +50.00Hz | 5.4A |
|---|---|---|---|
| 1.1 SIMPLY START | | | |
| **2/3 wire control** | **:** | | **2 wire** |
| Macro-configuration | : | | M. handling |
| Standard mot. Freq. | : | | 50Hz IEC |
| Rated motor power | : | | 2.2kW |
| Rated motor volt. | : | | 400V |
| Code | << | >> | Quick |

*Simply Start menu*

### ■ Simply Start menu

By accessing the Simply Start menu directly it is possible to:
□ Pre-program the drive for an application:
- Select the relevant macro-configuration
- 2-wire/3-wire control

□ Benefit from optimum motor performance:
- Enter data from the motor rating plate
- Auto-tuning

□ Protect the motor by setting the drive's integrated electronic thermal overload relay

## Start-up (continued)

■ **Programming using macro-configurations**

Programming using macro-configurations offers the choice of seven options corresponding to the various business areas and applications:

- □ Start/stop
- □ Material handling
- □ General use
- □ Hoisting
- □ Lift
- □ PID regulation
- □ Communication network connectivity
- □ Master/slave applications

Choosing one of these macro-configurations automatically assigns the functions, parameters and I/O, even in the case of option cards. Although the configuration is preset, it can still be modified, if necessary.

The Start/stop macro-configuration is set as the factory configuration.
The preset functions for each macro-configuration are given in the table below.

| Type of macro-configuration | | Start/stop | Material handling | General use | Hoisting | Lift (1) | PID regulation | Communication network connectivity | Master/slave application |
|---|---|---|---|---|---|---|---|---|---|
| **Altivar 71 drive I/O** | | | | | | | | | |
| **AI1** | | Ref. channel 1 | Ref. channel 1 | Ref. channel 1 | Ref. channel 1 | Ref. channel 1 | PID reference | Ref. channel 2<br>Ref. channel 1 by bus | Ref. channel 1 |
| **AI2** | | Not assigned | Ref. sum 2 | Ref. sum 2 | Not assigned | Not assigned | PID feedback | Not assigned | Ref. channel torque |
| **AO1** | | Motor freq. | Motor freq. | Motor freq. | Motor freq. | Not assigned | Motor freq. | Motor freq. | Signed torque |
| **2-wire** | **LI1** | Forward | Forward | Forward | Forward | Forward | Forward | Forward | Forward |
| | **LI2** | Reverse | Reverse | Reverse | Reverse | Reverse | Reverse | Reverse | Reverse |
| | **LI3** | Not assigned | 2 speeds preset | JOG | Fault reset | 2 speeds preset | Integral reset PID | Switching ref.2 | Switching torque/speed |
| | **LI4** | Not assigned | 4 speeds preset | Fault reset | Fault assign. ext. | 4 speeds preset | Ref. 2 PID preset | Fault reset | Fault reset |
| | **LI5** | Not assigned | 8 speeds preset | Limit torque | Not assigned | Fault reset | Ref. 4 PID preset | Not assigned | Not assigned |
| | **LI6** | Not assigned | Fault reset | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned |
| **3-wire** | **LI1** | Stop | Stop | Stop | Stop | Stop | Stop | Stop | Stop |
| | **LI2** | Not assigned | Not assigned | Not assigned | Not assigned | Forward | Not assigned | Not assigned | Not assigned |
| | **LI3** | Reverse | Reverse | Reverse | Reverse | Reverse | Reverse | Reverse | Reverse |
| | **LI4** | Not assigned | 2 speeds preset | JOG | Fault reset | 2 speeds preset | Integral reset PID | Switching ref.2 | Switching torque/speed |
| | **LI5** | Not assigned | 4 speeds preset | Fault reset | Fault assign. ext. | 4 speeds preset | Ref. 2 PID preset | Fault reset | Fault reset |
| | **LI6** | Not assigned | 8 speeds preset | Limit torque | Not assigned | Fault reset | Ref. 4 PID preset | Not assigned | Not assigned |
| **R1** | | Faulty | Faulty | Faulty | Faulty | Faulty | Faulty | Faulty | Faulty |
| **R2** | | Not assigned | Not assigned | Not assigned | Brake control | Brake control | Not assigned | Not assigned | Not assigned |
| **I/O extension card I/O** | | | | | | | | | |
| **2-wire** | **LI7** | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned |
| **3-wire** | **LI7** | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned |
| **LI8 to LI14** | | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned |
| **LO1 to LO4** | | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned |
| **R3/R4** | | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned |
| **AI3, AI4** | | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned |
| **RP** | | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned |
| **AO2** | | Motor current | Motor current | Motor current | Motor current | Motor current | Motor current | Motor current | Motor current |
| **AO3** | | Not assigned | Signed torque | Not assigned | Signed torque | Signed torque | PID output | Not assigned | Motor freq. |
| **Graphic display terminal keys** | | | | | | | | | |
| **F1 key** | | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned | Control via graphic display terminal | Not assigned |
| **F2, F3, F4 keys** | | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned | Not assigned |

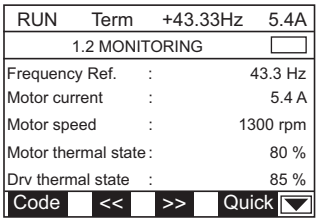
*(1) The "Lift" macro-configuration is programmable only on ATV 71H●●●●●383 variable speed drives (see pages 22 and 23).*

## Start-up (continued)

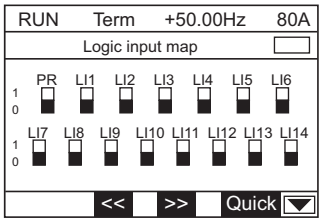
■ **MONITORING menu**

The MONITORING menu can be used to display commands, the operation of the motor and the application via the drive, its I/O or the communication network connections.

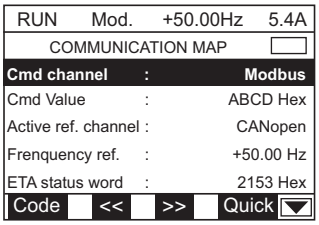
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*Displaying physical values*




*Logic input map*

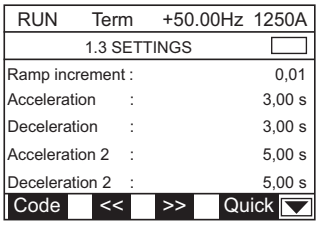



*Communication map*

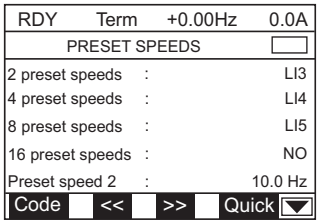
## Configuration and settings

The SETTINGS menu can be used to configure all the drive's settings.
Activating a function automatically provides access to the related settings on the same screen (the application functions are described on pages 278 to 299).

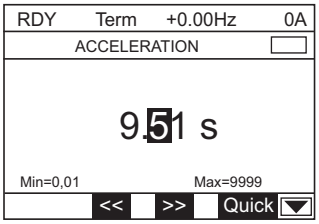
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*Settings screen*




*Setting a function*



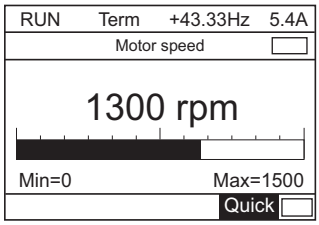

*Configuring a value*

## Operation

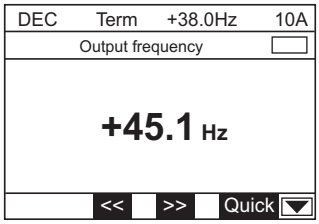
The display screen appears automatically every time the drive is turned on.
There are various possibilities:

- One or two bar charts are displayed.
- One, two or five digital values are displayed.

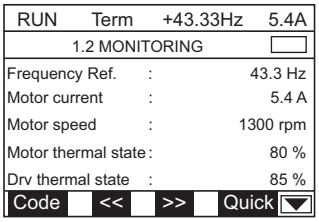
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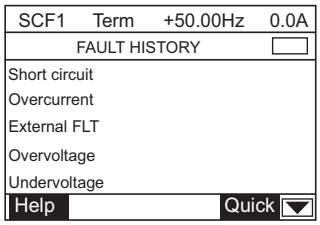

*1 bar chart*



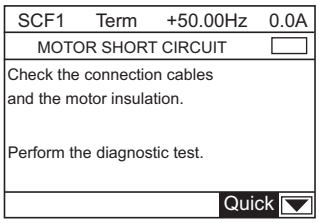

*1 digital value*



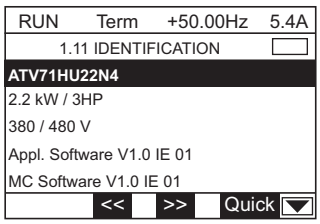

*5 digital values*



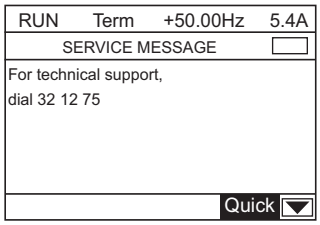

*Fault log*




*Troubleshooting screen*




*Identification screen*




*Example of a customized message*

## Maintenance, diagnostics

New functions have been added to the Altivar 71 drive to enable it to provide quick and simple maintenance, ultimately boosting productivity:

### ■ Response to faults or alarms

It is possible to use the alarm management or drive operation configuration functions to take corrective actions before stopping the machine.

### ■ Fault log and help

When a fault occurs, a help screen is available to quickly identify the cause of the fault.
When a fault occurs, values such as speed, current, thermal state and timer are saved and restored in the fault log.
The last 8 faults are stored.

### ■ IDENTIFICATION menu

The IDENTIFICATION menu can be used to display the relevant serial numbers and software versions, thereby helping to manage the equipment base. This information, also available with the PowerSuite software workshop, can be exported to other database-type software applications.

### ■ Test functions

The Altivar 71 drive includes the following test functions:
□ Identifying any motor short-circuit before start-up
□ Running, via the graphic display terminal or PowerSuite software workshop, automatic procedures during maintenance operations to test:
- the motor
- the drive power components

The test results are shown on the graphic display terminal or using the PowerSuite software workshop.
It is also possible to write and read messages in the drive using the graphic display terminal or the PowerSuite software workshop.

### ■ Oscilloscope function

The Altivar 71 drive has an oscilloscope function, which produces traces that can be viewed using the PowerSuite software workshop.
The PowerSuite software workshop can also be used to carry out remote diagnostics via modem.

## Controlling the drive

■ **Via the drive I/O**

Control signals are transmitted via cable to the I/O. Functions are assigned to logic inputs, analog inputs, etc.
A logic input can be assigned to more than one function. This means that two functions can be controlled using a single signal, thereby limiting the number of inputs required.

The Altivar 71 drive I/O can be configured independently from each other.
For instance,
□ A time delay can be applied when it comes to reading the logic inputs, so as to avoid any bounce-back from certain switches.
□ Transforming incoming signals on the analog inputs can help the drive fully adapt to the control devices and applications:
- Minimum and maximum values for the input signal
- Input filtering in order to eliminate unwanted interference from the signals received
- Magnifying glass effect through delinearizing the input signal in order to increase the precision with small amplitude signals
- “Pedestal” and “Deadband” functions for signals in order to prevent low speed operations which can have an adverse effect on the application
- “Mid-point” function, which can be used from a unipolar input signal to obtain a bipolar output signal to control the speed and direction of rotation

□ Transforming analog outputs which transfer information sent by the drive to other devices (display units, drives, PLCs, etc.):
- voltage or current output signal
- minimum and maximum values for the output signal
- output signal filtering

Logic outputs can be delayed on activation and deactivation.
The output state can also be configured when the signal is active.
The frequency control signals are also transformed by the drive:
□ signal frequency minimum and maximum values (30 kHz on the extended I/O card’s RP input, 300 kHz maximum on the encoder interface card input).

■ **Via the remote graphic display terminal**

The rotation commands and references (torque, speed or PID) can be controlled via the graphic display terminal. Some application functions can also be assigned to the function keys F1, F2, F3 and F4 on the graphic display terminal. It is possible to manage a change in command and/or reference source (bumpless function) in different ways.
For example: two options are offered when switching from control via the terminals to control via the graphic display terminal:
□ stop the Altivar 71 drive, or
□ continue operation with a copy of the direction of rotation and reference

## Controlling the drive (continued)

■ **Via a communication network**

□ **I/O profile**

The I/O profile, which is quick and easy to use, can be used to control the Altivar 71 drive via the communication network, in the same way as via the I/O terminals.
When commands are sent via a network they are written in a command word.
This word behaves like virtual terminals containing logic inputs.
Application functions can be assigned to the bits of this word. More than one function can be assigned to the same bit.

The commands and references can come from different sources, such as the terminals, graphic display terminal or communication networks.
Each source can be set or switched individually using logic inputs or command word bits.

The I/O profile is supported by all integrated communication ports (Modbus, CANopen machine bus), as well as by all the communication cards available (Modbus TCP, Fipio, PROFIBUS DP, etc.).

□ **CiA 402 profile ("Device Profile Drives and Motion Control")**

This profile, from the CiA (CAN in Automation) organization, describes standard functions, parameters and operation for variable speed drives.
This standard is an extension of the Drivecom profile. The Altivar 71 drive complies with the CiA 402 profile which supports the following 2 modes: separate and not separate.

**Separate mode**

The Start/Stop commands and references can come from different sources.
E.g. the speed reference is transmitted by the Modbus TCP network and the Start/Stop commands by the logic signals wired on the terminals.

Each source can be set or switched individually using logic inputs or command word bits.

**Not separate mode**

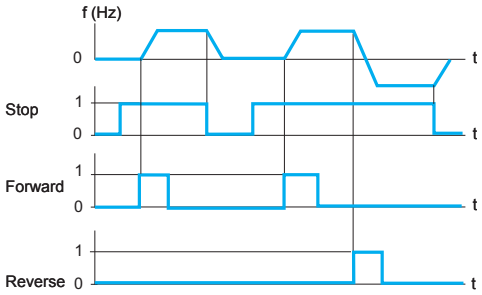
The Start/Stop commands and references (speed, torque, PID, etc.) come from the same source (e.g. CANopen machine bus).

It is possible to replace this source by another one, using a logic input or command word bit.

The CiA 402 profile is supported by all integrated communication ports (Modbus, CANopen machine bus), as well as by all the communication cards available (Modbus TCP, Fipio, PROFIBUS DP, etc.).

□ **CIP profile**

The CIP profile is supported by the DeviceNet communication card.



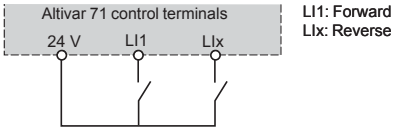

*Example of 3-wire control operation*

## Application functions

### ■ 2-wire control

This function is used to control the direction of operation by means of a stay-put contact.
It is enabled by means of 1 or 2 logic inputs (non-reversing or reversing).

This function is suitable for all non-reversing and reversing applications.
3 operating modes are possible:
- □ Detection of the state of the logic inputs
- □ Detection of a change in state of the logic inputs
- □ Detection of the state of the logic inputs with forward operation always having priority over reverse

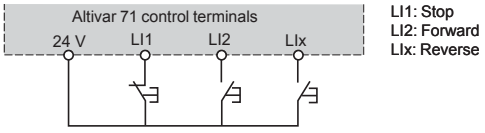



*Wiring diagram for 2-wire control*

### ■ 3-wire control

This function is used to control the operating and stopping direction by means of pulsed contacts.
It is enabled by means of 2 or 3 logic inputs (non-reversing or reversing).

This function is suitable for all non-reversing and reversing applications.




*Wiring diagram for 3-wire control*

### ■ Phase rotation

This function can be used to reverse the direction of rotation without modifying the drive wiring.

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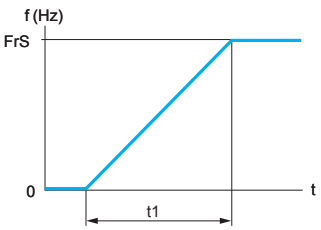
| RDY | Term | +0.00Hz | 0.0A |
|---|---|---|---|
| RAMP | | | |
| Ramp shape | : | | Linear |
| Ramp increment | : | | 0.01 |
| Acceleration | : | | 3.92 s |
| Deceleration | : | | 0.54 s |
| Ramp 2 threshold | : | | 0.0 Hz |
| Code | | | Quick |

*Ramp settings*

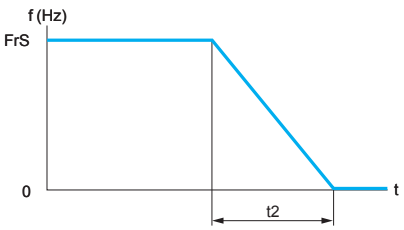
### ■ Ramps

#### □ Acceleration and deceleration ramp times

This function is used to define acceleration and deceleration ramp times according to the application and the machine dynamics.




*Linear acceleration ramp*




*Linear deceleration ramp*

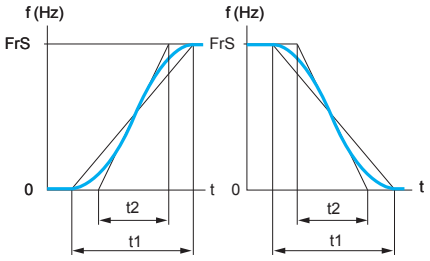
FrS: Nominal motor frequency
t1: Acceleration time
t2: Deceleration time
t1 and t2 can be set independently from 0.01 to 9999 s
(according to one of the following ramp increments: 0.01 s, 0.1 s or 1 s)
Factory setting: 3 s.

### □ Acceleration and deceleration ramp profile

Used to gradually increase the output frequency starting from a speed reference, following a linear profile or a preset profile.

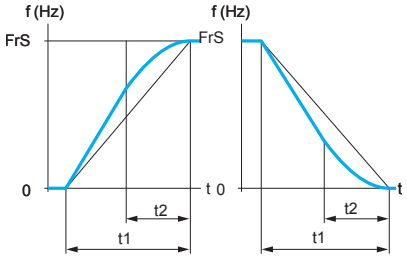
In the case of applications involving handling, packaging and passenger transport, the use of S ramps takes up mechanical play and eliminates jolts, and also limits "non-following" of speed during rapid transient operation of high-inertia machines. Selecting "linear", "S", "U" or customized profiles assigns both the acceleration and deceleration ramps.

**S ramps**



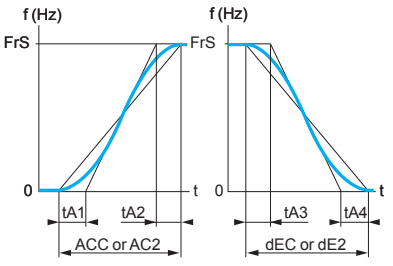

FrS: Nominal motor frequency
t1: Ramp time set
t2 = 0.6 x t1
The curve coefficient is fixed.

**U ramps**

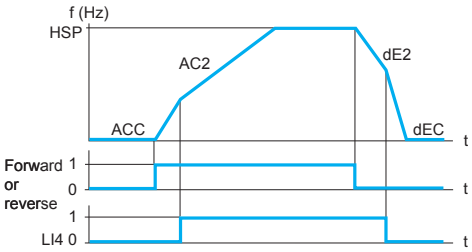



FrS: Nominal motor frequency
t1: Ramp time set
t2 = 0.5 x t1
The curve coefficient is fixed.

**Customized ramps**




FrS: Nominal motor frequency
tA1: Adjustable between 0 and 100% (of ACC or AC2)
tA2: Adjustable between 0 and (100% - tA1) (of ACC or AC2)
tA3: Adjustable between 0 and 100% (of dEC or dE2)
tA4: Adjustable between 0 and (100% - tA3) (of dEC or dE2)
ACC: Acceleration ramp 1 time
AC2: Acceleration ramp 2 time
dEC: Deceleration ramp 1 time
dE2: Deceleration ramp 2 time




*Example of switching using logic input LI4*

Acceleration 1 (ACC) and deceleration 1 (dEC):
- Adjustment 0.01 to 9999 s
- Factory setting 3 s

Acceleration 2 (AC2) and deceleration 2 (dE2):
- Adjustment 0.01 to 9999 s
- Factory setting 5 s

HSP: High speed.

### □ Ramp switching

This function is used to switch two acceleration and deceleration ramp times, which can be adjusted separately.
Ramp switching can be enabled by:
- a logic input
- a frequency threshold
- a combination of the logic input (or a command word bit) and the frequency threshold
- a command word bit

This function is suitable for:
- material handling with smooth starting and approach
- machines with fast steady state speed correction

### □ Automatic adaptation of deceleration ramp

Used to automatically adapt the deceleration ramp if the initial setting is too low when the load inertia is taken into account. This function prevents the drive from locking in the event of an overbraking fault.
When this function is active and a short deceleration time has been set, the drive optimizes the motor power supply in order to achieve a high braking torque.

This function is suitable for all applications not requiring precise stopping and not using braking resistors.

Automatic adaption must be disabled for machines with a stop position on a ramp and using a braking resistor. This function is automatically disabled if the brake sequence is configured.

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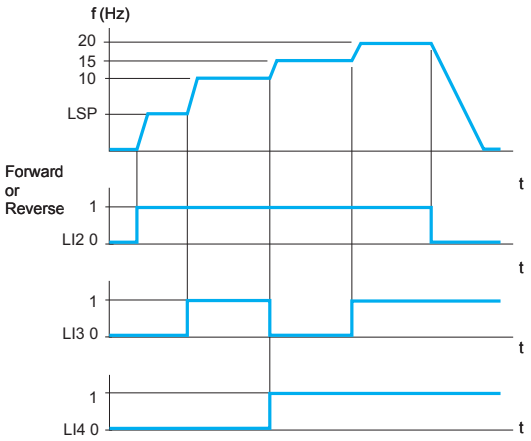
| RDY | Term | +0.00Hz | 0.0A |
|---|---|---|---|
| PRESET SPEEDS | | | |
| 2 preset speeds | : | | LI3 |
| 4 preset speeds | : | | LI4 |
| 8 preset speeds | : | | LI5 |
| 16 preset speeds | : | | NO |
| Preset speed 2 | : | | 10.0 Hz |
| Code | << | >> | Quick |

*Preset speed settings*

## ■ Preset speeds

This can be used to switch preset speed references.
Choose between 2, 4, 8 or 16 preset speeds.
It is enabled by means of 1, 2, 3 or 4 logic inputs.
Preset speeds can be set in increments of 0.1 Hz, from 0 Hz to 500 Hz or 1000 Hz, depending on the rating.

This function is suitable for material handling and machines with several operating speeds.




The speed achieved with the LI3 and LI4 inputs at 0 is LSP or reference speed, resulting from the operations carried out on the references.

Factory settings:

1st speed: LSP (low speed or speed reference)

2nd speed: 10 Hz

3rd speed: 15 Hz

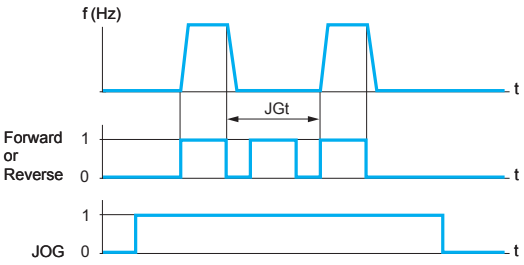
4th speed: 20 Hz

*Example of operation with 4 preset speeds and 2 logic inputs*

## ■ Jog operation

This can be used for pulse operation with minimum ramp times (0.1 s), limited speed reference and minimum time between 2 pulses.
It is enabled by 1 logic input and pulses given by the operating direction command.

This function is suitable for machines with product insertion in manual mode (e.g. gradual movement of the mechanism during maintenance operations).




Speed reference: Adjustable from 0 to 10 Hz, factory setting 10 Hz.

JGt: minimum time between 2 pulses, which can be set between 0.5 and 2 s.

*Example of jog operation*

## ■ Limiting low speed operating time

The motor is stopped automatically after a period of operation at low speed (LSP) with a zero reference and a run command present.
This time can be set between 0.1 and 999.9 seconds (0 corresponds to an unlimited time). Factory setting 0 s. The motor restarts automatically on the ramp when the reference reappears or if the run command is interrupted and then re-established.

Function suitable for automatic Stops/Starts.

■ **Motor control types**

□ **Flux vector control with sensor (FVC)**
In current mode, this control type can be used to obtain the best static and dynamic torque performance.

□ **Sensorless flux vector control**
In voltage mode, this control type can be used with a single motor or motors connected in parallel.
In current mode, this profile performs better than the previous type, but it cannot supply power to motors connected in parallel.

□ **2-point vector control**
The zone for operating at constant power can be optimized by defining an additional point in the control profile.
This function should be used with motors offering a two-part defluxing zone.
It can be used to limit the voltage at the motor terminals when the motor is being powered by a high line supply.

□ **Voltage/frequency ratio**
This control type is particularly suitable for special motors (high-speed motors, synchronized asynchronous motors, etc.). The ratio can be adjusted by 2 or 5 points and used to achieve output frequencies of up to 1000 Hz.

□ **ENA system**
This profile is reserved for unbalanced machines (presses, etc.). It can be used to reduce mechanical stress, power consumption and avoid the use of braking resistors.

□ **Synchronous motor**
This control type is exclusively reserved for controlling open loop synchronous permanent magnet motors with sinusoidal electromotive force (EMF).

■ **Using an incremental encoder**
The Altivar 71 drive uses encoder feedback to:
□ Operate in FVC closed loop control mode. In addition to the torque performance and speed accuracy it provides, the speed feedback can also be used to manage overspeed and slipping protection.
□ Improve the steady state speed accuracy and/or manage overspeed and slipping protection in the other control types (FVC open loop control mode and U/f ratio)
□ Manage only overspeed and slipping protection

■ **Encoder tests**
The Altivar 71 drive can detect encoder signal loss, as well as a mechanical break in the coupling between encoder and motor.

■ **Limiting motor overvoltage**
The Altivar 71 drive inverter bridge control can be used to limit overvoltage in the motor terminals, which is double the voltage level in the DC bus (Stressless PWM). This function is useful in cases where long lengths of cabling, rewound motors or motors in a low isolation class are involved.

■ **Auto tune**
Auto-tuning can be performed:
□ using a dialogue tool (graphical display terminal, PowerSuite software workshop, integrated 7-segment display terminal)
□ via a communication network
□ automatically every time the drive is switched on
□ by enabling a logic input

Auto-tuning is used to optimize application performance.
In Flux Vector Control mode (FVC closed loop and FVC open loop with current control), certain parameters are measured periodically.
Saving the motor thermal state can help to compensate exactly for the motor resistors, even after the drive has been switched off.

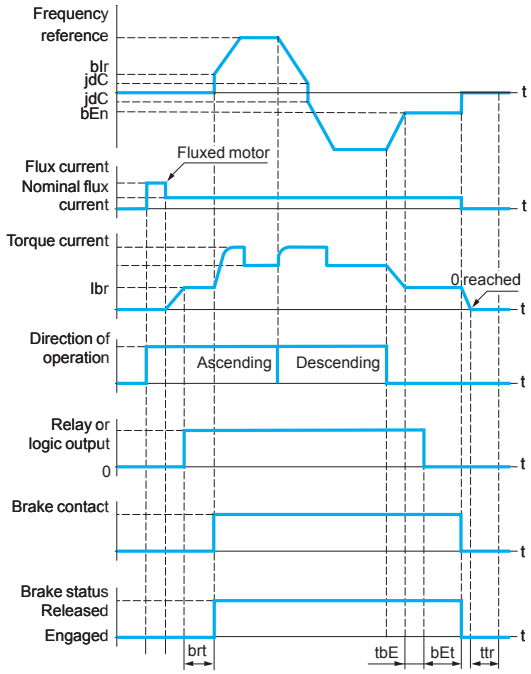
■ **Switching frequency, noise reduction**
The switching frequency setting permits a reduction in the noise generated by the motor for any application requiring a low level of noise.
The switching frequency is modulated randomly in order to avoid resonance.
This function can be disabled if it causes instability.
High frequency switching of the intermediate DC voltage can be used to supply the motor with a current wave that has little harmonic distortion.
The switching frequency can be adjusted during operation to reduce the noise generated by the motor.
Value: 1 to 16 kHz; factory setting 2.5 or 4 kHz, depending on the rating.

■ **Motor fluxing**
This can be used to obtain rapid high torque on start-up; magnetic flux needs to be already established in the motor.
There is a choice between open loop or closed loop operation.

In continuous mode, the drive automatically establishes the flux when it is powered up.

In non-continuous mode:
□ If a logic input or command word bit is assigned to the motor fluxing command, flux is established when the command is confirmed.
□ If neither a logic input nor a command word bit has been assigned, or if the latter are not active when a run command is given, fluxing occurs when the motor starts.

Fluxing is accelerated if a current higher than the nominal motor current is applied, then it is set to the value of the motor magnetizing current.




*Open loop vertical movement*

bEn: Brake engage frequency
bEt: Brake engage time
blr: Initialization of ramp once the "brake release" time (brt) has expired
brt: Brake release time
Ibr: Brake release current
JdC: Reverse jump
tbE: Brake engage time
ttr: Restart time

***Note:** In open loop mode, feedback from an incremental encoder can be connected to the drive in order to directly detect overspeed and slipping.*

## ■ Brake control

This can be used to manage control of an electromagnetic brake in synchronization with starting and stopping the motor to avoid jolts and load slipping.
The brake control sequence is managed by the drive.

### □ Movement type

The Altivar 71 drive adapts the brake control operation to the type of movement, whether vertical or horizontal, in order to achieve maximum torque performance and eliminate jolts.

### □ Brake feedback via contact

By connecting a brake contact to the drive, it is possible to detect brake faults.
If the brake status does not match the relevant control (the contact must be open for a released brake), the drive locks when a fault occurs.

### □ Brake release pulse

This can be used to set the torque for brake release when ascending (forward) or two release thresholds (one for ascending and the other for descending).

This function is only available for vertical movements.

### □ Brake engage on reversal of operating direction

To prevent the speed from passing through zero when reversing the direction of rotation, the drive firstly requires the brake to be engaged at the end of deceleration and then for it to be released before accelerating in the other direction of rotation.

### □ Brake engage request time delay

In the case of slewing movements, this function can be used, at the end of deceleration, to control how the brake is engaged when the torsional stress being exerted on the machine structure is zero.

### □ Automatic DC injection

In the case of a horizontal movement, the DC injection at the end of deceleration can be used to prevent jolting when the brake is being engaged.

This function is only available for horizontal movements.

## ■ Limit switch management

This can be used to manage the operation of one or two limit switches (with 1 or 2 operating directions).
Each limit (forward, reverse) is associated with a logic input. The type of stop that occurs on detection of a limit can be configured as a stop on ramp, freewheel or fast stop.
Following a stop, the motor can restart in the opposite direction only.

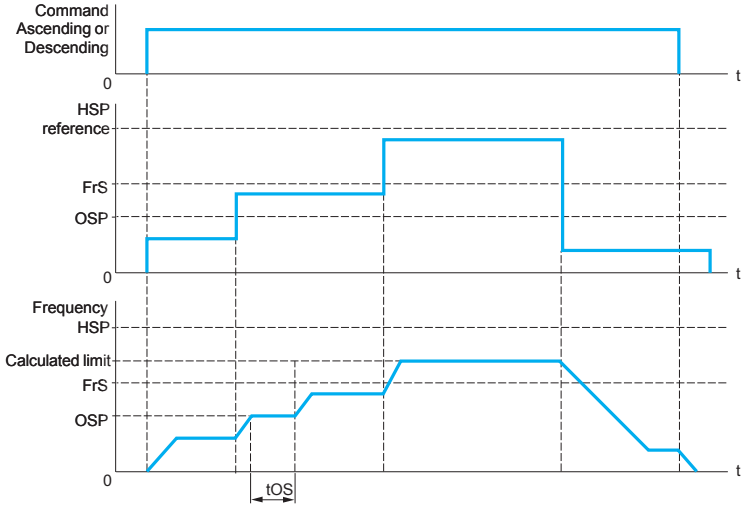
## ■ Slack sling

This is used to adapt the motor speed to the load depending on the minimum configured torque, either in speed reference mode or in current limiting mode.
A logic output can be assigned to this function to indicate the load value in relation to the configured torque value.

■ **High-speed hoisting**
This can be used to optimize cycle times for hoisting movements when the load is zero or small.
It allows operation at constant power (motor defluxing beyond the nominal motor frequency) in order to achieve a higher speed than the nominal speed, without exceeding the nominal motor current and thereby preventing the motor from overheating.

There are 2 possible operating modes:

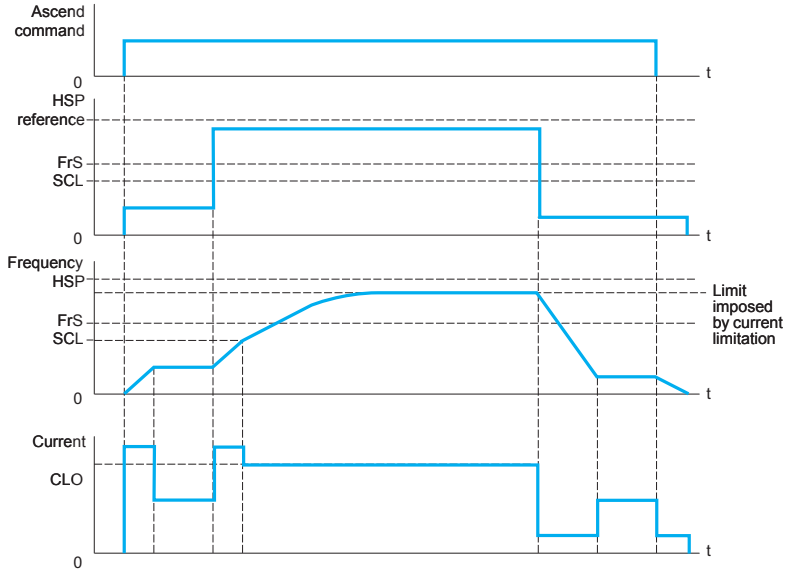
□ Speed reference mode: The maximum permitted speed is calculated by the drive at an imposed speed step so that the drive can measure the load.




*Speed reference mode*

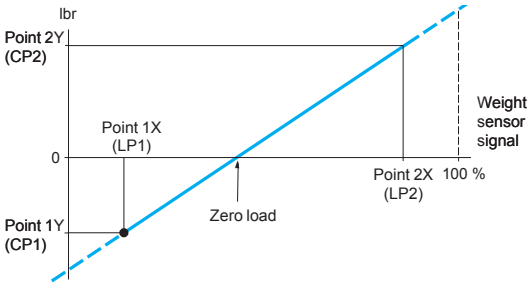
FrS: Nominal motor frequency
HSP: High speed parameter
OSP: Adjustable speed step for load measurement
tOS: Load measuring time
Two parameters can be used to reduce the speed calculated by the drive, for ascending and descending.

□ Current limiting mode: The maximum permitted speed is the speed at which the current is limited in the motor quadrant, ascending only. For descending, operation is always based on speed reference mode.



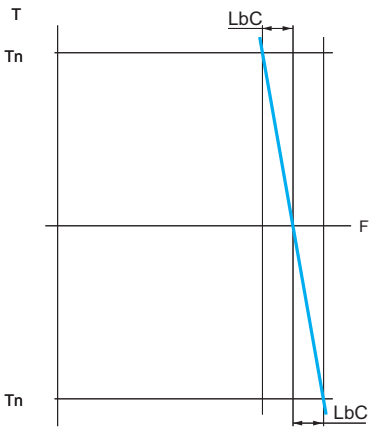

*Current limiting mode*

CLO: Current limitation for high speed-function
FrS: Nominal motor frequency
HSP: High speed parameter
SCL: Adjustable speed threshold above which current limitation is active



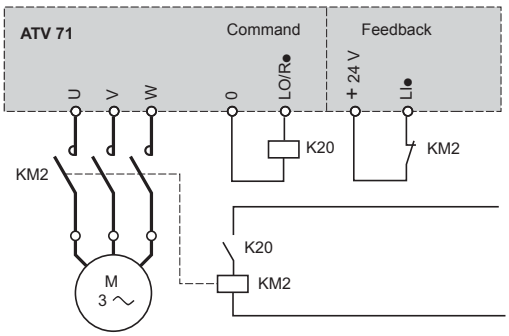

CP1, CP2, LP1, LP2: weight sensor calibration points

*This curve can represent a weight sensor on a lift winch, where a zero load is exerted on the motor when the load in the cabin is not zero.*




LbC: Load correction (Hz)

*Load sharing*




*Output contactor control and integrity check*

## ■ External weight measurement

This function uses the information supplied by a weight sensor via an analog input (usually a 4-20 mA signal) to adapt the current (Ibr) of the Brake logic control function.

Function suitable for applications involved in:
- □ measuring the total weight of a hoisting winch and its load
- □ measuring the total weight of a lift winch, the cabin and counterweight.

The current (Ibr) is adapted according to the curve opposite.

## ■ Load sharing

This function can be used for applications where several motors are mechanically linked in order to balance the loads of the different motors by adjusting the speed according to the torque on each motor.

## ■ Output contactor control and integrity check

### □ Control

This allows the drive to control a contactor located between the drive and the motor.
The request to close the contactor is made when a run command appears.
The request to open the contactor is made when there is no current in the motor.

***Note:*** *If a DC injection braking function has been configured it should not be left operating too long in stop mode, as the contactor only opens at the end of braking.*

### □ Integrity check

This check is carried out by connecting a volt-free contact on each contactor to one of the drive's logic inputs.
The corresponding logic input should be at 1 when there is no run command and at 0 during operation.
When there is any inconsistency, the drive locks in fault mode if the output contactor does not close (LIx = 1) or gets stuck (LIx = 0). The time delay for when the drive locks in fault mode can be adjusted.

These sequences are commonly used in lift applications.
In order to increase the safety level and reduce the amount of maintenance work, it is recommended that the Altivar 71 drive's integrated "Power Removal" safety function is used.

## ■ Stop on thermal alarm

This can be used to:
- □ Allow a movement to end before examining a thermal fault. There are two adjustable thresholds used to define the thermal state level which, when exceeded, makes a machine stop.
- □ Prevent a new run command from being accepted as long as the drive and motor temperatures are not less than 100%.

Function suitable for lift applications: it can prevent people getting trapped if a lift gets stuck between two floors.

## ■ Evacuation following power failure

This can be used to control the reduced speed engine with a reduced voltage supply (220 V ≂, for example: uninterruptible power supply (UPS)), by preserving torque performance.

Function suitable for lift applications: When there is a power failure, it facilitates the evacuation of people trapped in a lift stuck between two floors.

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| RDY | Term | +0.00Hz | 0.0A |
|---|---|---|---|
| +/- SPEED | | | |
| + speed assign. : | | | LI3 |
| - speed assign. : | | | LI4 |
| Ref. saved : | | | RAM |
| Code | | | Quick |

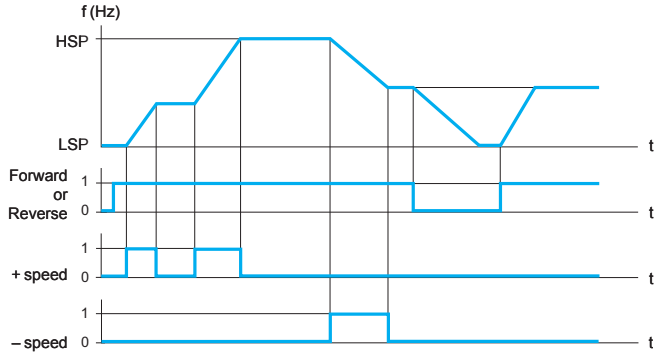
*+/- speed function settings*

■ **Uncontrolled output cut**
It is possible to configure output phase loss protection, which will allow the drive or motor circuit to be broken without the drive becoming locked in fault mode and facilitate a smooth restart after the motor has been reconnected. The output phase loss may also lock the drive, depending on the configuration.

■ **+/- speed**
Used to increase or decrease a speed reference by means of 1 or 2 logic inputs, with or without the last reference being saved (motorized potentiometer function). This function is suitable for centralized control of a machine with several sections operating in one direction or for control by a handling crane pendant control station with two operating directions.

Two types of operation are available:
□ Use of single action buttons: 2 logic inputs are required in addition to the operating direction(s).
□ Use of double action buttons: only 1 logic input assigned to + speed is required.

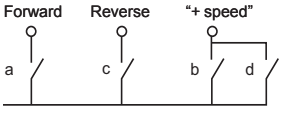
**Use of single action buttons**: 2 logic inputs are required in addition to the operating direction(s).




PV : low speed, HSP: high speed
*Example of "+/- speed" with 2 logic inputs, single action buttons and reference saving*

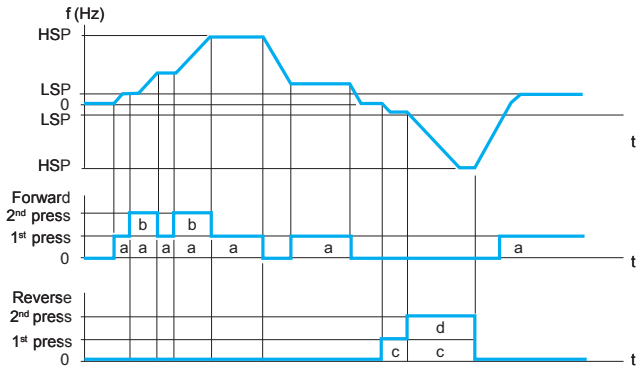
**Use of double action buttons**: only 1 logic input assigned to + speed is required.

Logic inputs:

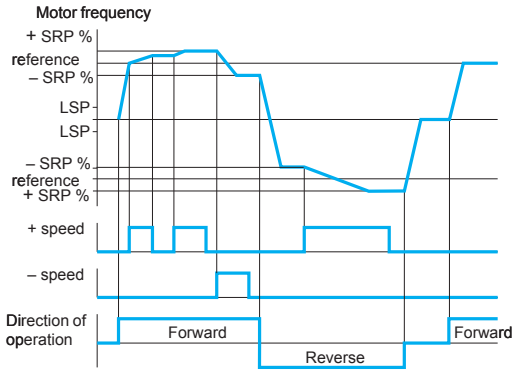



a and c: 1st press
b and d: 2nd press

| | Released (- speed) | 1st press (speed maintained) | 2nd press (+ speed) |
|---|---|---|---|
| Forward button | – | a | a and b |
| Reverse button | – | c | c and d |




PV : low speed, HSP: high speed
*Example with double action buttons and 1 logic input*
***Note:** This type of +/- speed control is incompatible with 3-wire control.*




*Example of +/- speed around a 2-wire control reference*

□ **Reference saving**

This function is associated with "+/- speed" control.

This can be used for reading and saving the last speed reference prior to the loss of the run command or line supply. The saved reference is applied the next time a run command is received.

□ **+/- speed around a reference**

The reference is given by Fr1 or Fr1b, including, if relevant, the summing, subtraction and multiplication functions, as well as the preset speeds.

During the run command the drive goes to the reference, following the acceleration and deceleration ramps (pressing +/- speed makes the speed vary around this reference according to acceleration ramp 2 and deceleration ramp 2).

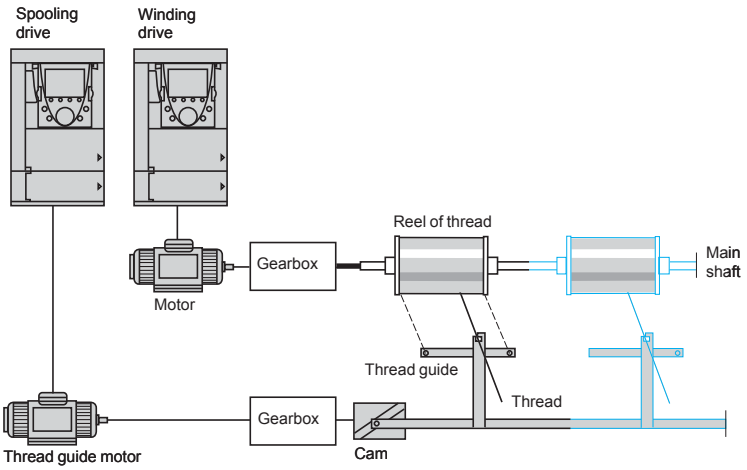
+ or – speed variation around the reference is limited to a percentage of the reference (SRP parameter). When operation has stopped, the amended reference is not saved.

The maximum total reference is always limited by high speed (HSP parameter) and the minimum reference (LSP parameter).

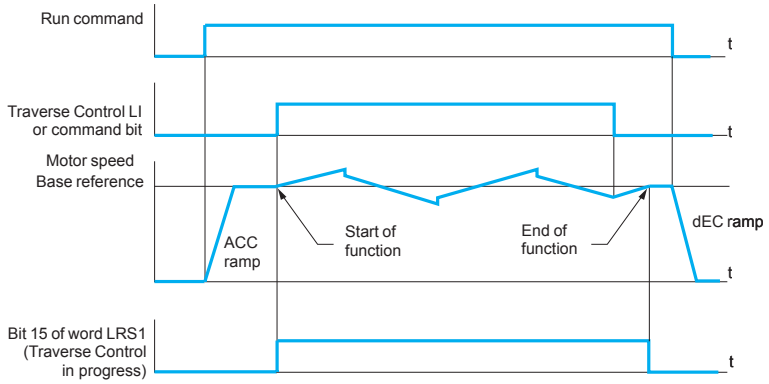
■ **Spooling**

□ **Traverse control**

Function for winding reels of thread (in textile applications)

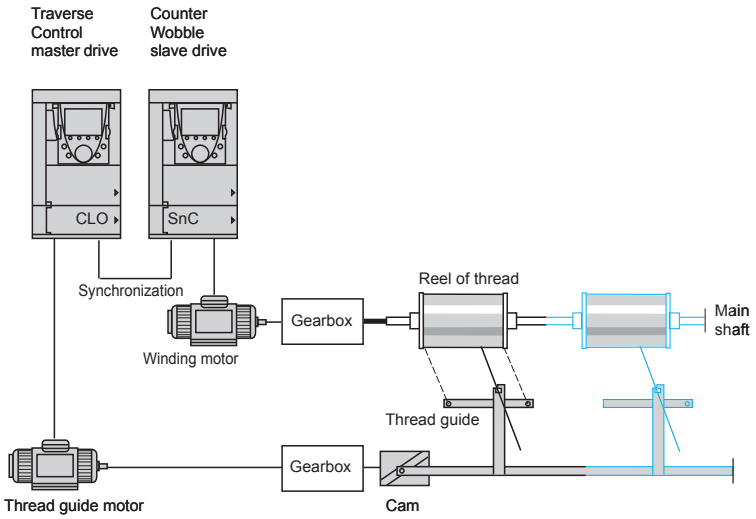



The cam rotation speed must follow a precise profile to ensure a steady, compact, linear reel is obtained.

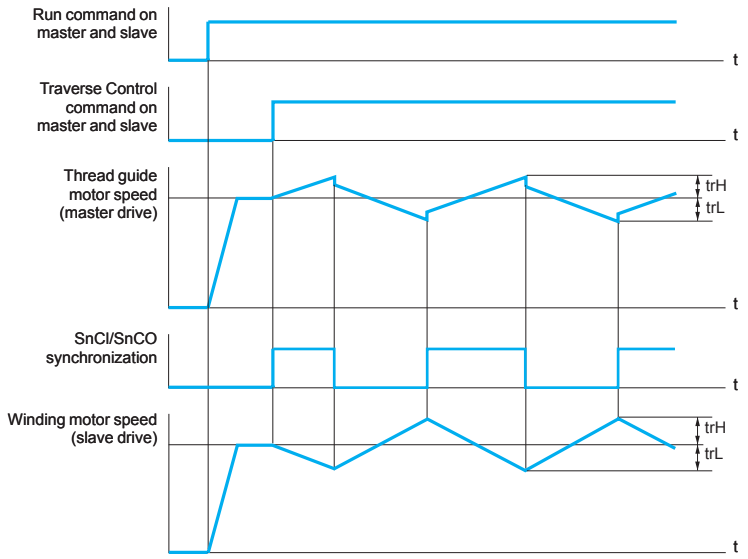



A function can also be used to reduce the base reference as the reel gets larger.

□ **Counter Wobble**




The Counter Wobble function is used in certain applications to obtain a constant thread tension when the Traverse Control function is producing considerable variations in speed on the thread guide motor.
The master drive controls the speed of the thread guide, while the slave drive controls the winding speed. The function assigns the slave a speed profile, which is in antiphase to that of the master. This means that synchronization is required, using one of the master's logic outputs and one of the slave's logic inputs.




■ **Automatic catching of a spinning load with speed detection** ("catch on the fly")
This function is used to restart the motor smoothly after one of the following events, provided the run command is still present:
□ loss of line supply or power off
□ fault reset or automatic restart
□ freewheel stop

On disappearance of the event, the effective speed of the motor is detected in order to restart on a ramp at this speed and return to the reference speed.
The speed detection time can reach 0.5 s.
This function is automatically disabled if the brake sequence is configured.
This function is suitable for machines for which the motor speed loss is negligible during a power failure (high-inertia machines such as centrifuges, etc.).

■ **Undervoltage management**
Depending on the application, it is possible to configure the Altivar 71's response to undervoltages or power failures.
If undervoltage occurs:
□ The Altivar 71 drive can continue operating with undervoltage levels up to -50% (adjustable threshold)
□ If the drive locks as a result, management of the fault relay can be configured (open or not). If the fault relay does not open an alarm is shown.

The Altivar 71 drive can also be configured to prevent the drive locking (using an alarm):
□ Controlled stop according to the type of stop configured
□ Deceleration based on a ramp which it automatically adapts to maintain the DC bus voltage, thereby preventing the drive from locking in fault mode
□ Instant IGBT (inverter bridge) loss followed by power supplied to the motor as soon as the line voltage has reappeared. This function can be used to prevent the Altivar 71 drive being reinitialized.

■ **Braking balance**
When several drives are connected on a common DC bus, this function can be used to adjust the braking thresholds in order to balance the braking powers between the various drives or braking units.

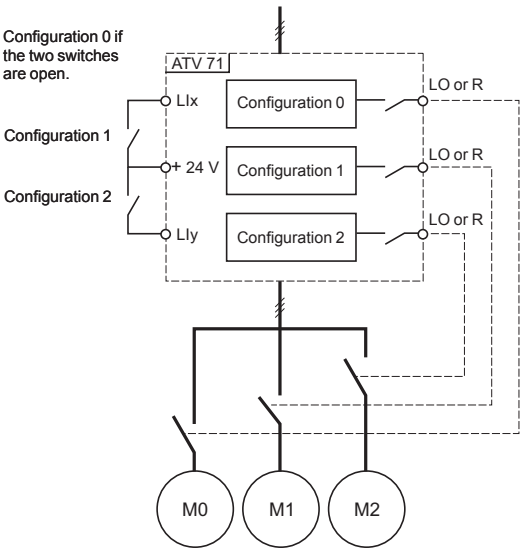
■ **Braking resistor thermal protection**
The Altivar 71 drive incorporates thermal protection for the braking resistor if it is not equipped with a thermal switch. If the resistor thermal state is too high an alarm can be assigned to the logic output or the drive may lock in fault mode, depending on how the function is programmed.

■ **Parameter set switching (multi-parameter)**
This can be used to switch 3 sets of 15 parameters maximum when the motor is running.
Each set can contain a different value for each of the parameters.
The sets are switched using 1 or 2 logic inputs or command word bits.

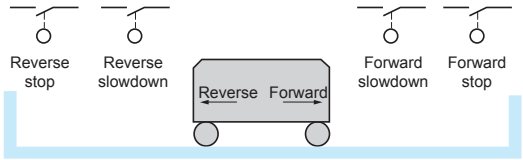
Function suitable for machines involving 2 or 3 manufacturing processes.

■ **Motor or configuration switching (multi-motor or multi-configuration)**
The Altivar 71 drive can have 3 configurations, which can be activated remotely, allowing it to adapt to:
□ 2 or 3 different motors or mechanisms in multi-motor mode. In this instance, the thermal state for all the motors is calculated and saved. This means that each motor is protected thermally.
□ 2 or 3 configurations for the same motor in multi-configuration mode. This function can also be used to save the current configuration in another memory zone, from which it can be retrieved.
Switching is carried out using 1 or 2 logic inputs, depending on the number of motors or configurations chosen (2 or 3).

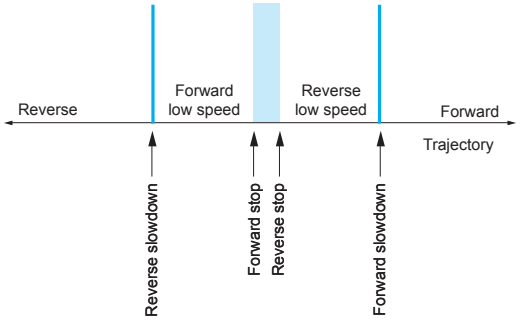
Multi-motor and multi-configuration modes cannot be used together.




*Schematic diagram for multi-motor mode*



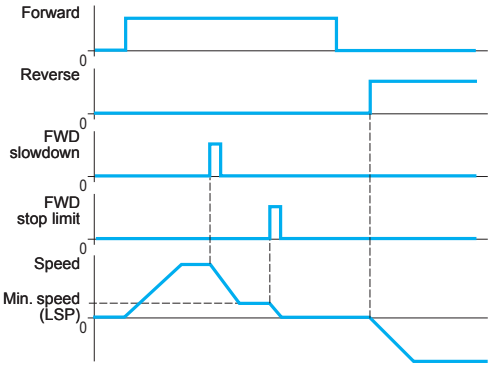

***Example 1:** limit switch positioning*
Slowdown and stopping occur when the sensor changes state (open contact). It is possible to assign a command word bit or a logic input to disable the function in order to be able restart or not stop on the position.




***Example 2:** positioning on a target zone*
The disable contact can be used to restart in order to get past the target.

## ■ Positioning on limit switches or position sensors

This can be used to manage positioning based on limit switches or position sensors.




Activating the slowdown contact or stop contact allows the device to start in the other direction, even at high speed.

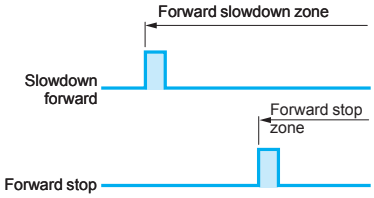
Slowdown mode can be configured:
- ☐ The drive uses the validated ramp time
- ☐ The drive calculates a ramp time according to the actual speed when the request to slow down is made. This calculation can be used to optimize the cycle time by limiting the time spent operating at low speed.

The stop type can also be configured:
- ☐ stop on ramp
- ☐ freewheel stop
- ☐ fast stop

## ■ Short and long cam operation

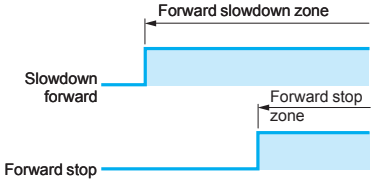
### ☐ Short cams

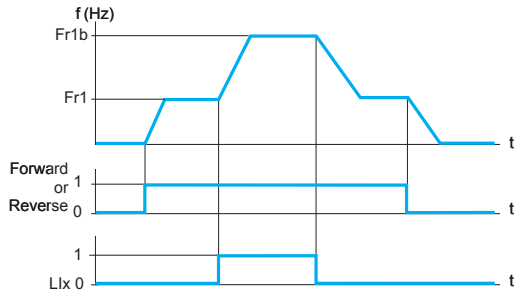
In this instance, when operating for the first time or after restoring the factory settings, the drive must initially be started outside the slowdown and stop zones in order to initialize the function.



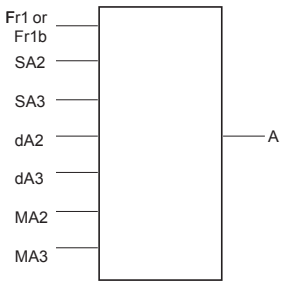

### ☐ Long cams

In this instance, there is no restriction, which means that the function is initialized across the whole trajectory.






*Example of reference switching*




*A: drive reference*
*SA2, SA3: summed inputs*
*dA2, dA3: subtraction inputs*
*MA2, MA3: multiplication inputs.*

■ **Reference switching**
Switching between two references (speed, torque, PID, etc.) can be enabled by:
□ a logic input
□ a command word bit
Reference 1 (Fr1) is active if the logic input (or command word bit) is at 0; reference 2 (Fr1b) is active if the logic input (or command word bit) is at 1.
References can be switched with the motor running.

Reference Fr1b, like Fr1, can originate from:
□ an analog input (AI)
□ a frequency control input (RP)
□ the graphic display terminal
□ the Modbus serial link or the CANopen machine bus
□ a communication card
□ the Controller Inside programmable card

■ **Operations on references (summing, subtraction, multiplication)**
Summing, subtraction and multiplication inputs can be activated simultaneously.

The drive reference is thus:
□ reference of drive A = (Fr1 or Fr1b + SA2 + SA3 - dA2 - dA3) x MA2 x MA3

□ **Summing inputs**
These can be used to add 2 to 3 references from different sources to Fr1 or Fr1b (see “Reference switching”).
The references to be added together are selected from all the possible types of reference.

For example:
Reference Fr1 or Fr1b from AI1
Reference SA2 from CANopen
Reference SA3 from a communication card
Reference of drive A = Fr1 or Fr1b + SA2 + SA3.

□ **Subtraction inputs**
These can be used to subtract 2 to 3 references from different sources from Fr1 or Fr1b (see “Reference switching”).
The references to be subtracted are selected from all the possible types of reference.

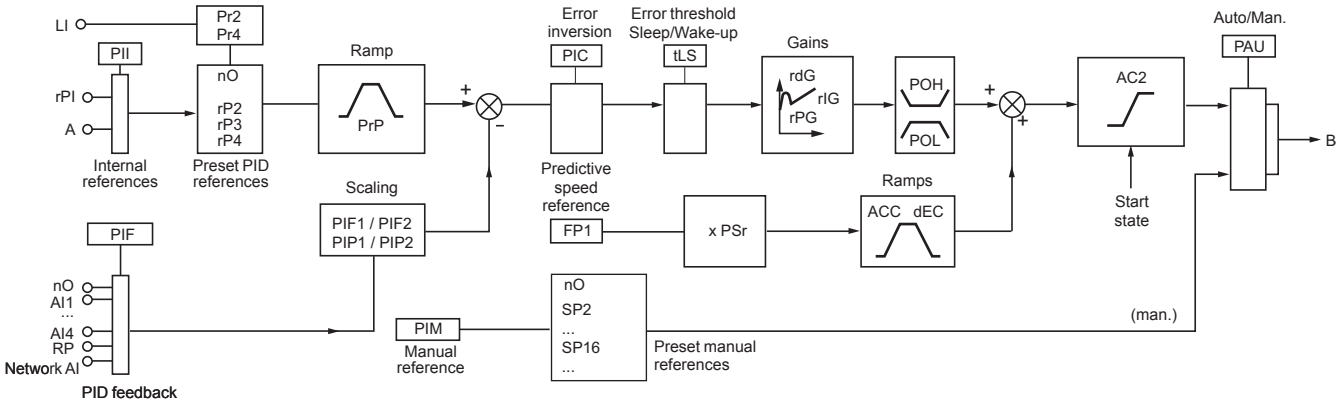
For example:
Reference Fr1 or Fr1b from AI1
Reference dA2 from CANopen
Reference dA3 from a communication card
Reference of drive A = Fr1 or Fr1b - dA2 - dA3.

□ **Multiplication inputs**
These can be used to multiply 2 to 3 references from different sources by Fr1 or Fr1b (see “Reference switching”).
The references to be multiplied are selected from all the possible types of reference.

For example:
Reference Fr1 or Fr1b from AI1
Reference MA2 from CANopen
Reference MA3 from a communication card
Reference of drive A = Fr1 or Fr1b x MA2 x MA3.

## ■ PID regulator

This can be used to regulate a process with a reference and feedback given by a sensor.
Function suitable for controlling traction on a winder.




ACC: Acceleration, DEC: Deceleration, LI: Logic inputs, B: Speed reference

### □ Internal references

- rPI: reference transmitted by the graphic display terminal or a communication network.
- A: reference given by Fr1 or Fr1b with the summing, subtraction and multiplication functions, as appropriate.

The “PII” parameter is used to choose between these two references.

### □ Preset PID references

2 or 4 PID references are available. Table showing combinations of selected PID references:

| LIx (Pr4) | LIy (Pr2) | Reference |
|---|---|---|
| 0 | 0 | rPI or A |
| 0 | 1 | rP2 |
| 1 | 0 | rP3 |
| 1 | 1 | rP4 |

### □ PID feedback

PID feedback can be assigned to one of the analog inputs (AI1 to AI4), the frequency control input (RP) or the encoder, depending on the option cards present. It can also be transmitted by a communication network (AI network).

### □ Predictive speed reference

This reference can come from the terminals (analog inputs, encoders, etc.), the graphic display terminal or a communication network.
This speed input gives an initial reference for starting.

### □ Auto/Man.

This can be used to switch from speed regulation mode (Man.) to PID regulation mode (Auto). A logic input or command word bit is used for switching.

**Speed regulation mode (Man.)**

The manual reference is transmitted via the terminals (analog inputs, encoder, preset speeds, etc.).
With manual switching, the speed reference changes according to the ACC and dEC ramp times.

**PID regulation mode (Auto)**

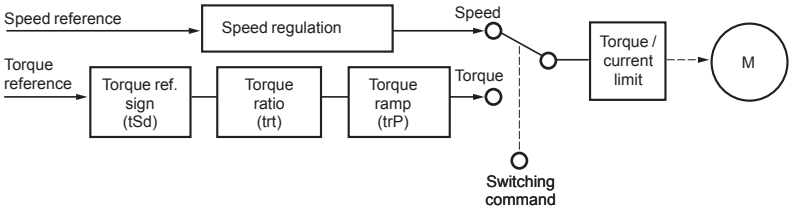
In automatic mode it is possible to:

- adapt the references and feedback to the process (transformation)
- correct a PID inversion
- adjust the proportional, integral and derivative gains (Kp, Ki and Kd)
- shunt the integral
- use the “alarm” on the logic output or display it on the graphic display terminal, if the threshold is exceeded (Max. feedback, Min. feedback and PID error)
- display the PID reference, PID feedback, PID error and PID output on the graphic display terminal and assign them to an analog output
- apply a ramp (time = PrP) to the PID reference

The motor speed is limited to between LSP and HSP. It is displayed as process values.

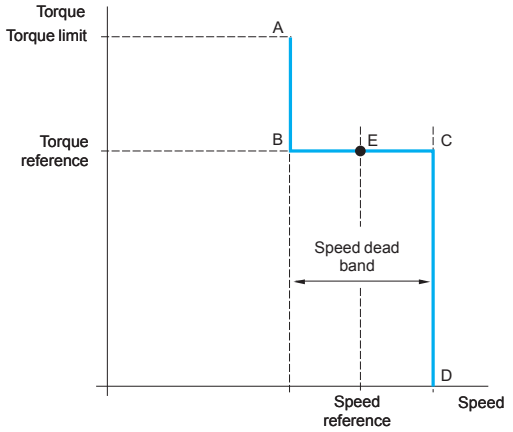
■ **Torque control**
This supports torque control or speed regulation mode.
These two types of mode can be switched using a logic input or command word bit.

Function suitable for applications requiring traction control.




The torque reference is signed and has its own ramp. A torque ratio can be used to scale the reference. It can be transmitted via an analog input, frequency control input (RP input or encoder) or communication network.
The torque sign and value can be output to a logic output and an analog output.

In torque control mode the speed may vary within an adjustable dead band. When it has reached the lower or upper limit, the drive automatically switches to speed regulation mode (fallback position).
The regulated torque is no longer maintained, in which case two scenarios can occur:
□ The speed falls within the dead band; the torque takes the required value.
□ The torque does not return to the required value at the end of an adjustable time; the drive switches to fault or alarm mode, depending on the configuration.




The stop in torque control mode can be configured:
□ automatic switch to speed regulation mode
□ freewheel stop
□ stop at zero torque but still maintaining the flux in the motor for an adjustable period of time.

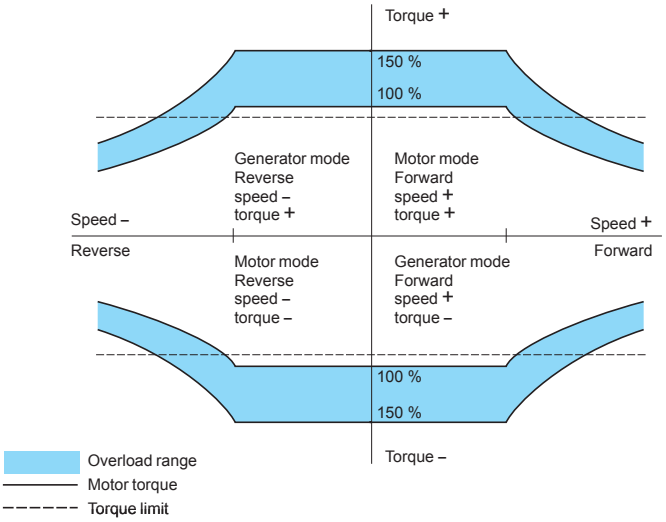
### ■ Torque limit

This can be used to limit the torque in the motor and generator quadrants using separate settings.

There are two types of torque limit:
- □ one with a value set by a parameter
- □ the other with a value given by an analog input, frequency control input or encoder.

When both torque limit types are enabled it is the lowest value which is read.
They can be switched using a logic input or command word bit.

This function is not available for voltage/frequency ratio.




The torque limit operates in both directions of rotation in motor or generator mode.

### ■ Torque or current limit detection

This function can be used to detect when the current or torque limit has been reached.
Depending on the configuration, it is possible to:
- □ use an alarm to signal this
- □ lock the drive after an adjustable period of time.

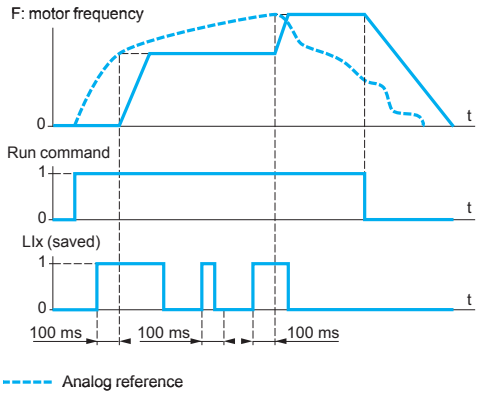
537368

| RDY | Term | +0.00Hz | 0.0A |
|---|---|---|---|
| 2nd CURRENT LIMIT. | | | |
| I Limit. 2 activ. | : | | LI6 |
| I Limit. 2 value | : | | 6.4 A |
| Current limitation : | | | 7.9 A |
| Code | | | Quick |

*Configuring current switching*

### ■ Current limit

A 2nd current limit can be configured between 0 and 1.65 times the drive nominal current and it can be used to limit the rise in motor temperature and the torque.
Switching between the two current limits can be enabled via:
- □ a logic input
- □ a command word bit




*Example of how reference saving works*

■ **Reference saving**
This can be used to:
□ Read and save a speed reference level on the reference input using a command lasting longer than 0.1 s on a logic input
□ Control the speed of several drives alternately via a single analog reference and a logic input for each drive
□ Enable a line reference (serial link) on several drives via a logic input in order to synchronize movements by eliminating variations when the reference is sent
The reference is acquired 100 ms after the rising edge of the request.
A new reference is not then acquired until a new request is made.

537369

| RDY | Term | +0.00Hz | 0.0A |
|---|---|---|---|
| STOP CONFIGURATION | | | |
| Type of stop | : | | Ramp stop |
| Freewheel assign. | : | | NO |
| Fast stop assign. | : | | LI4 |
| Ramp divider | : | | 0 |
| DC inject. assign. | : | | NO |
| Code | | | Quick |

*Configuring stop types*

■ **Stop types**
□ **Freewheel stop**
This stops the motor by resistive torque if the motor power supply is cut.

A freewheel stop is achieved:
- by configuring a normal stop command as a freewheel stop
(on disappearance of a run command or appearance of a stop command)
- by enabling a logic input
- by activating a command word bit

□ **Fast stop**
This can be used to achieve a braked stop with an acceptable deceleration ramp time (divided by an adjustable coefficient from 0 to 10) for the drive/motor unit to avoid locking in the event of an overbraking fault. If the coefficient is equal to 0 the motor decelerates as fast as possible.

Used for conveyors with emergency stop electrical braking.
A fast stop is achieved:
- by configuring a normal stop as a fast stop (on disappearance of a run command or appearance of a stop command)
- by enabling a logic input
- by activating a command word bit

□ **Fastest possible stop**
If the ramp divider coefficient is equal to 0 the motor decelerates as fast as possible.

□ **DC injection stop**
This can be used to brake high-inertia machines at low speed or maintain torque on stopping.
A DC injection stop is achieved:
- by configuring a normal stop as a DC injection stop (on disappearance of a run command or appearance of a stop command)
- by enabling a logic input
- by activating a command word bit

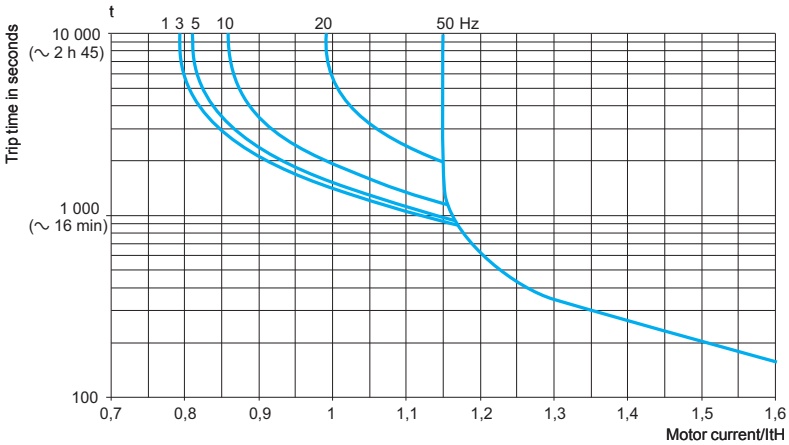
The DC value and the standstill braking time are adjustable.

■ **Motor thermal protection**
Motor thermal protection is provided by the drive:
□ directly, through PTC probes located in the motor windings
□ indirectly, via the integrated thermal relay. Indirect thermal protection is implemented via continuous calculation of its theoretical temperature rise.

The microprocessor calculates the theoretical temperature rise of the motor based on various elements:
□ the operating frequency
□ the current taken by the motor
□ the operating time
□ the maximum ambient temperature around the motor (40°C)
□ the type of motor ventilation (self-cooled or force-cooled)

Thermal protection can be adjusted from 0.2 to 1.5 times the nominal drive current. It must be adjusted to the nominal current indicated on the motor rating plate.

***Note:*** *The motor thermal state memory returns to zero when the drive control section is switched off.*




*Motor thermal protection curves*

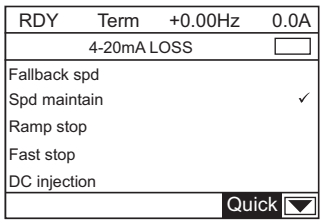
□ Self-cooled motors:
The tripping curves vary with the motor frequency.

□ Force-cooled motors:
Only the 50 Hz tripping curve should be considered, whatever the motor frequency.

■ **Drive thermal protection**
The drive thermal protection is provided by a PTC probe mounted on the heatsink or integrated in the power module.

■ **IGBT thermal protection**
The drive manages the switching frequency intelligently according to the IGBT temperature.
If the drive's current rating is exceeded (e.g.: current higher than the nominal drive current for a zero stator frequency), an alarm is displayed and a timer increases for as long the alarm is present.

537370




*Configuration of the drive's fault response*

■ **Configuring the drive's fault response (fault management)**
Different responses can be configured for the drive in the event of a resettable fault occurring:
□ freewheel stop
□ drive switches to the fallback speed
□ drive maintains the speed at which it was operating when the fault occurred until the fault disappears
□ stop on ramp
□ fast stop
□ DC injection stop
□ no stop (alarm activated)

**List of resettable faults:**
□ external fault
□ speed feedback loss
□ overspeed
□ slipping
□ output phase loss
□ auto-tuning fault
□ brake contactor feedback fault
□ encoder coupling
□ loss of 4-20mA
□ PTC probe
□ drive overheating
□ motor overload if the thermal state is less than 100%
□ line overvoltage
□ overbraking
□ current/torque limit
□ IGBT overheating
□ communication faults (Modbus, CANopen machine bus and other communication networks).

■ **Resetting resettable faults**
This can be used to remove the last fault using a logic input, command word bit or the STOP/RESET key on the graphic display terminal.
The restart conditions after a reset to zero are the same as those of a normal power-up.
List of resettable faults, see "Configuring the drive's fault response".
Line supply undervoltage and input phase loss faults are reset automatically when the line supply is restored.

Function suitable for applications where drives are difficult to access, such as when a drive is placed on a moving part.

■ **General reset (disables all faults)**
This function inhibits all faults, including thermal protection (forced operation), which can destroy the drive.

This function is suitable for applications where restarting may be crucial (conveyor in an oven, smoke extraction system, machines with solidifying products that need to be removed).
The function is enabled by a logic input.
Fault monitoring is active if the logic input is at state 1.
All faults are reset on a change of state ↑ the logic input.

***Note:*** *Use of this function invalidates the guarantee.*

■ **Automatic restart**
This function enables the drive to be restarted automatically after it has locked in fault mode, provided the relevant fault has disappeared and the other operating conditions permit a restart.
This restart is performed by a series of automatic attempts separated by increasingly longer waiting periods of 1 s, 5 s, 10 s then 1 minute for the rest.
The options for the restart process's duration are 5, 10 and 30 min., 1, 2, 3 hours and an unlimited time.
If the drive has not restarted after the configured time, it will lock and the procedure is abandoned until it has been powered off and on again.

The faults which permit this type of restart are:
□ line overvoltage
□ motor thermal overload
□ drive thermal overload
□ DC bus overvoltage
□ line phase failure
□ external fault
□ loss of 4-20mA
□ PTC probe
□ serial link
□ current or torque limit
□ output phase loss
□ line voltage too low. For this fault, the function is always active, even if it is not configured.
□ fault caused by CANopen machine bus, Modbus serial link or other commmunication networks. These faults are reset automatically as soon as the command word or frequency reference is sent to the drive.
For these types of fault, the relay configured as a fault relay remains activated if the function is configured. The speed reference and direction of operation must be maintained for this function.

This function is suitable for machines or installations which are in continuous operation or are not monitored, and where a restart will not endanger equipment or personnel in any way.

■ **PTC probe protection**
The probes can be connected directly to the drive control card or to the I/O option cards.
The way in which a temperature fault is recorded by the drive can be configured:
□ permanent record
□ only recorded when the drive's power section is switched on
□ only recorded when the motor is running

■ **IGBT testing**
When enabled, this function tests every IGBT and the motor connections in order to detect a short-circuit or an open circuit. This test is run every time the drive is powered on and before each motor start.

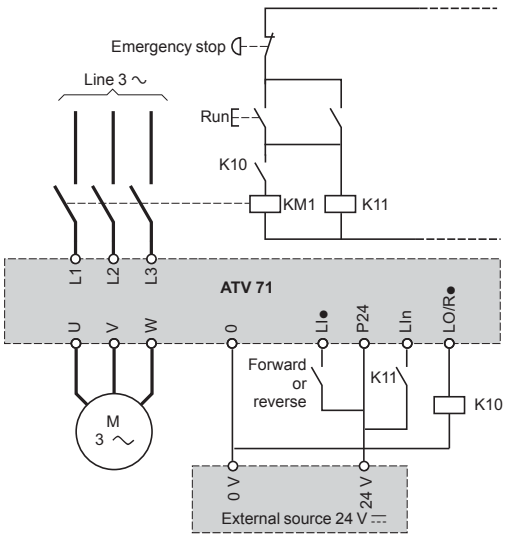
This function must not be enabled with machines with fast cycles in order to preserve the time for recording run commands.

■ **Resetting operating time to zero**
The drive operating and power-up time can be reset.

■ **External fault**
This function can lead to the drive locking if a fault occurs in the machine.
This fault is flagged on the drive display unit. The fault is flagged if the signal is at 1 or 0, according to the function configuration.

■ **Line contactor control**
This can be used on each run command to close the line contactor and open it when the motor is no longer on. The drive control section must be powered without fail by an external 24 V ⎓ source.

This function must be used for simple sequences with a low number of Start/Stop operations (Start/Stop cycle longer than 60 seconds).




After a run command, if the line contactor is not closed the drive will lock after an adjustable period of time.

■ **Forced local mode**
Forced local mode imposes control via the terminals or graphic display terminal and disables all other control modes.
Switching to forced local mode may be activated via:
□ a logic input
□ a function key on the graphic display terminal

The following references and commands are available for forced local mode:
□ references AI1, AI2, etc. and command via logic inputs
□ reference and command via the graphic display terminal

# Variable speed drives
Altivar 71

## Function compatibility table

■ **Configurable I/O**

Functions which are not listed in this table are fully compatible.
Stop functions have priority over run commands.
The selection of functions is limited:
- By the number of drive I/O which can be reassigned: if necessary, add an I/O extension card
- By the incompatibility of certain functions with one another

| Functions | Operation on the references | +/- speed *(3)* | Management of limit switches | Preset speeds | PID regulator | Traverse control | Jog operation | Brake control |
|---|---|---|---|---|---|---|---|---|
| Operation on the references | | | | ↑ | ■ | | ↑ | |
| +/- speed *(3)* | | | | | | ■ | ■ | |
| Management of limit switches | | | | | ■ | | | |
| Preset speeds | ← | | | | | | ↑ | |
| PID regulator | ■ | | ■ | | | ■ | ■ | ■ |
| Traverse control | | ■ | | | ■ | | ■ | |
| Jog operation | ← | ■ | | ← | ■ | ■ | | ■ |
| Brake control | | | | | ■ | | ■ | |
| Automatic catching a spinning load with speed detection (catch on the fly) | | | | | | | | ■ |
| Control and integrity check of output contactor | | | | | | | | ■ |
| DC injection stop | | | | | | | | ■ |
| Fast stop | | | | | | | | |
| Freewheel stop | | | | | | | | |
| +/- speed around a reference | | | | | ■ | ■ | ■ | |
| High-speed hoisting | | | | | ■ | ■ | ■ | |
| Torque control | ■ *(1)* | ■ *(1)* | | ■ *(1)* | ■ *(1)* | ■ *(1)* | ■ *(1)* | ■ *(1)* |
| Load sharing | | | | | ■ | | | |
| Position control via limit switches | | | | | ■ | | | |

*(1) Torque control and the speed reference functions are only incompatible if torque control mode is active.*
*(2) Priority is given to the first of these two stop modes to be activated.*
*(3) Excluding special use with reference channel Fr2.*

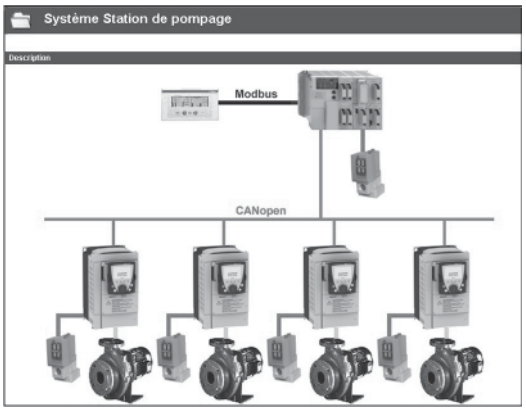
■ Incompatible functions
■ Compatible functions
■ Not applicable

**Priority functions** (functions which cannot be active at the same time)
← The arrow indicates which function has priority
↑ Example: The Freewheel stop function has priority over the Fast stop function.

| Automatic catching a spinning load with speed detection (catch on the fly) | Control and integrity check of output contactor | Injection stop DC | Fast stop | Freewheel stop | +/- speed around a reference | High-speed hoisting | Torque control | Sharing load | Position control via limit switches |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | ■ (1) | | |
| | | | | | | | ■ (1) | | |
| | | | | | | | | | |
| | | | | | | | ■ (1) | | |
| | | | | | ■ | ■ | ■ (1) | ■ | ■ |
| | | | | | ■ | ■ | ■ (1) | | |
| | | | | | ■ | ■ | ■ (1) | | |
| ■ | ■ | ■ | | | | | ■ (1) | | |
| | | | | | | | ■ (1) | | |
| | | | | | | | | | |
| | | | ■ (2) | ⬆ | | | | | |
| | | ■ (2) | | ⬆ | | | | | |
| | | ← | ← | | | | | | |
| | | | | | | | ■ (1) | | |
| | | | | | | | ■ | | ■ |
| ■ (1) | | | | | ■ (1) | ■ | | ■ | ■ (1) |
| | | | | | | | ■ | | |
| | | | | | | ■ (1) | ■ | | |

# PowerSuite software workshop

534513




*PowerSuite screen on PC*

## Presentation

The PowerSuite software workshop for PC is a user-friendly tool designed for setting up control devices for the following Telemecanique brand motors:
- TeSys U starter-controllers
- TeSys T motor management systems
- Altistart soft start/soft stop units
- Altivar variable speed drives
- Lexium 05 servo drives

It includes various functions designed for setup phases such as:
- Preparing configurations
- Start-up
- Maintenance

To facilitate start-up and maintenance, the PowerSuite software workshop is compatible with the Bluetooth® wireless link.

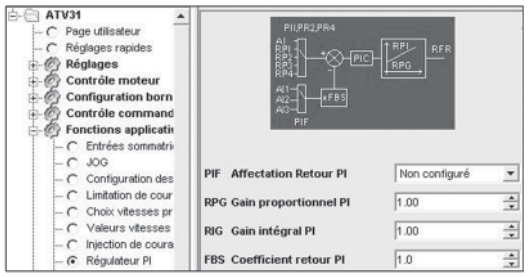
## Functions *(1)*

### Preparing configurations

The PowerSuite software workshop can be used on its own to generate the device configuration, which can be saved, printed and exported to office automation software.

The PowerSuite software workshop can also be used to convert an Altivar 58 or Altivar 58F drive configuration into one that is compatible with an Altivar 71.

533181




*PowerSuite screen on PC*
*View of PI regulator function parameters*

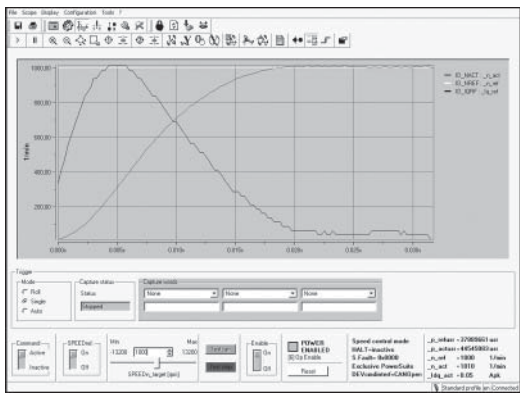
### Start-up

When the PC is connected to the device, the PowerSuite software workshop can be used to:
- Transfer the generated configuration
- Adjust
- Monitor. This option has been enhanced with new functions such as:
  - The oscilloscope
  - The high-speed oscilloscope (minimum time base: 2 ms)
  - The FFT *(Fast Fourier Transform)* oscilloscope
  - Display of communication parameters
- Control
- Save the final configuration

### Maintenance

To facilitate maintenance operations, the PowerSuite software workshop can be used to:
- Compare the configuration of a device currently being used with a saved configuration
- Manage the user's installed equipment base, in particular:
  - Organize the installed base into folders (electrical equipment, machinery, workshops, etc.)
  - Store maintenance messages
  - Facilitate Modbus TCP connection by storing the IP address

572708



*View of the FTT oscilloscope*

### User interface

The PowerSuite software workshop can be used to:
- Present the device parameters (arranged by function) in the form of illustrated views of diagrams or simple tables
- Customize the parameter names
- Create:
  - A user menu (choice of particular parameters)
  - Monitoring control panels with graphic elements (cursors, gauges, bar charts)
- Perform sort operations on the parameters
- Display text in five languages (English, French, German, Italian and Spanish). The language changes immediately and there is no need to restart the program.

It also features online contextual help:
- On the PowerSuite tool
- On the device functions by direct access to the user manuals

*(1) Certain functions are not available for all devices. See the table of available functions, page 303.*

References:
page 304

# PowerSuite software workshop

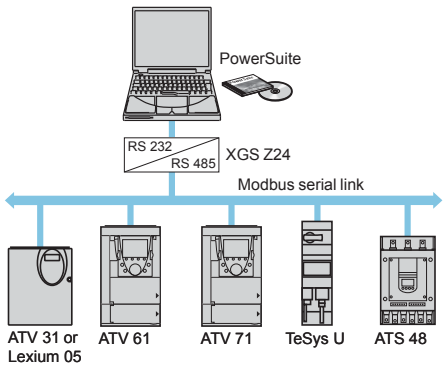
## Functions available for the PowerSuite software workshop

Functions not listed in the table are available for all devices.

| Function available with devices | Controller | Starter-controller | Soft start/ soft stop unit | Drives | | | | Servo drive |
|---|---|---|---|---|---|---|---|---|
| | TeSys T | TeSys U | ATS 48 | ATV 11 | ATV 31 | ATV 61 | ATV 71 | LXM 05 |
| Monitoring | ■ | ■ | ■ | □ | ■ | ■ | ■ | ■ |
| Oscilloscope | □ | □ | □ | □ | ■ | ■ | ■ | ■ |
| High-speed oscilloscope | □ | □ | □ | □ | □ | ■ | ■ | ■ |
| FFT oscilloscope | □ | □ | □ | □ | □ | ■ | ■ | ■ |
| Display of communication parameters | ■ | □ | □ | □ | □ | ■ | ■ | ■ |
| Control | □ | □ | ■ | □ | ■ | ■ | ■ | ■ |
| Customization of parameter names | □ | □ | □ | ■ | ■ | ■ | ■ | ■ |
| Creation of a user menu | □ | □ | □ | ■ | ■ | ■ | ■ | ■ |
| Creation of monitoring control panels | □ | □ | □ | □ | ■ | ■ | ■ | ■ |
| Sort operation on parameters | □ | □ | □ | ■ | ■ | ■ | ■ | ■ |
| Custom logic editor | ■ | □ | □ | □ | □ | □ | □ | □ |

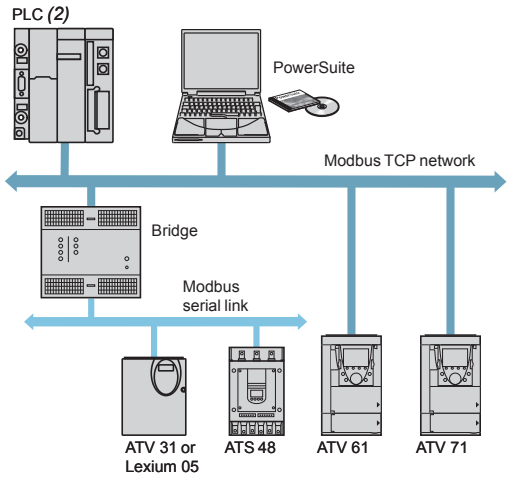
■ Functions available
□ Functions not available

536845




*Modbus multidrop connection*

536846




*Modbus TCP connection*

## Connections (1)

### Modbus serial link

The PowerSuite software workshop can be connected directly to the device terminal port or Modbus network port via the serial port on the PC.

Two types of connection are possible:
- With a single device (point-to-point connection), use a VW3 A8 106 PC serial port connection kit.
- With a number of devices (multidrop connection), use the XGS Z24 interface.

### Modbus TCP communication network

The PowerSuite software workshop can be connected to a Modbus TCP network. In this case, the devices can be accessed:
- Using a VW3 A3 310 communication card for the Altivar 61and 71 drives
- Using a TSX ETG 100 Modbus TCP/Modbus gateway

### Bluetooth® wireless link

The PowerSuite software workshop can communicate via a Bluetooth® radio link if the device is equipped with a Bluetooth® Modbus VW3 A8 114. The adapter plugs into the device connector terminal port or Modbus network port and has a range of 10 m (class 2).

If the PC does not feature Bluetooth® technology, use the VW3 A8 115 USB - Bluetooth® adapter.

### Remote maintenance

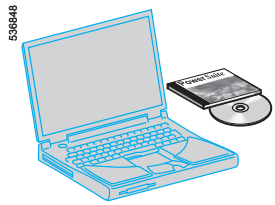
A simple Modbus TCP connection is all that is required for the PowerSuite software workshop to support remote monitoring and diagnostics.
When devices are not connected to the Modbus TCP network, or it is not directly accessible, various remote transmission solutions may be used instead (modem, teleprocessing gateway, etc.). Please consult your Regional Sales Office.

*(1) Please refer to the compatibility table on page 305.*
*(2) Please refer to our specialist "Automation platform Modicon Premium and Unity - PL7 software" and "Automation platform Modicon TSX Micro - PL7 software" catalogues.*

Presentation: page 302
References: page 304

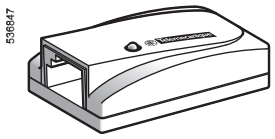
# PowerSuite software workshop

## PowerSuite software workshop




*VW3 A8 104*

| Description | Composition | Reference | Weight kg |
|---|---|---|---|
| **PowerSuite CD-ROM** | ■ 1 program for PC in English, French, German, Italian and Spanish<br>■ Variable speed drive, starter and servo drive technical manuals | **VW3 A8 104** | 0.100 |
| **PowerSuite update CD-ROM** *(1)* | ■ 1 program for PC in English, French, German, Italian and Spanish<br>■ Variable speed drive and starter technical manuals | **VW3 A8 105** | 0.100 |
| **PC serial port connection kit** for point-to-point Modbus connection | ■ 1 x 3 m cable with 1 RJ45 connector on starter-controller or drive side and 1 RS 232/RS 485 converter with 1 9-way female SUB-D connector on PC side<br>■ For the ATV 11 drive: 1 converter with one 4-way male SUB-D connector and 1 RJ45 connector<br>■ For ATV 38/58/58F drives: 1 RJ45/9-way male SUB-D adapter | **VW3 A8 106** | 0.350 |
| **RS 232/RS 485 interface** for multidrop Modbus connection | 1 Modbus multidrop converter for connection to screw terminals. Requires a 24 V ⎓ (20...30 V), 20 mA power supply *(2)*. | **XGS Z24** | 0.105 |
| **Modbus-Bluetooth® *adapter*** *(3)* | ■ 1 Bluetooth® adapter (10 m range, class 2) with 1 RJ45 connector<br>■ For PowerSuite: 1 x 0.1 m cable with 2 RJ45 connectors<br>■ For TwidoSoft: 1 x 0.1 m cable with 1 RJ45 connector and 1 mini DIN connector<br>■ For ATV 38/58/58F drives: 1 RJ45/9-way male SUB-D adapter | **VW3 A8 114** | 0.155 |
| **USB - Bluetooth® adapter for PC** | This adapter is required in the case of a PC that does not feature Bluetooth® technology. It is connected to a USB port on the PC. Range of 10 m (class 2). | **VW3 A8 115** | 0.290 |




*VW3 A8 114*

*(1) Updates a version ≥ V1.40 with the latest available version. For versions < V1.40, you should order the PowerSuite CD-ROM, VW3 A8 104.*
*(2) Please refer to the "Interfaces, I/O splitter boxes and power supplies" catalogue.*
*(3) Can also be used to communicate between a Twido PLC and the TwidoSoft software workshop.*

Presentation: page 302
Functions: pages 302 and 303

# PowerSuite software workshop

## Compatibility of PowerSuite software workshop with the following devices *(1)*

| Connection | Controller | Starter-controller | Soft start/ soft stop unit | Drives | | | | Servo drives | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | TeSys T | TeSys U *(2)* | ATS 48 | ATV 11 | ATV 31 | ATV 61 | ATV 71 | LXM 05A | LXM 05B | LXM 05C |
| **Modbus** | V2.5 | V1.40 | V1.30 | V1.40 | V2.0 | V2.3 | V2.2 | V2.2 | V2.4 | V2.5 |
| **Modbus TCP (device equipped with Modbus TCP card)** | | | | | | V2.3 | V2.2 | | | |
| **Modbus TCP via Modbus TCP/Modbus gateway** | | | V1.50 | | V2.0 | V2.3 | V2.2 | V2.2 | V2.4 | V2.5 |
| **Bluetooth®** | | | V2.2 | | V2.2 | V2.3 | V2.2 | V2.2 | V2.4 | V2.5 |

Compatible software versions

Incompatible software versions

## Hardware and software environments

The PowerSuite software workshop can operate in the following PC environments and configurations:

- Microsoft Windows® XP SP1, SP2,
- Pentium III, 800 MHz, hard disk with 300 MB available, 128 MB RAM
- SVGA or higher definition monitor

*(1) Minimum software version*

*(2) TeSys U starter-controller without communication module or with Modbus LUL C031, C032 or C033 communication module*

Presentation: page 302

Functions: pages 302 and 303

References: page 304

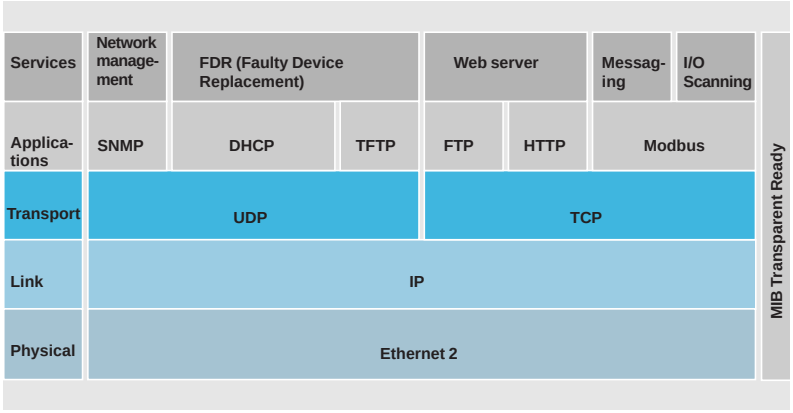
# Starters, drives and communication
## Modbus TCP network
## Transparent Ready concept

### Presentation

Introduced by Schneider Electric, the Transparent Ready concept enables transparent communication between control system devices, production and management. Network technologies and the associated new services are used to share and distribute data between sensors, PLCs, workstations and third-party devices in an increasingly efficient manner.
Web servers embedded in the network components and control system devices can be used to:
- Access configuration data transparently
- Perform remote diagnostics
- Incorporate simple human/machine interface functions

This concept is based on the Modbus TCP industrial standard which proposes a single network that meets most communication requirements from sensors/actuators through to production management systems.
Where a variety of communication systems are usually required, Transparent Ready standard technologies can result in significant cost savings in the areas of definition, installation, maintenance or training.

Transparent Ready is based on:
- Modbus TCP-based services meeting control system requirements in terms of functions, performance and quality of services
- Products including several ranges of PLC, distributed I/O, industrial terminals, variable speed drives, gateways and an increasing number of partner products
- The ConneXium range of cabling accessories: hubs, switches, cables adapted to the environment and to the requirements of industrial conditions.




*Services supported by Altivar 61 and Altivar 71 drives*

The Altistart 48 soft start/soft stop unit and the Altivar 31 variable speed drive are connected to the Modbus TCP network using a gateway TSX ETG 100 Ethernet/Modbus.

Altivar 61 and Altivar 71 variable speed drives are connected to the Modbus TCP network using a VW3 A3 310 communication card.
This card comes with a basic web server, which users can adapt completely according to the application (Java or FactoryCast development tool).

Characteristics: page 307
Functions: pages 307 to 309
Connections: page 310
References: pages 310 and 311

# Starters, drives and communication
## Modbus TCP network
## Transparent Ready concept

## Characteristics

| | | | |
|---|---|---|---|
| **Structure** | Topology | Industrial local area network conforming to ANSI/IEEE 802.3 (4th edition 1993-07-08)<br>Star network | |
| | Transmission mode | Manchester baseband. Half-duplex or full-duplex | |
| | Data rate | 10/100 Mbps with automatic recognition | |
| | Medium | STP double shielded twisted pair, impedance 100 W ± 15 W for 10 BASE-T or category 5 Ethernet cable, conforming to standard TIA/EIA-568A | |
| | Length of network | 100 m maximum between hub or switch and a station | |
| **Type of device** | | **ATS 48, ATV 31** | **ATV 61, ATV 71** |
| **Type of interface** | | **TSX ETG 100** | **VW3 A3 310** |
| **Universal services** | | SNMP | HTTP, BOOTP, DHCP, FTP, TFTP, SNMP |
| **Transparent Ready services** | | Modbus Messaging | Modbus messaging, IO Scanning, FDR |

## Universal services

### HTTP

HTTP, “Hypertext Transfer Protocol” (RFC 1945), is a protocol used to transmit web pages between a server and a browser. HTTP has been used on the Web since 1990.

*Web servers embedded in control system devices are at the heart of the Transparent Ready concept and provide easy access to devices anywhere in the world using a standard web browser such as Internet Explorer or Netscape Navigator.*

### BOOTP/DHCP

BOOTP/DHCP (RFC 1531) is used to supply (client) devices automatically with IP addresses and parameters. This avoids having to manage the addresses of each device individually by transferring their management to a server.
BOOTP identifies the client device by its Ethernet MAC address. This address is unique to each device and must be entered in the server each time the device is changed.
DHCP “Dynamic Host Configuration Protocol” identifies the client device by a name in plain language (“Device Name”) which is maintained throughout the application: e.g. “Conveyor 23”.

*Altivar 61 and Altivar 71 drives can be given a name (“Device Name”) by the terminal or the PowerSuite software workshop.*
*The FDR (“Faulty Device Replacement”) service uses the standard DHCP and TFTP protocols.*

### FTP/TFTP

FTP, “File Transfer Protocol” (RFCs 959, 2228 and 2640), and TFTP, “Trivial File Transfer Protocol” (RFC 1123), are used to exchange files with devices.

*Transparent Ready devices implement FTP for downloading firmware or custom web pages.*
*The FDR (“Faulty Device Replacement”) service uses the standard DHCP and TFTP protocols.*

### SNMP

The Internet community has developed the SNMP standard, “Simple Network Management Protocol” (RFCs 1155, 1156 and 1157), to support the management of the various network components by means of a single system. The network management system can exchange data with SNMP agent devices. This function allows the manager to view the status of the network and devices, to modify their configuration and to return alarms in the event of a fault.

*Transparent Ready devices are compatible with SNMP and can be integrated naturally into a network administered via SNMP.*

Presentation: page 306
Connections: page 310
References: pages 310 and 311

# Starters, drives and communication
## Modbus TCP network
## Transparent Ready concept

### Transparent Ready services
#### Modbus communication standard

Modbus, the industry communication standard since 1979, has been ported to Ethernet TCP/IP, the backbone of the Internet revolution, to create Modbus TCP, a totally open protocol on Ethernet. There is no need for any proprietary component, nor the purchase of a licence in order to develop a connection to Modbus TCP.
This protocol can easily be ported to any device supporting a standard TCP/IP communication stack. The specifications can be obtained free of charge from the website: www.modbus.org.

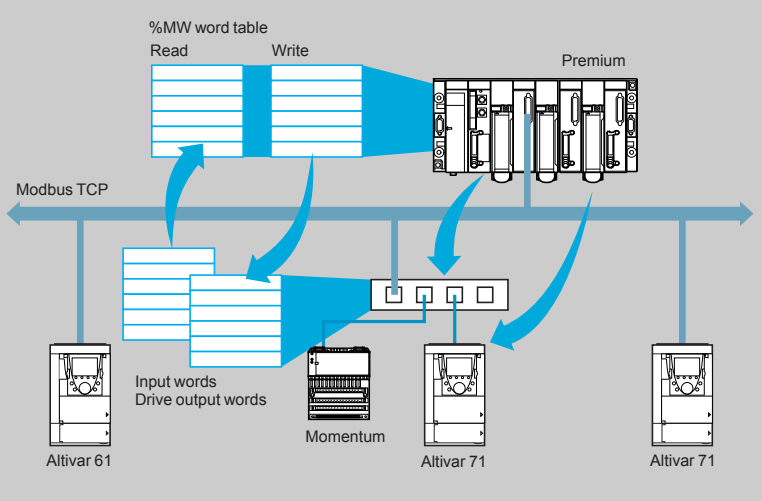
#### Modbus TCP, simple and open

The Modbus application layer is very simple and universally known. Thousands of manufacturers are already implementing this protocol. Many have already developed a Modbus TCP connection and numerous products are currently available.
The simplicity of Modbus TCP enables any small field device, such as an I/O module, to communicate on Ethernet without the need for a powerful microprocessor or a large amount of internal memory.

#### Modbus TCP, high performance

Thanks to the simplicity of its protocol and the fast Ethernet throughput data rate of 100 Mbps, Modbus TCP achieves excellent performance. This means that this type of network can be used in realtime applications such as I/O Scanning.

### I/O Scanning service
#### Schematic diagram




Altivar 61 and Altivar 71 drives accept the I/O Scanning service generated by:
- The following automation platforms:
  - Premium equipped with a TSX ETY 410/5101 module
  - Quantum
  - Momentum M1E
- A PC equipped with Modbus communication software with the I/O scanner function.

This service is used to manage the exchange of remote I/O on the Ethernet network after simple configuration and without the need for special programming.

The drive I/O are scanned transparently by means of read/write requests according to the Modbus Master/Slave protocol on the TCP/IP profile.

The I/O Scanning service can be configured, activated or deactivated by:
- The PowerSuite software workshop
- The standard web server.

Presentation: page 306
Characteristics: page 307
Connections: page 310
References: pages 310 and 311

## Transparent Ready services (continued)

### Faulty Device Replacement (FDR) service

The FDR service uses standard DHCP and TFTP technologies with the aim of simplifying the maintenance of Ethernet devices.
It is used to replace a faulty device with a new product, ensuring its detection, reconfiguration and automatic restarting by the system, without the need for any tricky manual intervention.

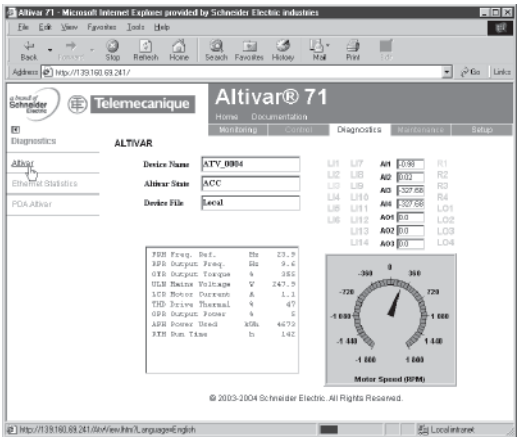
The main steps are:
- A device using the FDR service becomes faulty
- A similar device is taken out of the maintenance reserve base, preconfigured with the “Device_name” of the faulty device, then reinstalled on the network.
- The FDR server (which can be a Quantum or Premium PLC Ethernet module) detects the new arrival, configures it with its IP address and transfers all its configuration parameters to it.
- The substituted device checks that the parameters are fully compatible with its own characteristics, then switches to operational mode.

## Web server

The Ethernet card in Altivar 61 and Altivar 71 drives incorporates a standard web server, in English.
The functions provided by this web server require no special configuration or programming of the PC supporting the web browser. Using a password, two levels of access to the web server can be defined: read-only or modification.

The standard web server provides access to the following functions:
- Altivar Viewer
- Data Editor
- Ethernet Statistics
- Security
- Etc.

The standard web server can be adapted or replaced by a customized web server depending on the requirements of the application and downloaded via FTP.
Knowledge of the HTTP protocol and Java technology are required to be able to create or modify a web server.



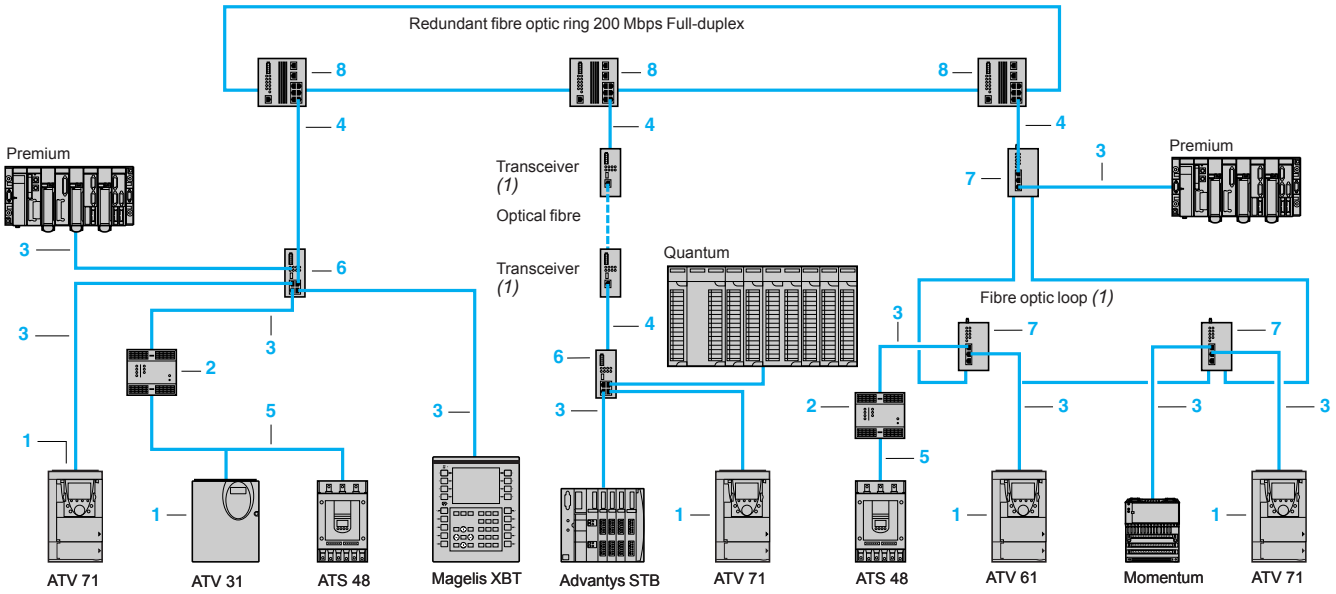

*Altivar Viewer*

# Starters, drives and communication

## Modbus TCP network

## Transparent Ready concept

## Connections




## Modbus TCP network connection elements (1)

### Communication interfaces

| Description | Use | Item No. | Reference | Weight kg |
|---|---|---|---|---|
| **Communication card equipped with an RJ45** Modbus TCP 10/100 Mbps Class C20 | Variable speed drives ATV 61, ATV 71 | 1 | **VW3 A3 310** | 0.300 |
| **Gateway/router Modbus Ethernet** Class B10 | ATS 48 soft start/soft stop units ATV 31 variable speed drives | 2 | **TSX ETG 100** | – |
| **Configuration kit** | Used to configure the gateway via the Ethernet or RS 232 port. Consists of an RJ45/9-way SUB-D adapter and a CAT5 crossover cable, length 3 m | – | **TCS EAK 0100** | – |
| **PoE power supply** (conforming to IEEE 802.3af) | Used to supply the gateway via Ethernet CAT5 cable. Power supply connected via daisy-chain connection. Includes mains cable (Australia, Europe, UK and USA) | – | **TCS EAQ 0100** | – |




*TSX ETG 100*

### ConneXium cordsets

| Description | Use | | Item No. | Length m | Reference (2) | Weight kg |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| **Straight shielded twisted pair cordsets** equipped with 2 RJ45 connectors | ATV 61 or ATV 71 (+ VW3 A3 310 communication card) or any other equipment terminal | Hubs 499 N●H 1●● ●0, switches 499 N●S ●●● 0●, TCS ESM083F2●●● | 3 | 2 | **490 NTW 000 02** | – |
| | | | | 5 | **490 NTW 000 05** | – |
| | | | | 12 | **490 NTW 000 12** | – |
| | | | | 40 | **490 NTW 000 40** | – |
| | | | | 80 | **490 NTW 000 80** | – |
| **Crossed shielded twisted pair cordsets** equipped with 2 RJ45 connectors | Hubs 499 NEH 1●● ●0, switches 499 N●S 251 02, TCS ESM083F2C●0, transceivers (1) | Hubs 499 NEH 1●● ●0, switches 499 N●S 251 02, TCS ESM083F2C●0, transceivers (1) | 4 | 5 | **490 NTW 000 05** | – |
| | | | | 15 | **490 NTC 000 15** | – |
| | | | | 40 | **490 NTC 000 40** | – |
| | | | | 80 | **490 NTC 000 80** | – |
| **Cordset for Modbus serial link** equipped with one RJ45 connector and one stripped end | ATS 48, ATV 31 | Gateway Modbus/ Ethernet TSX ETG 100 | 5 | 3 | **VW3 A8 306 D30** | – |

*(1) To order other Modbus TCP network connection elements, please refer to the "Ethernet TCP/IP, Transparent Ready" catalogue.*

*(2) Cable conforming to EIA/TIA-568 category 5 and IEC 1180/EN 50 173, class D. For UL and CSA 22.1 approved cables, add the letter **U** at the end of the reference. Example: 490 NTW 000 02 becomes **490 NTW 000 02U**.*

Presentation: page 306
Characteristics: page 307
Functions: pages 307 to 309

# Starters, drives and communication

## Modbus TCP network

## Transparent Ready concept

571200~1



*499 NEH 141 00*

571385~1



*499 NES 251 00*

571829~1



*499 NMS 251 02*

### Modbus TCP network connection elements *(1)* (continued)

#### ConneXium Hubs

| Description | Number of ports | | Item No. | Reference | Weight kg |
|---|---|---|---|---|---|
| | Copper cable | Optical fibre | | | |
| **Hub - 10 Mbps twisted pair**<br>10BASE-T ports for copper cable, shielded RJ45 connectors | 4 | – | 6 | **499 NEH 104 10** | 0.530 |
| **Hub - 100 Mbps twisted pair**<br>100BASE-TX ports for copper cable, shielded RJ45 connectors | 4 | – | 6 | **499 NEH 141 00** | 0.240 |
| **Hub - 10 Mbps twisted pair and multimode optical fibre**<br>10BASE-T ports for copper cable, shielded RJ45 connectors<br>10BASE-FL ports for optical fibre, ST connectors (BFOC) | 3 | 2 | 7 | **499 NOH 105 10** | 0.900 |

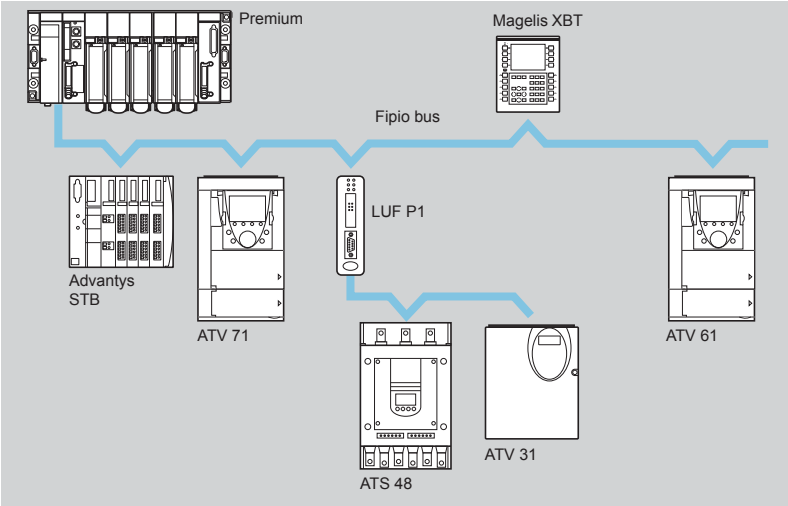
#### ConneXium Switches

| Description | Number of ports | | Item No. | Managed | Reference | Weight kg |
|---|---|---|---|---|---|---|
| | Copper cable | Optical fibre | | | | |
| **Optimized switch, twisted pair**<br>10BASE-T/100BASE-TX copper ports for copper cable, shielded RJ45 connectors | 5 | – | – | no | **499 NES 251 00** | 0.190 |
| **Switches, twisted pair**<br>10BASE-T/100BASE-TX ports for copper cable, shielded RJ45 connectors | 8 | – | – | no | **499 NES 181 00** | 0.230 |
| | 8 | – | – | yes | **TCS ESM083F23F0** | – |
| **Switches, twisted pair and multimode optical fibre**<br>10BASE-T/100BASE-TX ports for copper cable, shielded RJ45 connectors.<br>100BASE-FX ports for optical fibre, SC connectors | 4 | 1 | – | no | **499 NMS 251 01** | 0.330 |
| | 3 | 2 | 8 | no | **499 NMS 251 02** | 0.335 |
| | 6 | 2 | 8 | yes | **TCS ESM083F2CU0** | – |
| **Switches, twisted pair and single-mode optical fibre**<br>10BASE-T/100BASE-TX ports, for copper cable, shielded RJ45 connectors.<br>100BASE-FX ports, for optical fibre, SC connectors | 4 | 1 | – | no | **499 NSS 251 01** | 0.330 |
| | 3 | 2 | 8 | no | **499 NSS 251 02** | 0.335 |
| | 6 | 2 | 8 | yes | **TCS ESM083F2CS0** | – |

*(1) To order other Modbus TCP network connection elements, please refer to the "Ethernet TCP/IP, Transparent Ready" catalogue.*

# Starters, drives and communication
## Communication via Fipio bus

### Presentation




The Fipio fieldbus is a standard means of communication between control system components, and conforms to the World FIP standard.
A Premium PLC (bus manager) can control 127 devices (agents) over a maximum distance of 15 km.
The Fipio bus manager is integrated in the PLC processor.

The Altistart 48 soft start/soft stop unit and the Altivar 31 variable speed drive can be connected to the Fipio bus via an LUF P1 Fipio/Modbus gateway.

Altivar 61 and Altivar 71 drives can be connected to the Fipio bus via a communication card VW3 A3 311.

The following devices can also be connected to the Fipio bus:
- TSX Micro *(2)* or Premium Agent function *(1)* PLCs
- The CCX 17 operator panel *(2)*
- The Magelis XBT-F terminal with graphic screen *(3)*
- The Magelis iPC industrial PC *(3)*
- Advantys STB IP 20 distributed I/O *(4)*
- Discrete, analog or application-specific Momentum distributed I/O *(5)*
- Discrete or analog (IP 20) TBX distributed I/O *(1)*
- TBX discrete (IP 65) or TSX E●F (IP67) dust and damp proof distributed I/O *(1)*
- The TBX SAP 10 Fipio/AS-Interface gateway *(1)*
- The LUF P1 Fipio/Modbus gateway
- A PC terminal
- Partner products in the Collaborative Automation programme

*(1) Please consult our "Automation Platform Modicon Premium – Unity & PL7 software" specialist catalogue.*
*(2) Please consult our "Automation platform Modicon TSX Micro – PL7 software" specialist catalogue".*
*(3) Please consult our "Human-Machine interfaces" specialist catalogue.*
*(4) Please consult our "Distributed I/O Advantys STB" specialist catalogue.*
*(5) Please consult our "Modicon Momentum Automation platform" specialist catalogue.*

Characteristics: page 313
Connections: page 314
References: pages 314 and 315

# Starters, drives and communication
## Communication via Fipio bus

## Characteristics

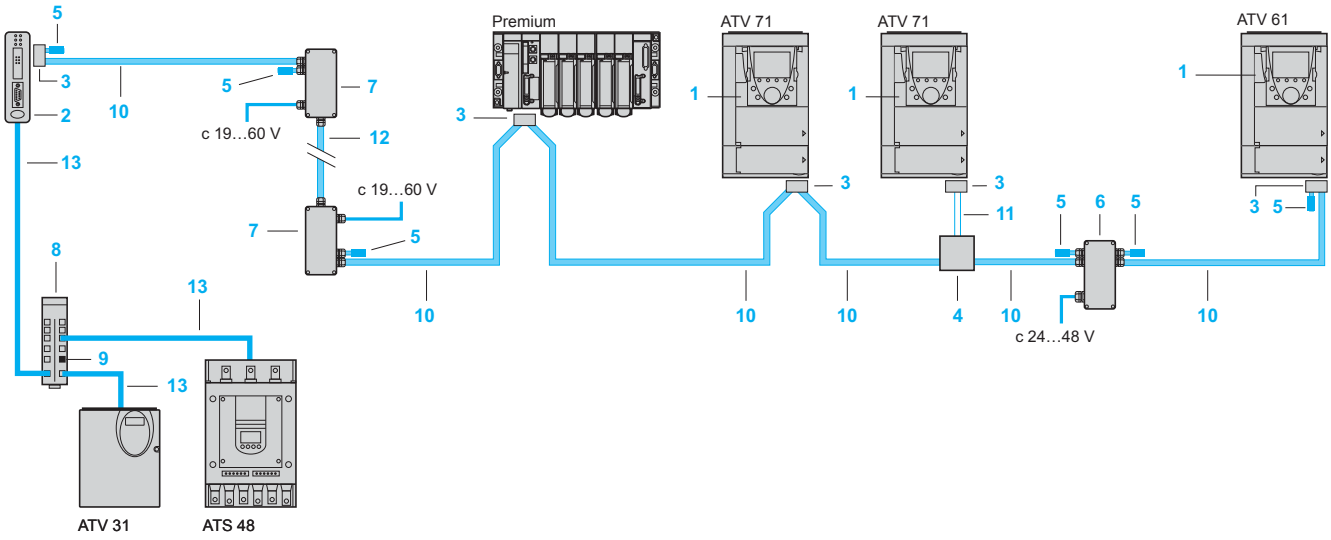
| | | | |
|---|---|---|---|
| **Structure** | Topology | Industrial bus conforming to the World FIP standard<br>Subscribers linked via daisy-chain or tap junctions | |
| | Access method | Producer/consumer principle<br>Bus management by a fixed arbitrator (bus manager) | |
| | Transmission mode | Baseband physical layer on shielded twisted pair, according to standard NF C 46-604 | |
| | Data rate | 1 Mbps | |
| | Medium | Shielded twisted pair 150 Ω<br>Optical fibre 62.5/125 with the use of electrical/fibre optic repeaters | |
| | Number of subscribers | 32 maximum per segment<br>1 manager + 127 agents maximum over all segments<br>The number of Fipio agents is limited by the memory capacity of Premium processors (62 Altivar drives maximum) *(1)* | |
| | Number of segments | Unlimited in tree or star architectures<br>Limited to 5 cascaded segments<br>The link between 2 subscribers may cross 4 electrical or electrical/fibre optic repeaters maximum | |
| | Length of bus | 15,000 m maximum<br>1,000 m maximum without repeater for an electrical segment<br>5,000 m maximum for 5 electrical segments<br>3,000 m maximum for 1 fibre optic segment | |
| **Type of device** | | **ATS 48, ATV 31** | **ATV 61, ATV 71** |
| **Type of interface** | | **LUF P1** | **VW3 A3 311** |
| **Profile** | | FED C 32P | FED C 32 |
| **Control and adjustment** | | 26 configurable words | 8 configurable words (communication scanner) |
| **Monitoring** | | 26 configurable words | 8 configurable words (communication scanner) |
| **Configuration and adjustment** | | 1 indexed word<br>Read/write access to all functions by the PLC application program | |

*(1) Please consult our "Automation Platform Modicon Premium – Unity & PL7 software" specialist catalogue.*

Presentation: page 312
Connections: page 314
References: pages 314 and 315

# Starters, drives and communication
## Communication via Fipio bus

### Fipio wiring system




### Elements for connecting the Fipio bus and a Premium PLC *(1)*




*LUF P1*

**Cards and gateway**

| Description | Used for | No. | Reference | Weight kg |
|---|---|---|---|---|
| **Standard Fipio card**<br>The card is equipped with a 9-way male SUB-Dconnector which can take a TSX FP ACC12 connector with a TSX FP CA●00 trunk cable or TSX FP CC●00 drop cable.<br>This card should be used for new installations. It is also used to replace an ATV 58 or ATV 58F equipped with a VW3 A58 311 card by an ATV 71. | ATV 61<br>ATV 71 | 1 | **VW3 A3 311** | 0.300 |
| **Substitution Fipio card**<br>The card is equipped with a 9-way male SUB-D connector which can take a TSX FP ACC12 connector with a TSX FP CA●00 trunk cable or TSX FP CC●00 drop cable.<br>This Fipio communication card is reserved for replacing an ATV 58 or ATV 58F equipped with a VW3 A58 301 card by an ATV 71. | ATV 71 | 1 | **VW3 A3 301** | 0.300 |
| **Fipio/Modbus gateway**<br>The gateway is equipped with:<br>■ 1 Fipio 9-way male SUB-D connector which can take a TSX FP ACC12 connector for use with a TSX FP CA●00 trunk cable or TSX FPCC●00 drop cable<br>■ 1 RJ45 connector for Modbus for connection with the VW3 A8 306 R●● cable.<br>Fit an external 24 V ⎓ power supply, 100 mA minimum, to be ordered separately *(2)*. | ATS 48<br>ATV 31 | 2 | **LUF P1** | 0.240 |

*(1) To order other elements for connection to the Fipio bus, please consult our "Automation platform Modicon Premium – Unity & PL7 software" specialist catalogue.*
*(2) Please consult our "Power supplies, splitter blocks and interfaces" specialist catalogue.*

Presentation:
page 312

Characteristics:
page 313

## Elements for connecting the Fipio bus and a Premium PLC (continued) (1)

### Accessories

| Description | Use | No. | Unit reference | Weight kg |
|---|---|---|---|---|
| **Female connector for device with 9-way female SUB-D connector** (polycarbonate, IP 20) | Connection via daisy-chain or tap junctions. For ATV 61, ATV 71, gateway LUF P1 and Premium PLC | 3 | **TSX FP ACC12** | 0.040 |
| **Tap junction** (polycarbonate, IP 20) | Trunk cable tap link | 4 | **TSX FP ACC14** | 0.120 |
| **Fipio line terminators** (sold in lots of 2) | Connector, tap junction and repeater | 5 | **TSX FP ACC7** | 0.020 |
| **Electrical repeater** (IP 65) Power supply 24...48 V ⎓, 150 mA *(2)* | Increases the length of the bus while enabling connection of 2 segments of 1000 m maximum | 6 | **TSX FP ACC6** | 0.520 |
| **Electrical/fibre optic repeater** (IP 65) Power supply 19...60 V ⎓, 210 mA *(2)* | Used for connection (via a patch panel) of an electrical segment (1000 m max.) and a fibre optic segment (3000 m max.) | 7 | **TSX FP ACC8M** | 0.620 |
| **Modbus splitter block** equipped with 10 RJ45 connectors and 1 screw terminal | Used to connect an ATV 31, ATS 48 on the LUP P1 gateway | 8 | **LU9 GC3** | 0.500 |
| **Modbus line terminators** *(3)* | LU9 GC3 Modbus splitter block | 9 | **VW3 A8 306 RC** | 0.010 |
| **FIP wiring test tool** | Used to test each section of a network segment | – | **TSX FP ACC9** | 0.050 |

### Connecting cables (1)

| Description | Use | | No. | Length m | Reference | Weight kg |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| **Trunk cables** 8 mm, 1 shielded twisted pair 150 Ω. In standard atmosphere *(4)* and inside buildings | Connector TSX FP ACC12, junction box TSX FP ACC14, repeaters TSX FP ACC6, ACC8M | Connector TSX FP ACC12, junction box TSX FP ACC14, repeater TSX FP ACC6 | 10 | 100 | **TSX FP CA100** | 5.680 |
| | | | | 200 | **TSX FP CA200** | 10.920 |
| | | | | 500 | **TSX FP CA500** | 30.000 |
| **Trunk cables** 9.5 mm, 1 shielded twisted pair 150 Ω. In harsh environments *(5)*, outside buildings or in mobile installations *(6)* | Connector TSX FP ACC12, junction box TSX FP ACC14, repeaters TSX FP ACC6, ACC8M | Connector TSX FP ACC12, junction box TSX FP ACC14, repeater TSX FP ACC6 | 10 | 100 | **TSX FP CR100** | 7.680 |
| | | | | 200 | **TSX FP CR200** | 14.920 |
| | | | | 500 | **TSX FP CR500** | 40.000 |
| **Drop cables** 8 mm, 2 shielded twisted pairs 150 Ω. In standard atmosphere *(4)* and inside buildings | Connector TSX FP ACC12 | Junction box TSX FP ACC14 | 11 | 100 | **TSX FP CC100** | 5.680 |
| | | | | 200 | **TSX FP CC200** | 10.920 |
| | | | | 500 | **TSX FP CC500** | 30.000 |
| **Fibre optic jumper** Double optical fibre 62.5/125 | Repeater TSX FP ACC8M | Patch panel | 12 | 2 | **TSX FP JF020** | 0.550 |
| **Cables for Modbus bus** 2 RJ45 connectors | LUF P1 gateway, ATS 48, ATV 31 | LU9 GC3 Modbus splitter block | 13 | 0.3 | **VW3 A8 306 R03** | 0.025 |
| | | | | 1 | **VW3 A8 306 R10** | 0.060 |
| | | | | 3 | **VW3 A8 306 R30** | 0.130 |

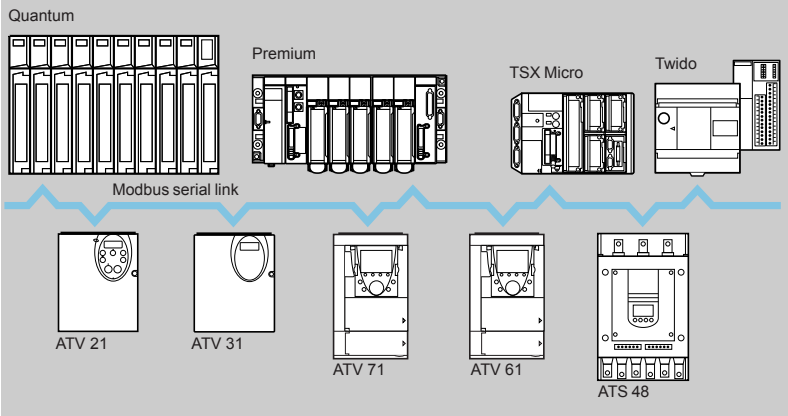
## Documentation

The manuals and quick reference guides for starters and variable speed drives, as well as the user manuals for communication gateways, are available on the web site: www.telemecanique.com.

*(1) To order other elements for connection to the Fipio bus, please consult our "Automation platform Modicon Premium – Unity & PL7 software" specialist catalogue.*
*(2) Please consult our "Power supplies, splitter blocks and interfaces" specialist catalogue.*
***(3) Sold in lots of 2.***
*(4) Standard environment:*
*- no particular environmental constraints*
*- operating temperature between +5°C and +60°C*
*- fixed installation*
*(5) Harsh environment:*
*- withstand to hydrocarbons, industrial oils, detergents, solder splashes*
*- relative humidity up to 100%*
*- saline atmosphere*
*- significant temperature variations*
*- operating temperature between -10°C and +70°C*
*(6) Mobile installation: cables in accordance with standard VDE 472 part 603/H:*
*- use on a cable-carrier chain with bending radius 75 mm minimum*
*- use on a gantry, provided that operating conditions such as acceleration, speed, length, etc, are adhered to: please consult your Regional Sales Office*
*- use not permitted on robots or multi-axis applications.*

# Starters, drives and communication
## Communication via Modbus serial link

## Presentation




Modbus is a master/slave protocol.

Two exchange mechanisms are possible:
■ Request/response: The request from the master is addressed to a given slave. The master then waits for the response from the slave which has been interrogated.
■ Broadcasting: The master broadcasts a request to all the slave stations on the serial link, which execute the command without transmitting a response.

The Altistart 48 soft start/soft stop units and the Altivar 21, Altivar 31, Altivar 61 and Altivar 71 variable speed drives have the Modbus protocol integrated as standard.

The Altistart 48 soft start/soft stop unit and the Altivar 21 and Altivar 31 variable speed drives are connected to the Modbus serial link via their terminal ports.

The Altivar 61 and Altivar 71 variable speed drives have 2 integrated communication ports:
■ A terminal port for connecting the graphic display terminal or an industrial HMI terminal (Magelis type)
■ A Modbus serial link port
As an option, they can also be equipped with a VW3 A3 303 Modbus/Uni-Telway communication card which offers additional characteristics (4-wire RS 485, ASCII mode, etc.).

## Characteristics

| Type of device | | | ATS 48 | ATV 21 | ATV 31 | ATV 61, ATV 71 | | |
|---|---|---|---|---|---|---|---|---|
| Type de connection | | | Terminal port | | | | Modbus serial link port | Communication card |
| **Structure** | Connector | | RJ45 | RJ45 | RJ45 | RJ45 | RJ45 | 9-way female SUB-D |
| | Topology | | Serial link | | | | | |
| | Physical interface | | 2-wire RS 485 | | | | | 2-wire or 4-wire RS 485 |
| | Access method | | Master/slave | | | | | |
| | Transmission mode | | RTU | | | | | RTU or ASCII |
| | Data rate | 38.4 Kbps | – | – | – | – | ● | – |
| | | 19.2 or 9.6 Kbps | ● | ● | ● | ● | ● | ● |
| | | 4.8 Kbps | ● | – | ● | – | ● | ● |
| | Medium | | Double shielded twisted pair | | | | | |
| | Number of subscribers | | 18, 27 or 31 slaves, depending on polarization *(1)* | | | | | |
| | Type of polarization | | 4.7 kΩ pulldown resistors | No pulldown | | | | Configurable. No pulldown or 4.7 kΩ pulldown resistors |
| | Length of serial link | | 1000 or 1300 m excluding tap links, depending on polarization *(1)* | | | | | |
| | Tap link | | 3 or 20 m maximum, depending on polarization *(1)* | | | | | |

*(1) See the configuration table on page 317.*

Connections: pages 317 and 318
References: pages 317 to 319

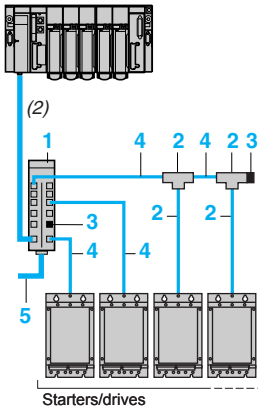
# Starters, drives and communication
## Communication via Modbus serial link

### Configuration on the basis of polarization

The specification of the physical layer provided by standard RS 485 is incomplete.
Various polarization diagrams can therefore be applied depending on the environment in which the equipment is to be used.
The Modbus standard specifies the polarization exactly *(1)*.

| | | Master | |
|---|---|---|---|
| | | **With or without polarization 4.7 kΩ** | **With polarization 470 Ω** |
| **Slave** | **Without polarization** | Configuration not recommended. | Modbus type configuration<br>31 slaves.<br>Length of serial link: 1300 m<br>Tap link: 3 m maximum<br>RC line terminators<br>(R =120 Ω, C = 1 nF) |
| | **With polarization 4.7 kΩ** | Uni-Telway type configuration<br>27 slaves<br>Length of serial link: 1000 m<br>Tap link: 20 m maximum<br>RC line terminators<br>(R =120 Ω, C = 1 nF) | Mixed configuration<br>18 slaves<br>Length of serial link: 1000 m<br>Tap link: 20 m maximum<br>RC line terminators<br>(R =120 Ω, C = 1 nF) |

PLC




### Connection elements for RJ45 wiring system

#### Card

| Description | Used with | Reference | Weight kg |
|---|---|---|---|
| **Communication card**<br>equipped with a 9-way female SUB-D connector | ATV 61, ATV 71 | **VW3 A3 303** | 0.300 |

#### Accessories

| Description | | No. | Unit reference | Weight kg |
|---|---|---|---|---|
| **Modbus splitter block**<br>10 RJ45 connectors and 1 screw terminal block | | 1 | **LU9 GC3** | 0.500 |
| **Modbus T-junction boxes** | With integrated cable (0.3 m) | 2 | **VW3 A8 306 TF03** | 0,190 |
| | With integrated cable (1 m) | 2 | **VW3 A8 306 TF10** | 0,210 |
| **Line terminators**<br>for RJ45 connector<br>*(3)* | R = 120 Ω, C = 1 nF | 3 | **VW3 A8 306 RC** | 0,010 |
| | R = 150 Ω | 3 | **VW3 A8 306 R** | 0.010 |

522184



*LU9 GC3*

#### Cables

| Description | Use | | No. | Length m | Reference | Weight kg |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| **Cables for Modbus serial link**<br>2 RJ45 connectors | ATS 48, ATV 21, ATV 31, ATV 61, ATV 71 (terminal ports or Modbus serial liink ports) | Modbus splitter block LU9 GC3 | 4 | 0.3 | **VW3 A8 306 R03** | 0.025 |
| | | | | 1 | **VW3 A8 306 R10** | 0.060 |
| | | | | 3 | **VW3 A8 306 R30** | 0.130 |
| | Modbus T-junction box VW3 A8 306 TF●● Modbus splitter block LU9 GC3 | Modbus T-junction box VW3 A8 306 TF●● Modbus splitter block LU9 GC3 | | | | |
| **Cables for Modbus serial link**<br>One 9-way male SUB-D connector<br>1 RJ45 connector | ATV 61, ATV 71 (+ communication card VW3 A3 303) | Modbus splitter block LU9 GC3 | 4 | 1 | **VW3 A58 306 R10** | 0.080 |
| | | | | 3 | **VW3 A58 306 R30** | 0.150 |
| **Double shielded twisted pair cables** | Modbus splitter block LU9 GC3 (screw terminals) | Modbus splitter block LU9 GC3 (screw terminals) | 5 | 100 | **TSX CSA 100** | 5.680 |
| | | | | 200 | **TSX CSA 200** | 10.920 |
| | | | | 500 | **TSX CSA 500** | 30.000 |

532174

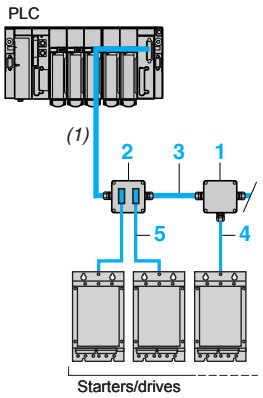


*VW3 A8 306 TF●●*

*(1) Standard defined in 2002, available on the website: www.modbus.org.*
*(2) The cable for connecting the PLC and the splitter block depends on the type of PLC; please consult our "Automation platform Modicon Premium – Unity & PL7 software", "Automation platform Modicon Quantum", "Automation platform Modicon TSX Micro – PL7 software" and "Automation and relay functions" specialist catalogues.*
***(3) Sold in lots of 2.***

Presentation: page 316
Characteristics: page 316

# Starters, drives and communication
## Communication via Modbus serial link




533178



*TSX SCA 50*

533179



*TSX SCA 62*

## Connection elements using tap junctions

### Accessories

| Description | No. | Reference | Weight kg |
|---|---|---|---|
| **Tap junction**<br>3 screw terminals, RC line terminator | 1 | **TSX SCA 50** | 0.520 |
| **Subscriber socket**<br>Two 15-way female SUB-D connectors and 2 screw terminals, RC line terminator | 2 | **TSX SCA 62** | 0.570 |

### Cables

| Description | Use | | No. | Length m | Reference | Weight kg |
|---|---|---|---|---|---|---|
| | From | To | | | | |
| **Double shielded twisted pair cables** | Tap junction TSX SCA 50, subscriber socket TSX SCA 62 | Tap junction TSX SCA 50, subscriber socket TSX SCA 62 | 3 | 100 | **TSX CSA 100** | 5.680 |
| | | | | 200 | **TSX CSA 200** | 10.920 |
| | | | | 500 | **TSX CSA 500** | 30.000 |
| **Cable for Modbus serial link**<br>1 RJ45 connector and one stripped end | ATS 48, ATV 21, ATV 31, ATV 61, ATV 71 (terminal ports or Modbus serial link ports) | Tap junction TSX SCA 50 | 4 | 3 | **VW3 A8 306 D30** | 0.150 |
| **Cable for Modbus serial link**<br>1 RJ45 connector and one 15-way male SUB-D connector | ATS 48, ATV 21, ATV 31, ATV 61, ATV 71 (terminal ports or Modbus serial link ports) | Subscriber socket TSX SCA 62 | 5 | 3 | **VW3 A8 306** | 0.150 |
| **Cable for Uni-Telway and Modbus serial link**<br>2 male SUB-D connectors, 9 and 15-way | ATV 61, ATV 71 (+ communication card VW3 A3 303) | Subscriber socket TSX SCA 62 | 5 | 3 | **VW3 A8 306 2** | 0.150 |

*(1) The cable for connecting the PLC and the splitter block depends on the type of PLC; please consult our "Automation platform Modicon Premium - Unity & PL7 software", "Automation platform Modicon Quantum", "Automation platform Modicon TSX Micro – PL7 software" and "Automation and relay functions" specialist catalogues.*

Presentation: page 316
Characteristics: page 316

## Connection elements using screw terminals

### Accessories

| Description | | Sold in lots of | Reference unit | Weight kg |
|---|---|---|---|---|
| **Line terminators** for screw terminals | R = 120 Ω, C = 1 nF | 2 | **VW3 A8 306 DRC** | 0.200 |
| | R = 150 Ω | 2 | **VW3 A8 306 DR** | 0.200 |

### Cable

| Description | Use | | Length | Reference | Weight |
|---|---|---|---|---|---|
| | From | To | m | | kg |
| **Cable for Modbus** 1 RJ45 connector and one stripped end | ATS 48, ATV 21, ATV 31, ATV 61, ATV 71 (terminal ports or Modbus serial link ports) | Standard screw terminal, tap junction TSX SCA 50 | 3 | **VW3 A8 306 D30** | 0.150 |

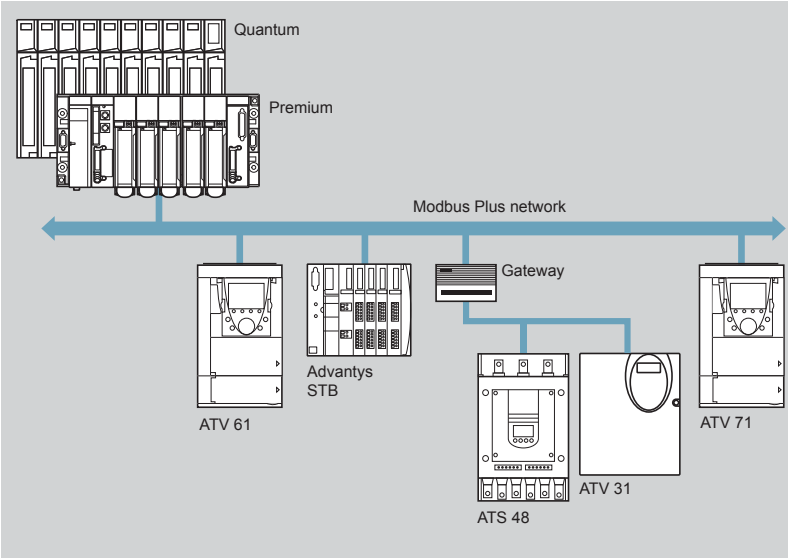
## Documentation

The manuals and quick reference guides for starters and variable speed drives, as well as the user manuals for communication gateways, are available on the website: www.telemecanique.com.

Presentation: page 316
Characteristics: page 316
Connections: pages 317 and 318

# Starters, drives and communication
## Communication via Modbus Plus network

### Presentation




The Modbus Plus network is a high-performance industrial local area network which can be used to meet the needs of client/server type extended architectures, combining a high data rate (1 Mbps), simple, low-cost transmission media and numerous messaging services.

The Altistart 48 soft start/soft stop unit and the Altivar 31 variable speed drive can be connected to the Modbus Plus network via an NW BM85000 gateway which has four RS 232 serial ports.

The Altivar 61 and Altivar 71 variable speed drives are connected to the Modbus Plus network via communication card VW3 A3 302.

#### Communication services

The main data exchange services between subscribers connected to the network are:
- The “Modbus messaging” service according to Modbus protocol
- The “Global Data” service: each subscriber makes available 32 words for each of the 63 other network subscribers
- The “Peer Cop” dialogue service: point-to-point transaction of 32 receive or transmit words

The “Global Data” and “Peer Cop” services are restricted to a Modbus Plus network with a maximum of 64 subscribers.

Altivar 61 and Altivar 71 drives are accessed by simple configuration in the PLC using “Peer Cop” and “Global Data” services.
These services enable rapid exchange of the main drive parameters:
- The “Peer Cop” service for controlling and adjusting the drive
- The “Global data” service for monitoring the drive

Other parameters, which are used less frequently, can be accessed by the Modbus messaging service.

Characteristics: page 321
Connections: page 322
References: pages 322 and 323

# Starters, drives and communication
## Communication via Modbus Plus network

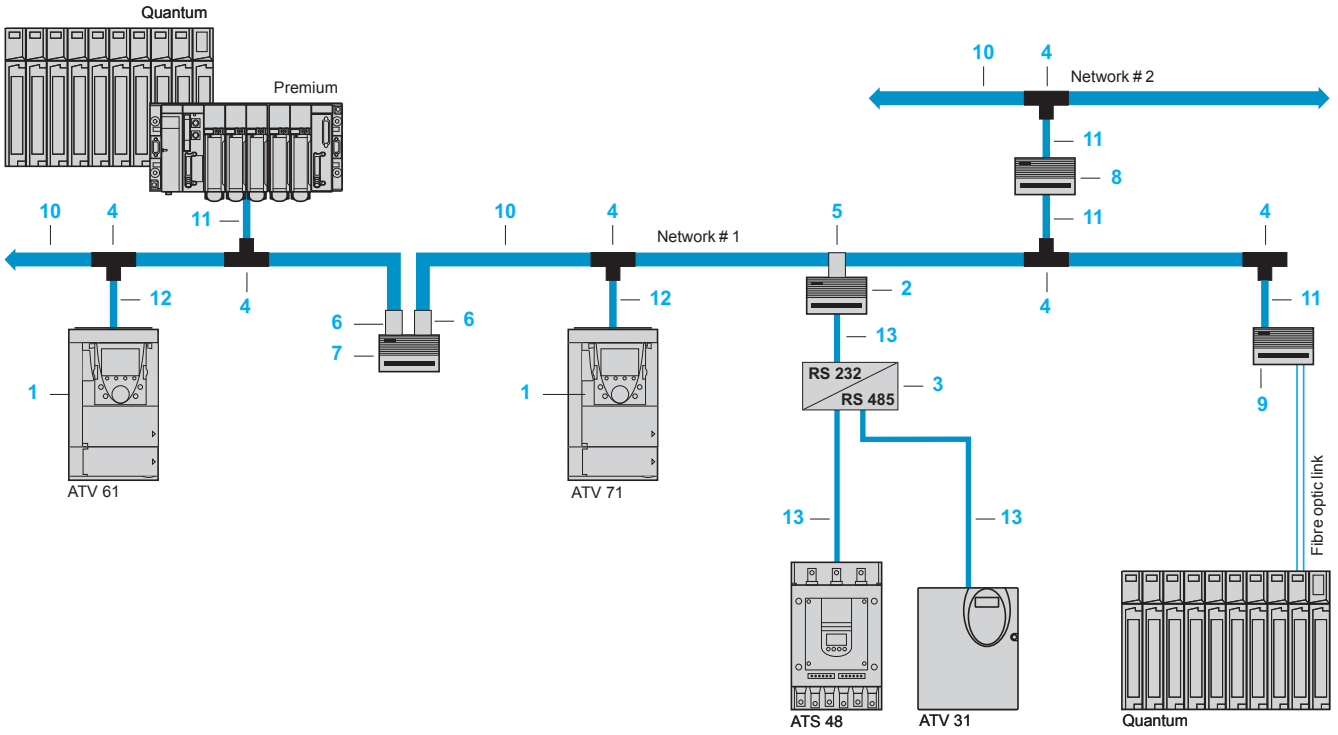
## Characteristics

| | | | |
|---|---|---|---|
| **Structure** | Topology | Network | |
| | Physical interface | RS 485 | |
| | Access method | Token network | |
| | Transmission mode | HDLC synchronous | |
| | Data rate | 1 Mbps | |
| | Medium | Shielded twisted pair 120 Ω<br>Optical fibre | |
| | Number of subscribers per network | 32, without repeater<br>64, with one or more repeaters | |
| | Number of networks | 4, separated by a maximum of 3 bridges | |
| | Length of network | 450 m maximum without repeater<br>1800 m maximum with 3 electrical repeaters<br>3000 m between 2 fibre optic repeaters | |
| **Services** | Modbus messaging | Point-to-point requests with confirmation report: 200 bytes maximum, compatible with all Modbus subscribers | |
| | "Global Data" | 4096-byte shared database<br>Cyclic exchange of 32 broadcast words<br>Limited to one network<br>This service does not cross bridges | |
| | "Peer Cop" dialogue | Point-to-point or broadcast message<br>Limited to one network<br>This service does not cross bridges | |
| **Type of device** | | **ATS 48, ATV 31** | **ATV 61, ATV 71** |
| **Type of interface** | | **NW BM85000** | **VW3 A3 302** |
| **Control** | | "Modbus messaging" | "Peer Cop"<br>8 configurable words maximum (communication scanner) |
| **Monitoring** | | "Modbus messaging" | "Global Data"<br>8 configurable words maximum (communication scanner) |
| **Configuration and adjustment** | | "Modbus messaging" | "Modbus messaging"<br>Read/write access to all drive parameters |

Presentation: page 320
Connections: page 322
References: pages 322 and 323

# Starters, drives and communication
## Communication via Modbus Plus network

### Modbus Plus wiring system




### Modbus Plus network connection elements *(1)*

#### Cards and gateways

| Description | Used with | No. | Reference | Weight kg |
|---|---|---|---|---|
| **Communication cards** equipped with one 9-way female SUB-D connector | ATV 61, ATV 71 | 1 | **VW3 A3 302** | 0.300 |
| **Modbus Plus/Modbus gateway** 4 RS 232 ports power supply 115…220 V ~ | ATS 48, ATV 31 | 2 | **NW BM85000** | 3.158 |
| **RS 232/RS 485 interface** power supply 24 V ⎓, 20 mA *(2)* | ATS 48, ATV 31 | 3 | **XGS Z24** | 0.105 |

#### Connection accessories

| Description | Use | No. | Reference | Weight kg |
|---|---|---|---|---|
| **Modbus Plus tap** (IP 20) | For connecting via a tap junction | 4 | **990 NAD 230 00** | 0.230 |
| **Modbus Plus in-line connector** | Gateway, bridge and repeater | 5 | **AS MBKT 085** | 0.035 |
| **Connector with Modbus Plus terminator** (sold in lots of 2) | Bridge and repeater | 6 | **AS MBKT 185** | 0.260 |
| **Modbus Plus electrical repeater** | Extension beyond 450 m or up to 64 subscribers | 7 | **NW RR85 001** | 2.677 |
| **Modbus Plus bridge with 4 ports** | Connection of 4 networks maximum | 8 | **NW BP85 002** | 2.813 |
| **Line/station fibre-optic repeater** | – | 9 | **490 NRP 254 00** | 2.856 |
| **Point-to-point fibre-optic repeater** | Used to connect an electrical segment to the fibre-optic segment (3000 m maximum) | – | **NW NRP 253 00** | 2.863 |
| **Wiring tool** | Inserting trunk and drop cables in a 990 NAD 230 00 tap | – | **043 509 383** | 3.000 |

*(1) To order other connection elements, please consult our "Automation platform Modicon Premium – Unity & PL7 software" and "Automation platform Modicon Quantum" specialist catalogues.*
*(2) Please consult our "Power supplies, splitter blocks and interfaces" specialist catalogue.*

Presentation:
page 320

Characteristics:
page 321

## Modbus Plus network connection elements (continued) (1)

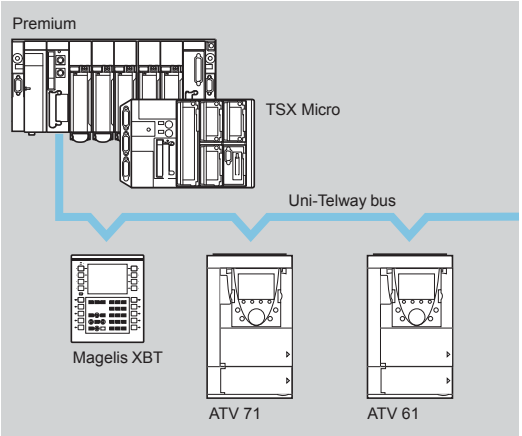
### Cables

| Description | Use | | No. | Length | Reference | Weight |
|---|---|---|---|---|---|---|
| | From | To | | m | | kg |
| **Trunk cables for Modbus Plus** | Modbus Plus tap 990 NAD 230 00 | Modbus Plus tap 990 NAD 230 00, Modbus Plus in-line connector AS MBKT 085, Modbus Plus connector with terminators AS MBKT 185 | 10 | 30.5 | **490 NAA 271 01** | 1.833 |
| | | | | 152.5 | **490 NAA 271 02** | 10.135 |
| | | | | 305 | **490 NAA 271 03** | 18.940 |
| | | | | 457 | **490 NAA 271 04** | 30.000 |
| | | | | 1525 | **490 NAA 271 06** | 112.950 |
| **Drop cables** One 9-way male SUB-D connector and one stripped end | Premium, Quantum PLCs, Modbus Plus bridge with 4 ports NW BP85 002, line/station fibre optic repeater 490 NRP 253 00 | Modbus Plus tap 990 NAD 230 00 | 11 | 2.4 | **990 NAD 211 10** | 0.169 |
| | | | | 6 | **990 NAD 211 30** | 0.459 |
| | ATV 61, ATV 71 (+ communication card VW3 A3 302) | Modbus Plus tap 990 NAD 230 00 | 12 | 2.4 | **990 NAD 219 10** | 0.142 |
| | | | | 6 | **990 NAD 219 30** | 0.465 |
| **Cable for Modbus** 1 RJ45 connector and one stripped end | ATS 48, ATV 31, Modbus Plus/ Modbus gateway NW BM85000 | RS 232-RS 485 interface | 13 | 3 | **VW3 A8 306 D30** | 0.115 |

*(1) To order other connection elements, please consult our "Automation platform Modicon Premium – Unity & PL7 software" and "Automation platform Modicon Quantum" specialist catalogues.*

# Starters, drives and communication
## Communication via Uni-Telway bus

## Presentation




The Uni-Telway bus is a standard means of communication between control system components (PLCs, HMI terminals, supervisors, variable speed drives, numerical controllers, etc).

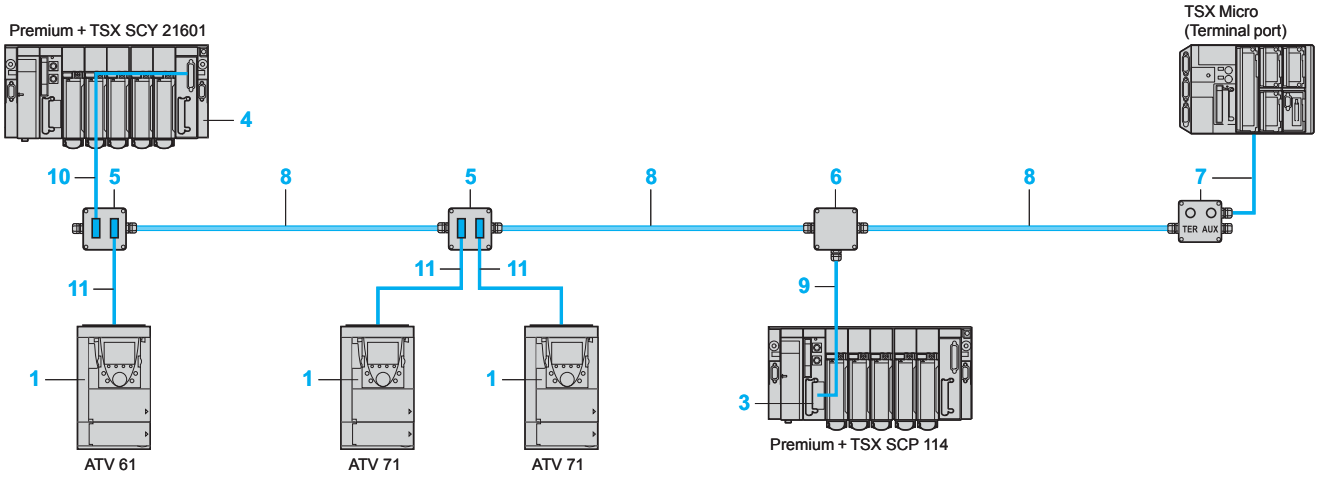
The Uni-Telway bus requires a master station (Premium, TSX Micro PLCs) which manages the allocation of bus access rights to the various connected slave stations (HMI terminals, variable speed drives, etc). The slave stations can communicate with one another without programming the master station.
An industrial HMI terminal (Magelis type) can be connected directly to the bus and can be used to adjust drives without developing applications specific to the PLC.

The Altivar 61 and Altivar 71 variable speed drives can be connected to the Uni-Telway bus via a communication card VW3 A3 303.

## Characteristics

| | | |
|---|---|---|
| **Structure** | Topology | Bus |
| | Physical interface | RS 485 isolated |
| | Link | Multidrop |
| | Access method | Master/slave type |
| | Transmission mode | Asynchronous transmission in baseband |
| | Data rate | 4.8…19.2 Kbps |
| | Medium | Double shielded twisted pair |
| | Number of stations | 28 maximum |
| | Length of bus | 1000 m maximum excluding tap links |
| | Tap links | 20 m maximum |
| **Services** | UNI-TE | Request/response of up to 240 bytes *(1)* initiated by any connected station.<br>Unsolicited point-to-point data of up to 240 bytes *(1)* without confirmation report, initiated by any connected station.<br>Broadcast messages of up to 240 bytes *(1)* initiated by the master station. |
| | Other functions | Transparent communication, via the master station, with any X-WAY architecture.<br>Diagnostics, debugging, adjustment, programming of PLCs. |
| | Security | Check character on each frame, acknowledgement and, if required, repetition of messages ensure security of transmission. |
| | Monitoring | The bus status table, transmission error counters and station status can be accessed on each station. |

## Uni-Telway bus wiring system




*(1) Limited to 128 bytes with the Premium and TSX Micro PLC terminal port.*

Reference:
page 325

# Starters, drives and communication
## Communication via Uni-Telway bus

### Uni-Telway bus connection elements *(1)*

#### Cards, kit and module

| Description | Used with | No. | Protocol | Reference | Weight kg |
|---|---|---|---|---|---|
| **Communication card** card equipped with a 9-way female SUB-D connector | ATV 61 ATV 71 | 1 | Uni-Telway, Modbus | **VW3 A3 303** | 0.300 |
| **RS 485 type III PCMCIA card** (compatible with RS 422) 1.2...19.2 Kbps | Premium, Atrium, TSX Micro PLCs, or TSX SCY 21601 module | 3 | Uni-Telway, Modbus, character mode | **TSX SCP 114** | 0.105 |
| **Communication module** | Premium or Atrium PLC | 4 | Uni-Telway, Modbus, character mode | **TSX SCY 21601** | 0.360 |

533153



*TSX SCA 62*

#### Connection accessories

| Description | Use | No. | Reference | Weight kg |
|---|---|---|---|---|
| Subscriber socket Two 15-way female SUB-D connectors and 2 screw terminals | 2-channel junction box, trunk cable extension and line terminator | 5 | **TSX SCA 62** | 0.570 |
| **Tap junction** 3 screw terminals | Junction box, trunk cable extension and line terminator | 6 | **TSX SCA 50** | 0.520 |
| **Terminal port connection box** with integrated cable, length 1 m | Connection of a TSX Micro or Premium PLC via the PLC terminal port and line terminator | 7 | **TSX P ACC 01** | 0.690 |

535577



*TSX SCA 50*

533154




*TSX P ACC 01*

#### Cables

| Description | Use From | Use To | No. | Length m | Reference | Weight kg |
|---|---|---|---|---|---|---|
| **Uni-Telway double shielded twisted pair cables** | Junction box TSX SCA 50, subscriber socket TSX SCA 62, terminal port connection box TSX P ACC 01 | Subscriber socket TSX SCA 62, junction box TSX SCA 50, terminal port connection box TSX P ACC 01 | 8 | 100 | **TSX CSA 100** | 5.680 |
| | | | | 200 | **TSX CSA 200** | 10.920 |
| | | | | 500 | **TSX CSA 500** | 30.000 |
| **Cables for isolated RS 485 tap link** | Card TSX SCP 114 | Junction box TSX SCA 50 | 9 | 3 | **TSX SCP CU 4030** | 0.160 |
| | | Subscriber socket TSX SCA 62 | 9 | 3 | **TSX SCP CU 4530** | 0.180 |
| | Integrated channel (channel 0) of TSX SCY 2160 1 module | Junction box TSX SCA 50 | 10 | 3 | **TSX SCP CU 6030** | 0.180 |
| | | Subscriber socket TSX SCA 62 | 10 | 3 | **TSX SCY CU 6530** | 0.200 |
| **Cable for Uni-Telway or Modbus bus** 2 male SUB-D connectors 9 and 15-way | ATV 61, ATV 71 (+ communi-cation card VW3 A3 303) | Subscriber socket TSX SCA 62 | 11 | 3 | **VW3 A8 306 2** | 0.150 |

*(1) To order other elements for connection to the Fipio bus, please consult our "Automation platform Modicon Premium – Unity & PL7 software" and "Automation platform Modicon TSX Micro – PL7 software" specialist catalogues.*

Presentation: page 324
Characteristics: page 324
Connections: page 324

# TeSys motor starters - open version
## Communication gateways LUF P

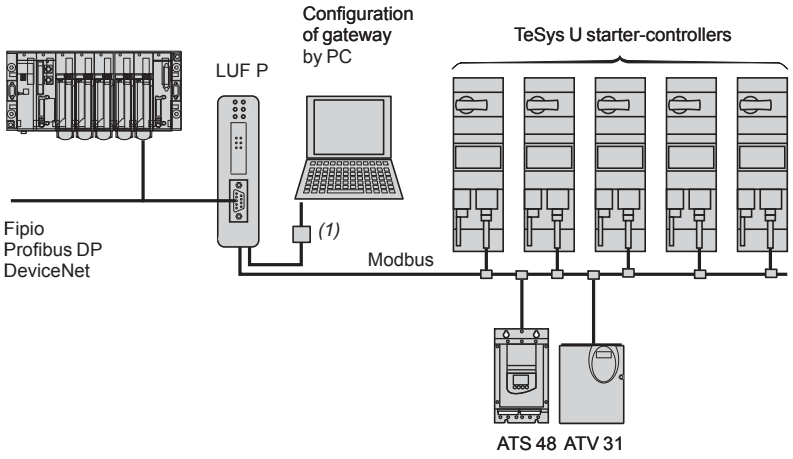
## Presentation

Communication gateways LUF P allow connection between the Modbus serial link and Fipio, Profibus DP or DeviceNet field buses.

After configuration, these gateways manage information which can be accessed by the Modbus serial link and make this information available for read/write functions (command, monitoring, configuration and adjustment) on the field buses.

An LUF P communication gateway consists of a box which can be clipped onto a 35 mm omega rail, allowing connection of up to 8 Slaves connected on the Modbus serial link.

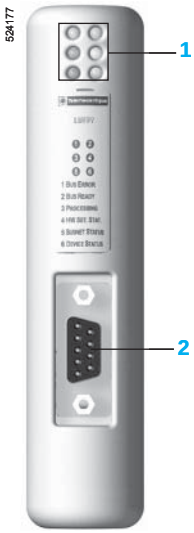
### Example of architecture




.

## Description

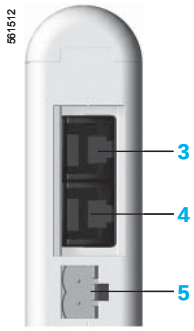
### Front panel of the product




1 LED indicating :
- communication status of the Modbus serial links,
- gateway status,
- communication status of the Fipio, Profibus DP or DeviceNet bus.

2 Connectors for connection to Fipio, Profibus DP or DeviceNet buses.

### Underside of product




3 RJ45 connector for connection of the Modbus serial link
4 RJ45 connector for link to a PC
5 ⎓ 24 V power supply

## Software set-up

For the Fipio bus, software set-up of the gateway is performed using either PL7 Micro/Junior/Pro software or ABC Configurator software.
For the Profibus DP and DeviceNet buses, software set-up is performed using ABC Configurator.
This software is included in the TeSys U user's manual.

*(1) Connection kit for PowerSuite software workshop (see page 304).*

Characteristics, references: page 327
Dimensions: page 327

# TeSys motor starters - open version
## Communication gateways LUF P

## Characteristics

| Bus type | | | Fipio | Profibus DP | DeviceNet |
|---|---|---|---|---|---|
| **Environment** | Conforming to IEC 60664 | | Degree of pollution: 2 | | |
| **Ambient air temperature** | Around the device | **°C** | + 5…+ 50 | | |
| **Degree of protection** | | | IP 20 | | |
| **Electromagnetic compatibility** | Emission | | Conforming to IEC 50081-2: 1993 | | |
| | Immunity | | Conforming to IEC 61000-6-2: 1999 | | |
| **Number of Modbus slaves which can be connected** | | | ⩽ 8 | | |
| **Connection** | Modbus | | By RJ45 connector conforming to Schneider Electric RS485 standard | | |
| | To a PC | | By RJ45 connector, with PowerSuite connection kit | | |
| | Field bus | | By SUB D9 female connector | By SUB D9 female connector | By 5-way removable screw connector |
| **Supply** | | **V** | External supply, ⎓ 24 ± 10 % | | |
| **Consumption** | Max. | **mA** | 280 | | |
| | Typical | **mA** | 100 | | |
| **Indication/diagnostics** | | | By LED on front panel | | |
| **Services** | Profile | | FED C32 or FED C32P | – | – |
| | Command | | 26 configurable words *(1)* | 122 configurable words | 256 configurable words |
| | Monitoring | | 26 configurable words *(1)* | 122 configurable words | 256 configurable words |
| | Configuration and adjustment | | By gateway mini messaging facility (PKW) | | |

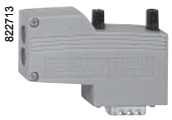
## References

| Description | For use with | With bus/ serial link | Reference | Weight kg |
|---|---|---|---|---|
| **Communication gateways** | TeSys U starter-controllers, Altistart 48, Altivar 31 | Fipio/Modbus | **LUF P1** | 0.245 |
| | | Profibus DP/Modbus | **LUF P7** | 0.245 |
| | | DeviceNet/Modbus | **LUF P9** | 0.245 |

### Connection accessories




*TSX FP ACC 12*



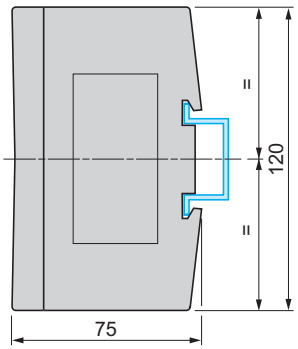

*490 NAD 911 03*

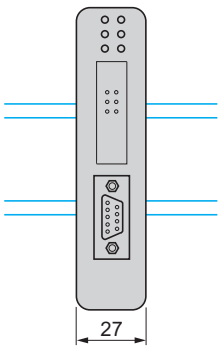
| Description | For use with | Length m | Connectors | Reference | Weight kg |
|---|---|---|---|---|---|
| **Connection cables** | Modbus | 3 | 1 RJ45 type connector and one end with stripped wires | **VW3 A8 306 D30** | 0.150 |
| | | 0.3 | 2 RJ45 type connectors | **VW3 A8 306 R03** | 0.050 |
| | | 1 | 2 RJ45 type connectors | **VW3 A8 306 R10** | 0.050 |
| | | 3 | 2 RJ45 type connectors | **VW3 A8 306 R30** | 0.150 |
| **Connectors** | Fipio | – | 1 SUB-D 9 male connector | **TSX FP ACC12** | 0.040 |
| | Profibus mid line | – | 1 SUB-D 9 male connector | **490 NAD 911 04** | – |
| | Profibus line end | – | 1 SUB-D 9 male connector | **490 NAD 911 03** | – |

### Documentation

| Description | Medium | Language | Reference | Weight kg |
|---|---|---|---|---|
| **User's manual for TeSys U range** *(2)* | CD-Rom | Multilingual: English, French, German, Italian, Spanish | **LU9 CD1** | 0.022 |

## Dimensions




*(1) If the gateway is configured using PL7 and not ABC Configurator, the I/O capacity is limited to a total of 26 words.*
*(2) This CD-Rom contains user's manuals for AS-Interface and Modbus communication modules, multifunction control units and gateways, as well as for the gateway programming software, ABC Configurator.*

Presentation, description: page 326
Setting-up: page 326

# Product reference index


043 509 383 318
490 NAD 911 03 323
and 325
490 NAD 911 04 323
and 325
490 NAA 271 0● 319
490 NRP 254 00 318
490 NTC 000 ●● 310
490 NTW 000 ●● 310
499 NEH 104 10 311
499 NEH 141 00 311
499 NES 181 00 311
499 NES 251 00 311
499 NMS 251 0● 311
499 NOH 105 10 311
499 NSS 251 0● 311
990 NAD 211 10 319
990 NAD 211 30 319
990 NAD 219 ●● 319
990 NAD 230 00 318

A

AS MBKT ●●● 318
ATV 71H037M3 22
ATV 71H075M3 22
ATV 71H075N4 23
ATV 71HC11N4 23
ATV 71HC11Y 25
ATV 71HC13N4 23
ATV 71HC13Y 25
ATV 71HC16N4 23
ATV 71HC16Y 25
ATV 71HC20N4 23
ATV 71HC20Y 25
ATV 71HC25N4 23
ATV 71HC25Y 25
ATV 71HC28N4 23
ATV 71HC31N4 23
ATV 71HC31Y 25
ATV 71HC40N4 23
ATV 71HC40Y 25
ATV 71HC50N4 23
ATV 71HC50Y 25
ATV 71HC63Y 25
ATV 71HD11M3X 22
ATV 71HD11N4 23
ATV 71HD11Y 25
ATV 71HD15M3X 22
ATV 71HD15N4 23
ATV 71HD15Y 25
ATV 71HD18M3X 22
ATV 71HD18N4 23
ATV 71HD18Y 25
ATV 71HD22M3X 22
ATV 71HD22N4 23
ATV 71HD22Y 25
ATV 71HD30N4 23
ATV 71HD30Y 25
ATV 71HD37N4 23
ATV 71HD37Y 25
ATV 71HD45N4 23
ATV 71HD45Y 25
ATV 71HD55N4 23
ATV 71HD55Y 25
ATV 71HD75N4 23
ATV 71HD75Y 25
ATV 71HD90N4 23
ATV 71HD90Y 25
ATV 71HU15M3 22
ATV 71HU22M3 22
ATV 71HU22N4 23
ATV 71HU22Y 25
ATV 71HU30M3 22
ATV 71HU30N4 23
ATV 71HU40M3 22
ATV 71HU40N4 23
ATV 71HU40Y 25
ATV 71HU55M3 22
ATV 71HU55N4 23
ATV 71HU55Y 25
ATV 71HU75M3 22
ATV 71HU75N4 23
ATV 71HU75Y 25
ATV 71P075N4Z 24
ATV 71PD11N4Z 24
ATV 71PU22N4Z 24
ATV 71PU30N4Z 24
ATV 71PU40N4Z 24
ATV 71PU55N4Z 24
ATV 71PU75N4Z 24
ATV 71HC11Y 248
ATV 71HC13Y 248
ATV 71HC16Y 248
ATV 71HC20Y 248
ATV 71HC25Y 249
ATV 71HC31Y 249
ATV 71HC40Y 249
ATV 71HC50Y 249
ATV 71HC63Y 249
ATV 71HD11Y 248
ATV 71HD15Y 248
ATV 71HD18Y 248
ATV 71HD22Y 248
ATV 71HD30M3X 22
ATV 71HD30Y 248
ATV 71HD37M3X 22
ATV 71HD37Y 248
ATV 71HD45M3X 22
ATV 71HD45Y 248
ATV 71HD55M3X 22
ATV 71HD55Y 248
ATV 71HD75M3X 22
ATV 71HD75Y 248
ATV 71HD90Y 248
ATV 71HU15N4 23
ATV 71HU22Y 248
ATV 71HU30Y 25
and 248
ATV 71HU40Y 248
ATV 71HU55Y 248
ATV 71HU75Y 248
ATV 71P075N4Z 247
ATV 71PU15N4Z 24
ATV 71PU22N4Z 247
ATV 71PU30N4Z 247
ATV 71PU40N4Z 247
ATV 71PU55N4Z 247
ATV 71PU75N4Z 247
ATV 71W075N4 24
and 246
ATV 71WD11N4 24
and 246
ATV 71WD15N4 24
and 246
ATV 71WD18N4 24
and 246
ATV 71WD22N4 24
and 246
ATV 71WD30N4 24
and 246
ATV 71WD37N4 24
and 246
ATV 71WD45N4 24
and 246
ATV 71WD55N4 24
and 246
ATV 71WD75N4 24
and 246
ATV 71WU15N4 24
and 246
ATV 71WU22N4 24
and 246
ATV 71WU30N4 24
and 246
ATV 71WU40N4 24
and 246
ATV 71WU55N4 24
and 246
ATV 71WU75N4 24
and 246

L

LA9 P307 325
LU9 CD1 323
LU9 GC3 109,133
and 315
LUF P1 314
and 323
LUF P7 323
LUF P9 323

N

NW RR85 001 318
NW BM85000 318
NW BP85 002 318
NW NRP 253 00 318

T

TCS EAK 0100 310
TCS EAQ 0100 310
TCS ESM083F23F0 311
TCS ESM083F2CS0 311
TCS ESM083F2CU0 311
TSX CAN CA 100 123
and 133
TSX CAN CA 300 123
and 133
TSX CAN CA 50 1123
and 133
TSX CAN CB 100 123
and 133
TSX CAN CB 300 123
and 133
TSX CAN CB 50 123
and 133
TSX CAN CD 100 123
and 133
TSX CAN CD 300 123
and 133
TSX CAN CD 50 123
and 133
TSX FP ACC12 315
and 323
TSX FP ACC14 315
TSX FP ACC6 315
TSX FP ACC7 315
TSX FP ACC8M 315
TSX FP ACC9 315
TSX CAN KCDF 123
TSX CSA 100 321
TSX CSA 200 321
TSX CSA 500 321
TSX ETG 100 310
TSX FP CA100 315
TSX FP CA200 315
TSX FP CA500 315
TSX FP CC100 315
TSX FP CC200 315
TSX FP CC500 315
TSX FP CR100 315
TSX FP CR200 315
TSX FP CR500 315
TSX FP JF020 315
TSX P ACC 01 321
TSX SCA 50 321
TSX SCA 62 321
TSX SCP 114 321
TSX SCP CU 4030 321
TSX SCP CU 4530 321
TSX SCP CU 6030 321
TSX SCY 21601 321
TSX SCY CU 6530 321

V

VW3 A1 101 108
VW3 A1 102 108
and 109
VW3 A1 103 108
VW3 A1 104 R10 108
and 109
VW3 A1 104 R100 108
and 109
VW3 A1 104 R30 108
and 109
VW3 A1 104 R50 108
and 109
VW3 A1 105 108
VW3 A3 101 26
VW3 A3 201 115
VW3 A3 202 115
VW3 A3 301 132
and 314
VW3 A3 302 132
and 318
VW3 A3 303 132
and 321
VW3 A3 304 132
VW3 A3 307 132
VW3 A3 309 132
VW3 A3 310 132
and 314
VW3 A3 311 132
and 314
VW3 A3 316 132
VW3 A3 317 132
VW3 A3 40● 113
VW3 A3 411 113
and 168
VW3 A3 501 123
VW3 A4 401 168
VW3 A4 402 168
VW3 A4 403 168
VW3 A4 404 168
VW3 A4 405 168
VW3 A4 406 168
VW3 A4 407 168
VW3 A4 408 168
VW3 A4 410 168
VW3 A4 412 168
VW3 A4 413 168
VW3 A4 501 155
VW3 A4 502 155
VW3 A4 503 155
VW3 A4 504 155
VW3 A4 505 155
VW3 A4 506 155
VW3 A4 507 155
VW3 A4 508 155
VW3 A4 509 155
VW3 A4 510 155
VW3 A4 511 155
VW3 A4 512 155
VW3 A4 551 160
VW3 A4 552 160
VW3 A4 553 160
VW3 A4 554 160
VW3 A4 555 160
VW3 A4 556 160
VW3 A4 557 160
VW3 A4 558 160
VW3 A4 559 160
VW3 A4 560 160
VW3 A4 561 160
VW3 A4 562 160
VW3 A4 563 160
VW3 A4 564 160
VW3 A4 565 160
VW3 A4 568 160
VW3 A4 569 160
VW3 A4 570 160
VW3 A4 571 160
VW3 A4 572 160
VW3 A4 601 162
VW3 A4 602 162
VW3 A4 603 162
VW3 A4 604 162
VW3 A4 605 162
VW3 A4 606 162
VW3 A4 607 162
VW3 A4 608 162
VW3 A4 609 162
VW3 A4 610 162
VW3 A4 611 162
VW3 A4 612 162
VW3 A4 613 162
VW3 A4 619 162
VW3 A4 621 163
VW3 A4 622 163
VW3 A4 623 163
VW3 A4 624 163
VW3 A4 625 163
VW3 A4 626 163
VW3 A4 627 163
VW3 A4 628 163
VW3 A4 629 163
VW3 A4 630 163
VW3 A4 631 163
VW3 A4 632 163
VW3 A4 633 163
VW3 A4 639 163
VW3 A4 641 164
VW3 A4 642 164
VW3 A4 643 164
VW3 A4 644 164
VW3 A4 645 164
VW3 A4 646 164
VW3 A4 647 164
VW3 A4 648 164
VW3 A4 649 164
VW3 A4 650 164
VW3 A4 651 164
VW3 A4 656 164
VW3 A4 657 164
VW3 A4 661 165
VW3 A4 662 165

**VW3 A4 663** *165*
**VW3 A4 664** *165*
**VW3 A4 665** *165*
**VW3 A4 666** *165*
**VW3 A4 667** *165*
**VW3 A4 668** *165*
**VW3 A4 669** *165*
**VW3 A4 670** *165*
**VW3 A4 671** *165*
**VW3 A4 676** *165*
**VW3 A4 677** *165*

**VW3 A5 101** *172 and 173*
**VW3 A5 102** *172 and 173*
**VW3 A5 103** *172 and 173*
**VW3 A5 104** *172 and 173*
**VW3 A5 105** *172 and 173*
**VW3 A5 106** *172 and 173*
**VW3 A5 107** *172 and 173*
**VW3 A5 108** *172 and 173*
**VW3 A5 201** *175*
**VW3 A5 202** *175*
**VW3 A5 203** *175*
**VW3 A5 204** *175*
**VW3 A5 205** *175*
**VW3 A5 206** *175*
**VW3 A5 207** *175*
**VW3 A5 208** *175*
**VW3 A5 209** *175*
**VW3 A5 210** *175*
**VW3 A5 211** *175*
**VW3 A58501** *160*
**VW3 A58502** *160*
**VW3 A58502** *160*
**VW3 A7 101** *135*
**VW3 A7 102** *135*
**VW3 A7 103** *135*
**VW3 A7 104** *135*
**VW3 A7 201** *149*
**VW3 A7 202** *149*
**VW3 A7 203** *149*
**VW3 A7 204** *149*
**VW3 A7 205** *149*
**VW3 A7 206** *149*
**VW3 A7 207** *149*
**VW3 A7 208** *149*
**VW3 A7 209** *149*
**VW3 A7 210** *149*
**VW3 A7 211** *149*
**VW3 A7 212** *149*
**VW3 A7 231** *149*
**VW3 A7 232** *149*
**VW3 A7 233** *149*
**VW3 A7 234** *149*
**VW3 A7 235** *149*
**VW3 A7 236** *149*
**VW3 A7 237** *149*
**VW3 A7 238** *149*
**VW3 A7 239** *149*
**VW3 A7 240** *149*
**VW3 A7 241** *149*
**VW3 A7 701** *137*
**VW3 A7 702** *137*
**VW3 A7 703** *137*
**VW3 A7 704** *137*
**VW3 A7 705** *137*
**VW3 A7 706** *137*
**VW3 A7 707** *137*
**VW3 A7 708** *137*
**VW3 A7 709** *137*
**VW3 A7 710** *137*
**VW3 A7 711** *137*
**VW3 A7 712** *137*
**VW3 A7 713** *137*
**VW3 A7 714** *137*
**VW3 A7 715** *137*
**VW3 A7 716** *137*
**VW3 A7 717** *137*
**VW3 A7 718** *137*
**VW3 A7 801** *139*
**VW3 A7 802** *139*
**VW3 A7 803** *139*
**VW3 A7 804** *139*
**VW3 A7 805** *139*
**VW3 A7 806** *139*
**VW3 A7 807** *139*
**VW3 A7 808** *139*
**VW3 A7 809** *139*
**VW3 A7 810** *139*
**VW3 A7 811** *139*
**VW3 A7 812** *139*
**VW3 A7 813** *139*
**VW3 A7 814** *139*
**VW3 A7 815** *139*
**VW3 A7 816** *139*
**VW3 A7 817** *139*
**VW3 A8 104** *304*
**VW3 A8 105** *304*
**VW3 A8 106** *123 and 304*
**VW3 A8 114** *304*
**VW3 A8 115** *304*
**VW3 A8 306 2** *321*
**VW3 A8 306 D30** *310, 319, 323 and 325*
**VW3 A8 306 R** *133*
**VW3 A8 306 R30** *323*
**VW3 A8 306 R03** *109, 133, 315 and 323*
**VW3 A8 306 R10** *109, 133, 315 and 323*
**VW3 A8 306 R30** *109*
**VW3 A8 306 RC** *109,133 and 315*
**VW3 A8 306 TF03** *109*
**VW3 A8 306 TF10** *109*
**VW3 A9 101** *33*
**VW3 A9 102** *33*
**VW3 A9 103** *33*
**VW3 A9 104** *33*
**VW3 A9 105** *33*
**VW3 A9 106** *33*
**VW3 A9 107** *33*
**VW3 A9 108** *33*
**VW3 A9 109** *33*
**VW3 A9 110** *33*
**VW3 A9 111** *33*
**VW3 A9 112** *33*
**VW3 A9 113** *33*
**VW3 A9 114** *33*
**VW3 A9 115** *33*
**VW3 A9 116** *33*
**VW3 A9 117** *33*
**VW3 A9 201** *32*
**VW3 A9 202** *32*
**VW3 A9 203** *32*
**VW3 A9 204** *32*
**VW3 A9 205** *32*
**VW3 A9 206** *32*
**VW3 A9 207** *32*
**VW3 A9 208** *32*
**VW3 A9 209** *32*
**VW3 A9 210** *32*
**VW3 A9 211** *32*
**VW3 A9 212** *32*
**VW3 A9 213** *32*
**VW3 A9 214** *32*
**VW3 A9 217** *32*
**VW3 A9 301** *34*
**VW3 A9 302** *34*
**VW3 A9 303** *34*
**VW3 A9 304** *34*
**VW3 A9 305** *34*
**VW3 A9 306** *34*
**VW3 A9 307** *34*
**VW3 A9 308** *34*
**VW3 A9 309** *34 and 35*
**VW3 A9 310** *34 and 35*
**VW3 A9 312** *34 and 35*
**VW3 A9 314** *34*
**VW3 A9 404** *27*
**VW3 A9 405** *27*
**VW3 A9 406** *27*
**VW3 A9 407** *27*
**VW3 A9 501** *30*
**VW3 A9 502** *30*
**VW3 A9 503** *30*
**VW3 A9 504** *30*
**VW3 A9 505** *30*
**VW3 A9 506** *30*
**VW3 A9 507** *30*
**VW3 A9 508** *30*
**VW3 A9 509** *30*
**VW3 A9 510** *30*
**VW3 A9 511** *30*
**VW3 A9 512** *30*
**VW3 A9 513** *30*
**VW3 A9 514** *30*
**VW3 A9 515** *30*
**VW3 A9 541** *39*
**VW3 A9 542** *39*
**VW3 A9 543** *39*
**VW3 A9 544** *39*
**VW3 A9 545** *39*
**VW3 A9 546** *39*
**VW3 A9 547** *39*
**VW3 A9 548** *39*
**VW3 A9 549** *39*
**VW3 A9 550** *39*
**VW3 A9 551** *39*
**VW3 A9 601** *169*
**VW3 A9 602** *169*
**VW3 A9 612** *173*
**VW3 A9 613** *173*
**VW3 A9 621** *28*
**VW3 A9 622** *28*
**VW3 A9 623** *28*
**VW3 A9 624** *28*
**VW3 A9 625** *28*
**VW3 A9 626** *28*
**VW3 A9 627** *28*
**VW3 A9 628** *28*
**VW3 A9 629** *29*
**VW3 A9 631** *29*
**VW3 A9 633** *29*
**VW3 A9 635** *29*
**VW3 A9 637** *29*
**VW3 A9 638** *29*
**VW3 A9 639** *29*
**VW3 A9 640** *29*
**VW3 A9 641** *29*
**VW3 A9 642** *28*
**VW3 A9 643** *28*
**VW3 A9 644** *29*
**VW3 A9 645** *29*
**VW3 A9 646** *29*
**VW3 A9 801** *31*
**VW3 A9 802** *31*
**VW3 A9 803** *31*
**VW3 A9 901** *26*
**VW3 A9 902** *26*
**VW3 A9 903** *26*
**VW3 A9 904** *26*
**VW3 A9 905** *26*
**VW3 A9 906** *26*
**VW3 A9 907** *26*
**VW3 CAN A71** *123 and 133*
**VW3 CAN KCDF** *133*
**VZ3 V1 ●●●** *31*

X

**XGS Z24** *304 and 318*

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