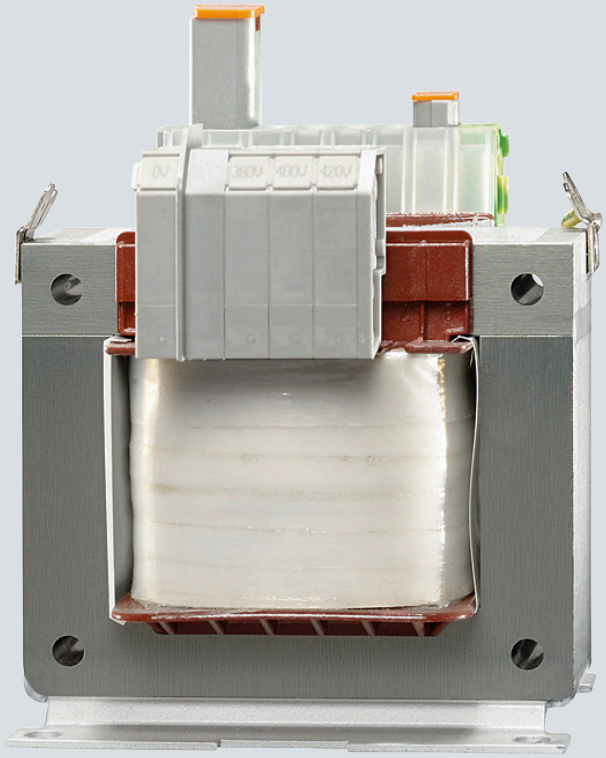
Transformers

Single-Phase Transformers • Three-Phase Transformers

Reference Manual · April 2009



Low-Voltage Controls and Distribution

SIEMENS

Transformers

Introduction

Overview

Single-phase transformers


4AM


4AT


4BT


4AX24


4AT for supply of medical rooms


4FK


4CH

Version	Rated power kVA	Rated input voltage V AC	Rated output voltage V AC	Protec-tion class	Page
4AM, 4AT safety, isolating, control and mains transformers					
4AM safety (mains transformers) and control transformers					
With one input voltage	0.063 ... 1.0	230 ± 5 %; 400 ± 5 %; 440 ± 5 %; 500 ± 5 %	24; 42	I	6
For European voltages	0.063 ... 1.0	400/230 ± 15 V	24; 42	I	6
In multi-voltage version	0.063 ... 1.0	550 ... 208; 600 ... 230	24; 42	I	6
4AM safety transformers (mains transformers)					
With one input voltage	0.025 ... 0.04	230 ± 5 %; 400 ± 5 %; 440 ± 5 %; 500 ± 5 %	24; 42	I	6
4AM, 4AT isolating, control and mains transformers					
4AM and 4AT with one input voltage	4AM: 0.063 ... 2.5; 4AT: 4 ... 10	230 ± 5 %; 400 ± 5 %; 440 ± 5 %; 500 ± 5 %	110; 2 × 115; 230	I	6
4AM and 4AT with one input voltage, without c**UL**us	4AM: 0.063 ... 2.5; 4AT: 4 ... 10	660 ± 5 %; 690 ± 5 %	230	I	6
4AM in European voltage design	0.063 ... 2.5	400/230 ± 15 V	2 × 115	I	6
4AM and 4AT in multi-voltage version	4AM: 0.063 ... 2.5; 4AT: 4 ... 10	550 ... 208; 600 ... 230	2 × 115	I	6
4AM isolating and mains transformers					
4AM with one input voltage	0.025 ... 0.04	230 ± 5 %; 400 ± 5 %; 440 ± 5 %; 500 ± 5 %	110; 230	I	6
4AM and 4AT with one input voltage, without c**UL**us	0.025 ... 0.04	660 ± 5 %; 690 ± 5 %	230	I	6
4AM, 4AT transformers with selectable voltages					
4AM and 4AT safety, isolating, control and mains transformers and autotransformers	4AM: 0.025 ... 2.5; 4AT: 4 ... 16	Selectable; 4AM: 12 … 690[1]; 4AT: 24 … 690[1]	Selectable; 4AM: 12 … 690[1]; 4AT: 24 … 690[1]	 I I	6
4BT power transformers					
4BT transformers with selectable voltages	18 ... 250	Selectable; 100 … 1000[1]	Selectable; 100 … 1000[1]	I	16
4AX22, 4AX23 safety transformers					
Resin-enclosed	0.1 ... 1	230	24; 42	II	19
4AX24 isolating transformers					
Resin-enclosed	0.16 ... 2.5	230	230	II	20
4AT isolating transformers					
For supply of medical premises	2.5 ... 8	230	230-115	I	21
4FL, 4FK voltage regulators					
4FL transformer type	2.2 ... 63	230	230	I	22
4FK magnetic type	0.12 ... 0.75 1 ... 2.5 3.15 ... 10	230/selectable 110 ... 500 230/selectable 110 ... 500 400/selectable 110 ... 500	230/selectable 110 ... 500 230/selectable 110 ... 500 230/selectable 110 ... 500	I I I	23 23 23
4CH, 4CP variable-ratio transformers					
4CH toroidal-core variable-ratio transformers	0.28 ... 3.22 0.69 ... 3.22	400 230	0 ... 230 stepless 0 ... 230 stepless	I I	2) 2)
4CP pillar-type variable-ratio transformers	13.8 ... 207	400	0 ... 400 stepless	I	2)

1) c**UL**us max. 600 V.

2) For more information see the interactive Catalog CA 01 and Mall.

Three-phase transformers


4AP20


4AU


4BU


4FL

Version	Rated power kVA	Rated input voltage V AC	Rated output voltage V AC	Protection class	Page
4AP, 4AU safety, isolating, control and mains transformers					
4AP, 4AU isolating, control and mains transformers					
4AP and 4AU in two-voltage version	0.63 ... 16	Y 500-400 /Δ 289-230	Y 400/Δ 230	I	33
4AP and 4AU in multi-voltage version	0.63 ... 16	Y 520 ... 360 /Δ 300 ... 208	Y 400/Δ 230	I	33
4AP isolating and mains transformers					
In two-voltage version	0.16 ... 0.4	Y 500-400 /Δ 289-230	Y 400/Δ 230	I	33
4AP, 4AU transformers with selectable voltages					
4AP and 4AU safety, isolating, control and mains transformers and autotransformers	4AP: 0.16 … 5; 4AU: 6.3 …16	Selectable; 4AP: 12 ... 690[1]; 4AU: 24 ... 690[1]	Selectable; 4AP: 12 ... 690[1]; 4AU: 24 ... 690[1]	I I	33
4BU power transformers					
4BU matching transformers With one input voltage	18 ... 180[2]	Δ 400, 400 ± 5 %, 440, 440 ± 5 %, 480, 480 ± 5 %/ Y400, 400 ± 5 %, 440, 440 ± 5 %, 480, 480 ± 5 %	Y 208, 400	I	40
4BU matching transformers With cULus approval With one input voltage	18 ... 180[2]	Δ 400, 400 ± 5 %, 440, 440 ± 5 %, 480, 480 ± 5 %/ Y400, 400 ± 5 %, 440, 440 ± 5 %, 480, 480 ± 5 %	Y 208, 400	I	40
4BU transformers with selectable voltages	18 ... 400	Selectable 100 ... 1000[1]	Selectable 100 ... 1000[1]	I	40
4AP, 4AU autotransformers					
For matching purposes according to EN 61558-2-13	4AP: 5 ... 22.5; 4AU: 12.5 ... 50	4AP, 4AU: 480 ... 380 4AP, 4AU: 480 ... 400 (380)[3]	4AP, 4AU: 400 4AP, 4AU: 230 (220)[3]	I I	44
4FL voltage regulators					
4FL transformer type	6.8 ...190	400	400	I	45
4CJ, 4CQ variable-ratio transformers					
4CJ toroidal-core variable-ratio transformers	2.07 ... 9.66	400	0 ... 400 stepless	I	4)
4CQ pillar-type variable-ratio transformers	16 ... 240	400	0 ... 400 stepless	I	4)

1) cULus max. 600 V.

2) For other ratings up to 400 kVA see the interactive Catalog CA 01 and Mall.

3) Operating with 3 AC 380 V at the input terminals results in an output voltage of 3 AC 220 V.

4) For more information see the interactive Catalog CA 01 and Mall.

General data

Overview

4AM../4AT.. transformers

With the right transformer, the right voltage will be available at any conditions.

Our transformers are the right choice for each application: They work reliably, safely and worldwide under a wide range of different conditions.

The transformers are configured in user-friendly combinations as isolating, control and mains transformers according to EN 61558-2-4, -2-2, -2-1, or as safety, control and mains transformers according to EN 61558-2-6, -2-2, -2-1, or as autotransformers according to EN 61558-2-13 with selectable input and output voltages.

Note:
Mains transformers with ≤50 V on the output side are, in the case of SIRIUS transformers, always designed as safety transformers.

Our transformers provide optimal protection through high permissible ambient temperatures up to 40 °C or 55 °C, a high short-time rating in the case of control transformers, fuseless construction and due to its safety standard "Safety inside" EN 61558.

Design

Standards

EN 61558-2-6, -2-4, -2-2, -2-1, -2-13

The standard EN 61558 with the is the European edition of the international standard IEC 61558 (Safety of power transformers, power supply units and similar).

Some of the transformers are subject to more stringent manufacturing and testing conditions in view of these changes.

Transformers for general applications always have double or reinforced insulation with SELV voltages (can be touched, maximum 50 V AC and 120 V DC), i. e. these transformers are exclusively safety transformers.

Furthermore, all transformers are supplied with information on the protective elements with which they are protected against short-circuit and overload.

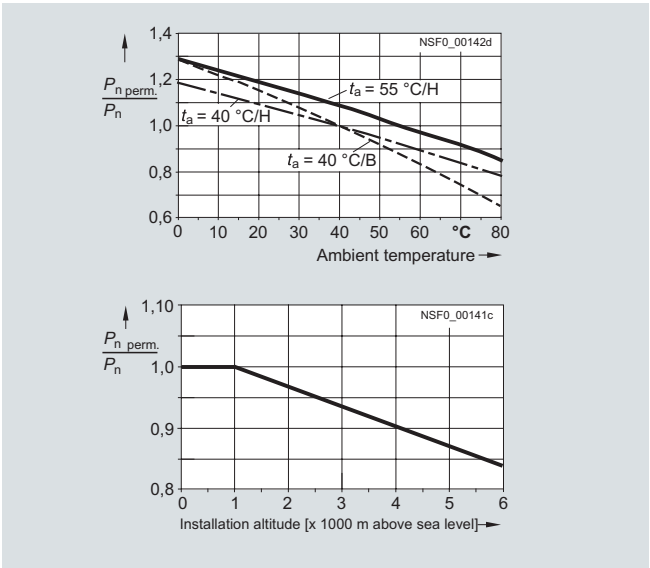
The SIRIUS transformer series contains the combined features of safety, isolating and control or mains transformers, i. e. one transformer for (virtually) all applications. SIRIUS transformers comply with the highest requirements (and with regard to safety the most stringent requirements) of the transformer designs contained in this catalog. A SIRIUS transformer is the right one whatever the application.

Rated power P_n at high ambient temperature – the characteristic for thermal load capacity

Reference conditions under which the transformers have the rated power P_n stated in the selection tables:

- Uninterrupted duty P_n
- Frequency AC 50 Hz ... 60 Hz
- Degree of protection IP00
- Installation height up to 1000 m above sea level and
- Ambient temperature t_a, type-dependent 40 °C or 55 °C

Other installation and operating conditions than this will affect the permissible permanent load capacity. In the case of the 4AM transformers, for example, with a low ambient temperature of 30 °C an increase in load of 8 %is possible (see "Load Characteristics").



Load characteristics: Permissible transformer permanent load in relation to the ambient temperature and the installation height

Short-time rating $P_{shortt.}$ of control transformers – the characteristic variable for the dynamic capacity

The most important selection criterion for control transformers is their short-time rating $P_{shortt.}$.

This is required for switching on electromagnetic loads, e. g. contactors with high making current in relation to the holding current. According to EN 61558-2-2 "Special requirements for control transformers" the output voltage with this load should not drop more than 5 % in relation to the rated voltage in order to ensure safe switching.

Depending on their application, control transformers 4AM and 4AT ≤ 16 kVA are optimized for high short-time ratings with comparatively low ratings and thus small size.

Low inrush current – primary-side short-circuit and overload protection with standard circuit breakers

The single-phase transformers 4AM and 4AT for the performance range ≤ 16 kVA have been designed for protective devices which provide reliable protection against short-circuits or overloads.

Standard 3RV and 3VF circuit breakers offer optimum protection. This way, the transformers are protected on the primary side against both short-circuits and overload, without the possibility of false tripping on startup. The low inrush current, the short-circuit current and the thermal load capacity on overload are matched to the tripping characteristics of the circuit breakers.

It is also possible to protect the transformers on the secondary side against short-circuits and overloads with circuit breakers or miniature circuit breakers with C characteristics.

Note:
The specified primary-side circuit breakers are for protecting the primary side of transformers in the event of short-circuits and overload on the secondary side. In the event of a possible short-circuit on the feeder lines between the protective device and the primary side of the transformer, the rated short-circuit breaking capacity of the circuit breaker must be taken into account with regard to the maximum possible prospective short-circuit current at the place of installation. For these device assignments, see the tables in the "Technical specifications".

Design

Standard version

All 4AM and 4AT transformers are supplied for screw fixing on a mounting plate (exception: 4AM32 to 4AM40 transformers are supplied as standard for both screw mounting and with integrated standard rail mounting).

Standard rail mounting

All 4AM single-phase transformers from 25 VA to 500 VA offer a considerable saving potential in mounting requirements with snap-on mounting to the 35 mm standard mounting rail for horizontal mounting. For the 4AM single-phase transformers from 63 VA to 250 VA, snap-on mounting for the 35 mm standard mounting rail has been integrated into the fixing plate for the transformer as standard.

- Integrated version
  The 4AM32, 4AM34, 4AM38, and 4AM40 single-phase transformers are supplied as standard for screw mounting as well as with an integrated snap-on mounting for the 35 mm standard mounting rail according to EN 60715.
- Optional version
  4AM23, 4AM26, 4AM43, 4AM46 and 4AM48 single-phase transformers are supplied on request with a pre-mounted adapter for mounting on a 35 mm standard mounting rail.

Terminals

Screw terminals

The 4AM transformers up to a rated current of 60 A and 4AT transformers up to a rated current of 81 A in the standard version are supplied with screw terminals.

For higher currents, the transformers are supplied with flat connectors or with threaded bolts.

Cage Clamp terminals

A large number of the 4AM single-phase transformers for currents ≤ 24 A can be supplied on request with screwless Cage Clamp terminals (no multi-voltage version possible). The ground connection is designed as a Cage Clamp terminal.

Enclosure mounting

4AM and 4AT transformers are also available in protective enclosures of the degree of protection IP23 and IP54.

Required specifications for requests and orders for 4AM and 4AT transformers with selectable voltages

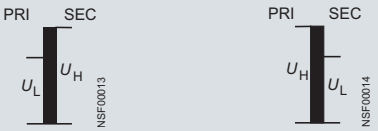
Rated power P_n (output division with separate SEC windings, $P_n = P_1 + P_2$, throughput rating = load rating for autotransformers), PRI and SEC voltages, frequency, vector group, degree of protection (power reduction with degrees of protection other than IP00), Order No. stem.

The Order No. stem is added to the Order No. for delivery.

Example:

Single-phase transformer with selectable voltages 0.16 kVA
PRI 415 V ± 5 %, SEC 115 V,
frequency 50 Hz ... 60 Hz,
degree of protection IP00,
shield winding,
Order No. stem 4AM38 4.

4AM and 4AT autotransformers: determine the type rating $P_{n\ req.}$



$$P_{n\ req.} = P_{n\ load.} \frac{U_H - U_L}{U_H}$$

(the single-phase example also applies for three-phase autotransformers)

Step-up transformer (left) and step-down transformer (right)

General data

Technical specifications

Transformers	Type	**4AM**	**4AT**
• Version		EI core	UI core
• Performance range (with IP00)	kVA	0.025 ... 2.5	> 2.5 ... 16
• Approvals		c UL us	
Voltage range	V	≤ 690	
• Approvals for USA, Canada	V	≤ 600	
Rated frequency	Hz	50 ... 60	
Thermal class		B	H
• Acc. to UL/CSA		Class 130	Class 180
Ambient conditions		Protection against harmful ambient conditions: complete impregnation in polyester resin Climate-proof for installation in rooms with an external climate to DIN 50010	
Rated ambient temperature			
• At rated power	°C	40	55
• Maximum value (after power reduction depending on load characteristics, see "Design")	°C	80	
• Minimum value	°C	–25	
Relative air humidity			
• Mean value up to	%	80	
• Maximum value for 30 days/year	%	95	
• At 40 °C occasionally	%	100	
Protection class		I	
Degree of protection			
• Without enclosure		IP00	
• With protective enclosure (acc. to "Selection and ordering data", see Catalog LV 1)		IP23 or IP54	
• Version		IP23, IP54: sheet-steel enclosure coated with epoxy resin, color gray RAL 7032	
Installation height		Up to 1000 m above sea level (above this, power reduction is necessary)	
Protective devices			
• External		The transformers can be protected against short-circuits and overload on the primary and secondary side with circuit breakers. For reliable protection against short-circuits, overload and touch, the cables between the output terminals of the transformer and the load must have a negligible line impedance. For more details see DIN VDE 0100 (Erection of low-voltage systems) Part 410, Part 520 (particularly section 525) and Part 600 (similar to IEC 60364-4-41, -5-52 and -6). Assigned protective devices (see "Primary-side short-circuit and overload protection with motor starter protectors")	
Connection methods		The permissible conductor cross-sections are assigned to the specified terminal types.	
• Terminal arrangement (see "Schematics")		Refer to DIN VDE 0298-4 and EN 60204 for the permissible conductor cross-sections for the specified current according to the installation type. The terminals used are finger-safe according to EN 50274.	
• For terminal versions and connectable cross-sections (see "Project planning aids")		Other terminal sizes than standard versions on request.	
Mounting position		The permissible mounting position for each version is shown in the "Project planning aids".	

Further technical specifications can be found on the Internet at http://www.siemens.com/sirius-supplying.

Rated power outputs at different ambient temperatures

- With electrically isolated windings
- Degree of protection IP00
- According to EN 61558, cULus

Transformers	Rated power P_n	Permissible transformer load depending on the ambient temperature							
		t_a = 60 °C	t_a = 55 °C	t_a = 50 °C	t_a = 45 °C	t_a = 40 °C	t_a = 35 °C	t_a = 30 °C	t_a = 25 °C
Type	kVA	kVA	kVA	kVA	kVA	kVA	kVA	kVA	kVA
4AM transformers									
4AM23 4	0.025	0.021	0.022	0.023	0.024	0.025	0.026	0.027	0.0278
4AM26 4	0.04	0.0336	0.0352	0.0368	0.0384	0.04	0.0416	0.0432	0.0444
4AM32 4	0.063	0.0529	0.0554	0.058	0.0605	0.063	0.0655[1)]	0.068[1)]	0.0699[1)]
4AM34 4	0.1	0.084	0.088	0.092	0.096	0.1	0.104[1)]	0.108[1)]	0.111[1)]
4AM38 4	0.16	0.134	0.141	0.147	0.154	0.16	0.166[1)]	0.173[1)]	0.178[1)]
4AM40 4	0.25	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.278
4AM43 4	0.315	0.265	0.277	0.29	0.302	0.315	0.328	0.34	0.35
4AM46 4	0.4	0.336	0.352	0.368	0.384	0.4	0.416	0.432	0.444
4AM48 4	0.5	0.42	0.44	0.46	0.48	0.5	0.52	0.54	0.555
4AM52 4	0.63	0.529	0.554	0.58	0.605	0.63	0.655	0.68	0.699
4AM55 4	0.8	0.672	0.704	0.736	0.768	0.8	0.832	0.864	0.888
4AM57 4	1	0.84	0.88	0.92	0.96	1	1.04	1.08	1.11
4AM61 4	1.6	1.34	1.41	1.47	1.54	1.6	1.66	1.73	1.78
4AM64 4	2	1.68	1.76	1.84	1.92	2	2.08	2.16	2.22
4AM65 4	2.5	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.78
4AT transformers									
4AT30 3	4	3.88	4	4.12	4.24	4.4	4.52	4.64	4.76
4AT36 1	5	4.85	5	5.15	5.3	5.5	5.65	5.8	5.95
4AT36 3	6.3	6.11	6.3	6.49	6.68	6.93	7.12	7.31	7.5
4AT39 1	8	7.76	8	8.24	8.48	8.8	9.04	9.28	9.52
4AT39 3	10	9.7	10	10.3	10.6	11	11.3	11.6	11.9
4AT43 0	11.2	10.9	11.2	11.5	11.9	12.3	12.7	13	13.3
4AT43 1	12.5	12.1	12.5	12.9	13.3	13.8	14.1	14.5	14.9
4AT43 2	14	13.6	14	14.4	14.8	15.4	15.8	16.2	16.7
4AT45 0	16	15.5	16	16.5	17	17.6	18.1	18.6	19

1) For control transformers, the values t_a = 40 °C apply.

Operation characteristics

- According to EN 61558-2-6, EN 61558-2-4, EN 61558-2-2, EN 61558-2-1

Transformers	Rated power P_n 50 Hz ... 60 Hz 1000 m above sea level Degree of protection IP00	Core size	Voltage rise in no-load operation (operating temperature)	Voltage drop on rated load[1)]	Short-circuit voltage[1)]	Degree of efficiency
			u_A approx.	u_R approx.	u_Z approx.	η approx.
Type	kVA		%	%	%	%
4AM transformers: t_a = 40 °C/B						
4AM23 4	0.025	EI 60/20	26	17.6	17.6	74
4AM26 4	0.04	EI 66/22	23	15.3	15.3	76
4AM32 4	0.063	EI 84/28	10	8.4	8.4	85
4AM34 4	0.1	EI 84/42	10	7.7	7.7	86
4AM38 4	0.16	EI 96/44	10.4	7.6	7.7	86
4AM40 4	0.25	EI 96/58	7.2	5.4	5.4	89
4AM43 4	0.315	EI 105/60	6.6	4.9	5	90
4AM46 4	0.4	EI 120/52	5.7	4.3	4.4	91
4AM48 4	0.5	EI 120/72	5	3.8	3.8	91
4AM52 4	0.63	EI 150/48	4.7	3.6	3.7	92
4AM55 4	0.8	EI 150/65	4	3	3.1	92
4AM57 4	1	EI 150/90	3.2	2.5	2.5	93
4AM61 4	1.6	EI 174/82	2.4	1.9	2.1	96
4AM64 4	2	EI 174/102	2.1	1.7	1.9	96
4AM65 4	2.5	EI 192/110	1.6	1.3	1.6	96
4AT transformers: t_a = 55 °C/H						
4AT30 3	4	UI 150/75	3.8	2.7	2.9	95
4AT36 1	5	UI 180/75	5.5	3.8	3.9	94
4AT36 3	6.3	UI 180/75	4.3	3.1	3.3	95
4AT39 1	8	UI 210/70	4.3	3.1	3.3	95
4AT39 3	10	UI 210/70	3.5	2.5	3.3	96
4AT43 0	11.2	UI 240/80	3.9	2.8	2.8	95
4AT43 1	12.5	UI 240/80	3.5	2.5	2.6	96
4AT43 2	14	UI 240/80	3.1	2.2	2.4	96
4AT45 0	16	UI 240/107	2.9	2.1	2.1	96

Calculation of power loss P_V

$$P_V = \frac{P_n\,(100 - \eta)}{\eta}\ [\text{kW}]$$

1) Winding reference temperature: 20 °C.

General data

Primary-side short-circuit and overload protection with motor starter protectors

Version with one input voltage

Transformers	Rated power P_n	Motor starter protector version: Motor protection[1]	Rated input voltage U_{1N} in V																	
Type	kVA	Type	690	660	600	575	550	525	500	480	460	440	415	400	380	240	230	220	208	200	190
4AM transformers																					
4AM23 4	0.025	3RV10 11-□□□10	0AA	0AA	0AA	0AA	0AA	0AA	0AA	0AA	0AA	0AA	0AA	0AA	0AA	0CA	0CA	0CA	0CA	0DA	0DA
		Set value in A	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.18	0.18	0.19	0.2	0.22	0.22
4AM26 4	0.04	3RV10 11-□□□10	0AA	0AA	0AA	0AA	0AA	0AA	0AA	0BA	0BA	0BA	0BA	0CA	0CA	0EA	0EA	0EA	0EA	0FA	0FA
		Set value in A	0.11	0.11	0.11	0.11	0.11	0.12	0.13	0.14	0.14	0.14	0.15	0.18	0.18	0.28	0.28	0.29	0.3	0.35	0.35
4AM32 4	0.063	3RV10 11-□□□10	0BA	0BA	0BA	0BA	0CA	0CA	0CA	0CA	0CA	0DA	0DA	0DA	0DA	0FA	0GA	0GA	0GA	0GA	0GA
		Set value in A	0.14	0.14	0.15	0.16	0.18	0.18	0.18	0.19	0.19	0.22	0.22	0.22	0.24	0.37	0.45	0.45	0.45	0.45	0.47
4AM34 4	0.1	3RV10 11-□□□10	0DA	0DA	0EA	0EA	0EA	0EA	0EA	0FA	0FA	0FA	0FA	0FA	0GA	0JA	0JA	0JA	0JA	0KA	0KA
		Set value in A	0.22	0.23	0.28	0.28	0.28	0.28	0.3	0.35	0.35	0.35	0.36	0.37	0.45	0.7	0.7	0.7	0.72	0.9	0.9
4AM38 4	0.16	3RV10 11-□□□10	0FA	0FA	0FA	0FA	0FA	0GA	0GA	0GA	0GA	0HA	0HA	0HA	0HA	0KA	0KA	1AA	1AA	1AA	1AA
		Set value in A	0.35	0.35	0.39	0.4	0.42	0.45	0.46	0.48	0.5	0.55	0.56	0.58	0.61	0.96	1	1.1	1.1	1.2	1.2
4AM40 4	0.25	3RV10 11-□□□10	0HA	0HA	0HA	0HA	0JA	0JA	0JA	0JA	0JA	0KA	0KA	0KA	0KA	1BA	1BA	1CA	1CA	1CA	1CA
		Set value in A	0.55	0.55	0.57	0.59	0.7	0.7	0.7	0.7	0.74	0.9	0.9	0.9	0.9	1.4	1.5	1.8	1.8	1.8	1.8
4AM43 4	0.315	3RV10 11-□□□10	0JA	0JA	0JA	0JA	0KA	0KA	0KA	0KA	1AA	1AA	1AA	1AA	1AA	1CA	1DA	1DA	1DA	1DA	1DA
		Set value in A	0.7	0.7	0.71	0.74	0.9	0.9	0.9	0.9	1.1	1.1	1.1	1.1	1.1	1.8	2.2	2.2	2.2	2.2	2.2
4AM46 4	0.4	3RV10 11-□□□10	0KA	0KA	0KA	0KA	1AA	1AA	1AA	1AA	1AA	1BA	1BA	1BA	1BA	1DA	1DA	1EA	1EA	1EA	1EA
		Set value in A	0.9	0.9	0.9	0.92	1.1	1.1	1.1	1.1	1.2	1.4	1.4	1.4	1.4	2.2	2.3	2.8	2.8	2.8	2.8
4AM48 4	0.5	3RV10 11-□□□10	1AA	1AA	1AA	1BA	1BA	1BA	1BA	1BA	1BA	1CA	1CA	1CA	1CA	1EA	1FA	1FA	1FA	1FA	1FA
		Set value in A	1.1	1.1	1.1	1.4	1.4	1.4	1.4	1.4	1.5	1.8	1.8	1.8	1.8	2.8	3.5	3.5	3.5	3.5	3.5
4AM52 4	0.63	3RV10 11-□□□10	1AA	1BA	1BA	1BA	1BA	1BA	1CA	1CA	1CA	1CA	1DA	1DA	1DA	1FA	1FA	1FA	1GA	1GA	1GA
		Set value in A	1.2	1.4	1.4	1.4	1.5	1.6	1.8	1.8	1.8	1.9	2.2	2.2	2.2	3.5	3.5	3.7	4.5	4.5	4.5
4AM55 4	0.8	3RV10 11-□□□10	1CA	1CA	1CA	1DA	1DA	1DA	1DA	1DA	1DA	1EA	1EA	1EA	1EA	1GA	1GA	1HA	1HA	1HA	1HA
		Set value in A	1.8	1.8	1.8	2.2	2.2	2.2	2.2	2.2	2.2	2.8	2.8	2.8	2.8	4.5	4.5	5.5	5.5	5.5	5.5
4AM57 4	1	3RV10 11-□□□10	1DA	1DA	1DA	1DA	1DA	1EA	1EA	1EA	1EA	1EA	1FA	1FA	1FA	1HA	1HA	1JA	1JA	1JA	1JA
		Set value in A	2.2	2.2	2.2	2.3	2.4	2.8	2.8	2.8	2.8	3	3.5	3.5	3.5	5.5	5.7	7	7	7	7
4AM61 4	1.6	3RV10 11-□□□10	1FA	1FA	1FA	1FA	1FA	1GA	1GA	1GA	1GA	1HA	1HA	1HA	1HA	1KA	--	--	--	--	--
		3RV10 21-□□□10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4AA	4AA	4AA	4AA	4AA
		Set value in A	3.5	3.5	3.5	3.7	3.9	4.5	4.5	4.5	4.6	5.5	5.5	5.5	5.6	9	11	11	11	11	11
4AM64 4	2	3RV10 11-□□□10	1GA	1GA	1GA	1GA	1HA	1HA	1HA	1HA	1HA	1JA	1JA	1JA	1JA	--	--	--	--	--	--
		3RV10 21-□□□10	--	--	--	--	--	--	--	--	--	--	--	--	--	4AA	4AA	4BA	4BA	4BA	4BA
		Set value in A	4.5	4.5	4.5	4.5	5.5	5.5	5.5	5.5	5.7	7	7	7	7	11	11	14	14	14	14
4AM65 4	2.5	3RV10 11-□□□10	1GA	1GA	1HA	1HA	1HA	1JA	1JA	1JA	1JA	--	--	--	--	--	--	--	--	--	--
		3RV10 21-□□□10	--	--	--	--	--	--	--	--	--	1KA	1KA	1KA	1KA	4BA	4BA	4CA	4CA	4CA	4DA
		Set value in A	4.5	5.5	5.5	5.5	5.7	7	7	7	7	9	9	9	9	14	14	17	17	17	20
4AT transformers																					
4AT30 3	4	3RV10 11-□□□10	1JA	1JA	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		3RV10 21-□□□10	--	--	1KA	1KA	1KA	1KA	4AA	4AA	4AA	4AA	4AA	4AA	4BA	--	--	--	--	--	--
		3RV10 31-□□□10	--	--	--	--	--	--	--	--	--	--	--	--	--	4EA	4EA	4EA	4EA	4FA	4FA
		Set value in A	8	8	9	9	9	10	11	11	11	12	12	13	14	22	22	23	24	28	28
4AT36 1	5	3RV10 11-□□□10	1KA	1KA	1KA	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		3RV10 21-□□□10	--	--	--	4AA	4AA	4AA	4BA	4BA	4BA	4BA	4BA	4BA	4CA	--	--	--	--	--	--
		3RV10 31-□□□10	--	--	--	--	--	--	--	--	--	--	--	--	--	4FA	4FA	4FA	4FA	4FA	4GA
		Set value in A	10	10	11	11	12	12	14	14	14	15	16	16	17	28	28	29	31	32	36
4AT36 3	6.3	3RV10 21-□□□10	4AA	4AA	4BA	4BA	4BA	4BA	4CA	4CA	4CA	4CA	4DA	4DA	4DA	--	--	--	--	--	--
		3RV10 31-□□□10	--	--	--	--	--	--	--	--	--	--	--	--	--	4GA	4GA	4GA	4GA	4GA	4HA
		Set value in A	12	12	14	14	15	15	17	17	17	18	20	20	21	36	36	36	38	39	41
4AT39 1	8	3RV10 21-□□□10	4BA	4BA	4CA	4CA	4CA	4DA	4DA	4DA	4DA	--	--	--	--	--	--	--	--	--	--
		3RV10 31-□□□10	--	--	--	--	--	--	--	--	--	4EA	4EA	4EA	4FA	4HA	4HA	4HA	--	--	--
		3RV10 41-□□□10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4JA	4JA	4JA
		Set value in A	15	15	17	18	18	20	20	21	22	23	24	25	28	42	43	45	48	50	52
4AT39 3	10	3RV10 21-□□□10	4CA	4CA	4DA	4DA	4DA	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		3RV10 31-□□□10	--	--	--	--	--	4EA	4EA	4EA	4FA	4FA	4FA	4FA	4FA	--	--	--	--	--	--
		3RV10 41-□□□10	--	--	--	--	--	--	--	--	--	--	--	--	--	4JA	4KA	4KA	4KA	4KA	4KA
		Set value in A	18	19	21	22	23	24	25	26	28	28	30	31	32	51	57	57	59	69	64
4AT43 0	11.2	3RV10 31-□□□10	4EA	4EA	4EA	4EA	4EA	4FA	4FA	4FA	4FA	4GA	4GA	4GA	4HA	--	--	--	--	--	--
		3RV10 41-□□□10	--	--	--	--	--	--	--	--	--	--	--	--	--	4KA	4KA	4LA	4LA	4LA	4MA
		Set value in A	22	22	23	24	25	28	28	29	30	36	36	36	40	58	60	70	70	70	80
4AT43 1	12.5	3RV10 31-□□□10	4EA	4EA	4FA	4FA	4FA	4FA	4FA	4GA	4GA	4GA	4HA	4HA	--	--	--	--	--	--	--
		3RV10 41-□□□10	--	--	--	--	--	--	--	--	--	--	--	--	4JA	4LA	4LA	4LA	4LA	4MA	4MA
		Set value in A	22	23	28	28	28	29	31	36	36	36	40	40	45	70	70	70	73	80	80
4AT43 2	14	3RV10 31-□□□10	4EA	4FA	4FA	4FA	4FA	4GA	4GA	4HA	4HA	4HA	--	--	--	--	--	--	--	--	--
		3RV10 41-□□□10	--	--	--	--	--	--	--	--	--	--	4JA	4JA	4JA	4MA	4MA	4MA	4MA	4MA	4MA
		Set value in A	25	28	29	30	31	36	36	40	40	40	45	45	45	80	80	80	82	85	90
4AT45 0	16	3RV10 31-□□□10	4FA	4FA	4GA	4GA	4HA	4HA	--	--	--	--	--	--	--	--	--	--	--	--	--
		3RV10 41-□□□10	--	--	--	--	--	--	4JA	4JA	4JA	4JA	4JA	4KA	4KA	4MA	4MA	4MA	4MA	4MA	4MA
		Set value in A	29	30	33	36	40	40	45	45	45	45	47	57	57	81	85	89	94	97	100

1) Two-pole or single-pole motor starter protectors can be connected (3 conducting paths in series).

European voltage and multi-voltage version

Transformers	Rated power P_n	Motor starter protectors[1]	Rated input voltage U_{1N} in V																	
Type	kVA	Type	690	660	600	575	550	525	500	480	460	440	415	400	380	240	230	220	208	200	190
Motor starter protector version for 4AM transformers: transformer protection																					
4AM23 4	0.025	3RV14 21-□□□10	0AA	0AA	0AA	0AA	0AA	0AA	0AA	0AA	0AA	0AA	0AA	0AA	0AA	0CA	0CA	0CA	0CA	0CA	0CA
		Set value in A	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.12	0.19	0.2	0.2	0.23	0.24	0.25
4AM26 4	0.04	3RV14 21-□□□10	0AA	0AA	0AA	0AA	0AA	0BA	0BA	0BA	0BA	0BA	0BA	0CA	0CA	0DA	0DA	0DA	0EA	0EA	0EA
		Set value in A	0.11	0.11	0.12	0.12	0.13	0.14	0.14	0.15	0.16	0.16	0.17	0.18	0.19	0.3	0.32	0.32	0.35	0.35	0.38
4AM32 4	0.063	3RV14 21-□□□10	0BA	0BA	0BA	0CA	0CA	0CA	0CA	0CA	0DA	0DA	0DA	0DA	0DA	0FA	0FA	0FA	0GA	0GA	0GA
		Set value in A	0.15	0.15	0.17	0.18	0.19	0.2	0.2	0.21	0.22	0.23	0.25	0.26	0.27	0.43	0.45	0.47	0.49	0.5	0.55
4AM34 4	0.1	3RV14 21-□□□10	0DA	0DA	0EA	0EA	0EA	0EA	0EA	0FA	0FA	0FA	0FA	0FA	0FA	0HA	0HA	0HA	0JA	0JA	0JA
		Set value in A	0.25	0.26	0.29	0.3	0.31	0.33	0.34	0.35	0.35	0.39	0.41	0.43	0.45	0.72	0.75	0.75	0.83	0.85	0.9
4AM38 4	0.16	3RV14 21-□□□10	0FA	0FA	0GA	0GA	0GA	0GA	0GA	0HA	0HA	0HA	0HA	0HA	0HA	0KA	0KA	0KA	1AA	1AA	1AA
		Set value in A	0.39	0.4	0.45	0.45	0.49	0.51	0.54	0.55	0.55	0.6	0.65	0.67	0.71	1.1	1.1	1.2	1.3	1.35	1.4
4AM40 4	0.25	3RV14 21-□□□10	0HA	0HA	0HA	0HA	0JA	0JA	0JA	0JA	0JA	0KA	0KA	0KA	0KA	1BA	1BA	1BA	1BA	1BA	1BA
		Set value in A	0.55	0.6	0.66	0.69	0.7	0.75	0.8	0.82	0.85	0.9	0.95	0.99	1	1.65	1.7	1.8	1.9	1.9	2
4AM43 4	0.315	3RV14 21-□□□10	0JA	0JA	0JA	0JA	0KA	0KA	0KA	0KA	0KA	0KA	0KA	1AA	1AA	1CA	1CA	1CA	1CA	1CA	1CA
		Set value in A	0.7	0.75	0.8	0.85	0.9	0.9	1	1	1	1.1	1.2	1.24	1.3	2	2.1	2.2	2.3	2.4	2.5
4AM46 4	0.4	3RV14 21-□□□10	0KA	0KA	0KA	0KA	1AA	1AA	1AA	1AA	1AA	1AA	1AA	1BA	1BA	1DA	1DA	1DA	1DA	1DA	1DA
		Set value in A	0.9	0.9	1	1	1.1	1.1	1.2	1.3	1.35	1.4	1.48	1.55	1.63	2.6	2.7	2.8	3	3.1	3.2
4AM48 4	0.5	3RV14 21-□□□10	1AA	1AA	1AA	1AA	1BA	1BA	1BA	1BA	1BA	1BA	1BA	1CA	1CA	1EA	1EA	1EA	1EA	1EA	1EA
		Set value in A	1.1	1.1	1.3	1.35	1.4	1.4	1.5	1.6	1.65	1.75	1.85	1.9	2	3.2	3.3	3.5	3.7	3.8	4
4AM52 4	0.63	3RV14 21-□□□10	1AA	1BA	1BA	1BA	1BA	1CA	1CA	1CA	1CA	1CA	1CA	1DA	1DA	1FA	1FA	1FA	1FA	1FA	1FA
		Set value in A	1.35	1.4	1.5	1.6	1.7	1.8	1.9	1.9	2	2.1	2.2	2.3	2.5	3.9	4	4	4.5	4.7	5
4AM55 4	0.8	3RV14 21-□□□10	1BA	1CA	1CA	1CA	1CA	1DA	1DA	1DA	1DA	1DA	1DA	1EA	1EA	1GA	1GA	1GA	1GA	1GA	1GA
		Set value in A	1.5	1.8	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.9	3	3.1	5	5	5.5	5.8	6	6.3
4AM57 4	1	3RV14 21-□□□10	1DA	1DA	1DA	1DA	1DA	1EA	1EA	1EA	1EA	1EA	1EA	1FA	1FA	1HA	1HA	1HA	1HA	1HA	1HA
		Set value in A	2.2	2.3	2.5	2.6	2.7	2.9	3	3.1	3.3	3.4	3.6	3.8	4	6.3	6.5	6.5	7	7.6	8
4AM61 4	1.6	3RV14 21-□□□10	1FA	1FA	1FA	1FA	1GA	1GA	1GA	1GA	1GA	1GA	1GA	1GA	1GA	1KA	1KA	1KA	1KA	1KA	1KA
		Set value in A	3.6	3.7	4.1	4.3	4.5	4.7	5	5	5.4	5.6	5.9	6.2	6.3	10	10.5	11	12	12.3	12.5
4AM64 4	2	3RV14 21-□□□10	1FA	1GA	1GA	1GA	1HA	1HA	1HA	1HA	1HA	1HA	1HA	1HA	1HA	4AA	4AA	4AA	4AA	4AA	4AA
		Set value in A	4.4	4.6	5	5.3	5.5	5.8	6.1	6.3	6.6	6.9	7.3	7.6	8	12.5	13	13.5	14.5	15	16
4AM65 4	2.5	3RV14 21-□□□10	1HA	1HA	1HA	1HA	1JA	1JA	1JA	1JA	1JA	1JA	1JA	1KA	1KA	4BA	4BA	4BA	4BA	4BA	--
		3RV14 31-□□□10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4DA
		Set value in A	5.5	5.8	6.4	6.6	7	7.3	7.5	8	8.3	8.7	9.2	9.5	10	16	16.5	17	18.5	19	20
Motor starter protector version for 4AT transformers: motor protection																					
4AT30 3	4	3RV10 11-□□□10	1JA	1JA	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		3RV10 21-□□□10	--	--	1KA	1KA	1KA	1KA	4AA	4AA	4AA	4AA	4AA	4AA	4BA	--	--	--	--	--	--
		3RV10 31-□□□10	--	--	--	--	--	--	--	--	--	--	--	--	--	4EA	4EA	4EA	4EA	4FA	4FA
		Set value in A	8	8	9	9	9	10	11	11	11	12	12	13	14	22	22	23	24	28	28
4AT36 1	5	3RV10 11-□□□10	1KA	1KA	1KA	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		3RV10 21-□□□10	--	--	--	4AA	4AA	4AA	4BA	4BA	4BA	4BA	4BA	4BA	4CA	--	--	--	--	--	--
		3RV10 31-□□□10	--	--	--	--	--	--	--	--	--	--	--	--	--	4FA	4FA	4FA	4FA	4FA	4GA
		Set value in A	10	10	11	11	12	12	14	14	14	15	16	16	17	28	28	29	31	32	36
4AT36 3	6.3	3RV10 21-□□□10	4AA	4AA	4BA	4BA	4BA	4BA	4CA	4CA	4CA	4CA	4DA	4DA	4DA	--	--	--	--	--	--
		3RV10 31-□□□10	--	--	--	--	--	--	--	--	--	--	--	--	--	4GA	4GA	4GA	4GA	4GA	4HA
		Set value in A	12	12	14	14	15	15	17	17	17	18	20	20	21	36	36	36	8	39	41
4AT39 1	8	3RV10 21-□□□10	4BA	4BA	4CA	4CA	4CA	4DA	4DA	4DA	4DA	--	--	--	--	--	--	--	--	--	--
		3RV10 31-□□□10	--	--	--	--	--	--	--	--	--	4EA	4EA	4EA	4FA	4HA	4HA	4HA	--	--	--
		3RV10 41-□□□10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4JA	4JA	4JA
		Set value in A	15	15	17	18	18	20	20	21	22	23	24	25	28	42	43	45	48	50	52
4AT39 3	10	3RV10 21-□□□10	4CA	4CA	4DA	4DA	4DA	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		3RV10 31-□□□10	--	--	--	--	--	4EA	4EA	4EA	4FA	4FA	4FA	4FA	4FA	--	--	--	--	--	--
		3RV10 41-□□□10	--	--	--	--	--	--	--	--	--	--	--	--	--	4JA	4KA	4KA	4KA	4KA	4KA
		Set value in A	18	19	21	22	23	24	25	26	28	28	30	31	32	51	57	57	59	69	64
4AT43 0	11.2	3RV10 31-□□□10	4EA	4EA	4EA	4EA	4EA	4FA	4FA	4FA	4FA	4GA	4GA	4GA	4HA	--	--	--	--	--	--
		3RV10 41-□□□10	--	--	--	--	--	--	--	--	--	--	--	--	--	4KA	4KA	4LA	4LA	4LA	4MA
		Set value in A	22	22	23	24	25	28	28	29	30	36	36	36	40	58	60	70	70	70	80
4AT43 1	12.5	3RV10 31-□□□10	4EA	4EA	4FA	4FA	4FA	4FA	4FA	4GA	4GA	4GA	4HA	4HA	--	--	--	--	--	--	--
		3RV10 41-□□□10	--	--	--	--	--	--	--	--	--	--	--	--	4JA	4LA	4LA	4LA	4LA	4MA	4MA
		Set value in A	22	23	28	28	28	29	31	36	36	36	40	40	45	70	70	70	73	80	80
4AT43 2	14	3RV10 31-□□□10	4EA	4FA	4FA	4FA	4FA	4GA	4GA	4HA	4HA	4HA	--	--	--	--	--	--	--	--	--
		3RV10 41-□□□10	--	--	--	--	--	--	--	--	--	--	4JA	4JA	4JA	4MA	4MA	4MA	4MA	4MA	4MA
		Set value in A	25	28	29	30	31	36	36	40	40	40	45	45	45	80	80	80	82	85	90
4AT45 0	16	3RV10 31-□□□10	4FA	4FA	4GA	4GA	4HA	4HA	--	--	--	--	--	--	--	--	--	--	--	--	--
		3RV10 41-□□□10	--	--	--	--	--	--	4JA	4JA	4JA	4JA	4JA	4KA	4KA	4MA	4MA	4MA	4MA	4MA	4MA
		Set value in A	29	30	33	36	40	40	45	45	45	45	47	57	57	81	85	89	94	97	100

1) Two-pole or single-pole motor starter protectors can be connected (3 conducting paths in series).

General data

Secondary-side short-circuit and overload protection with motor starter protector or miniature circuit breaker[1)]

Transformers	Rated power P_n	Motor starter protectors					
		Version: Motor protection[2)]	Rated output voltage U_{2N} in V				
Type	kVA	Type	230	115	110	42	24
4AM transformers							
4AM23 4	0.025	3RV10 11-□□□10	0AA	0DA	0DA	0HA	1AA
		Set value in A	0.14	0.26	0.29	0.75	1.3
4AM26 4	0.04	3RV10 11-□□□10	0CA	0FA	0FA	0KA	1CA
		Set value in A	0.21	0.41	0.45	1.2	2.1
4AM32 4	0.063	3RV10 11-□□□10	0EA	0HA	0HA	1BA	1EA
		Set value in A	0.34	0.68	0.72	1.9	3.3
4AM34 4	0.1	3RV10 11-□□□10	0GA	0KA	0KA	1DA	1GA
		Set value in A	0.55	1.1	1.14	3	5.2
4AM38 4	0.16	3RV10 11-□□□10	0JA	1BA	1BA	1FA	1JA
		Set value in A	0.86	1.72	1.82	4.8	8.4
4AM40 4	0.25	3RV10 11-□□□10	1AA	1DA	1DA	1HA	--
		3RV10 21-□□□10	--	--	--	--	4AA
		Set value in A	1.37	2.7	2.8	7.4	13
4AM43 4	0.315	3RV10 11-□□□10	1BA	1EA	1EA	1JA	--
		3RV10 21-□□□10	--	--	--	--	4BA
		Set value in A	1.72	3.4	3.6	9.4	16.5
4AM46 4	0.4	3RV10 11-□□□10	1CA	1FA	1FA	1KA	--
		3RV10 21-□□□10	--	--	--	--	4CA
		Set value in A	2.2	4.4	4.6	12	21
4AM48 4	0.5	3RV10 11-□□□10	1DA	1GA	1GA	--	--
		3RV10 21-□□□10	--	--	--	4AA	--
		3RV10 31-□□□10	--	--	--	--	4EA
		Set value in A	2.7	5.4	5.7	15	26
4AM52 4	0.63	3RV10 11-□□□10	1EA	1HA	1HA	--	--
		3RV10 21-□□□10	--	--	--	4BA	--
		3RV10 31-□□□10	--	--	--	--	4FA
		Set value in A	3.4	6.8	7.2	18.8	33
4AM55 4	0.8	3RV10 11-□□□10	1FA	1JA	1JA	--	--
		3RV10 21-□□□10	--	--	--	4DA	--
		3RV10 31-□□□10	--	--	--	--	4GA
		Set value in A	4.4	8.8	9.2	24	42
4AM57 4	1	3RV10 11-□□□10	1GA	1KA	1KA	--	--
		3RV10 31-□□□10	--	--	--	4EA	--
		3RV10 41-□□□10	--	--	--	--	4JA
		Set value in A	5.4	10.8	11.4	30	52
4AM61 4	1.6	3RV10 11-□□□10	1JA	--	--	--	--
		3RV10 31-□□□10	--	4BA	4BA	4HA	--
		3RV10 41-□□□10	--	--	--	--	4LA
		Set value in A	8.6	17	18.5	48	81
4AM64 4	2	3RV10 11-□□□10	1KA	--	--	--	--
		3RV10 31-□□□10	--	4DA	4DA	--	--
		3RV10 41-□□□10	--	--	--	4JA	4MA
		Set value in A	10.9	22	23	60	101
4AM65 4	2.5	3RV10 21-□□□10	4AA	--	--	--	--
		3RV10 31-□□□10	--	4EA	4EA	--	--
		3RV10 41-□□□10	--	--	--	4KA	--
		3VF32 11-□□□□□-0AA0	--	--	--	--	1BU41
		Set value in A	13.6	27	28	72	125
4AT transformers							
4AT30 3	4	3RV10 21-□□□10	4CA	--	--	--	--
		3RV10 31-□□□10	--	4GA	--	--	--
		Set value in A	21	41	--	--	--
4AT36 1	5	3RV10 31-□□□10	4EA	--	--	--	--
		3RV10 41-□□□10	--	4JA	--	--	--
		Set value in A	26	51	--	--	--
4AT36 3	6.3	3RV10 31-□□□10	4FA	--	--	--	--
		3RV10 41-□□□10	--	4KA	--	--	--
		Set value in A	32	64	--	--	--
4AT39 1	8	3RV10 31-□□□10	4GA	--	--	--	--
		3RV10 41-□□□10	--	4LA	--	--	--
		Set value in A	41	81	--	--	--
4AT39 3	10	3RV10 41-□□□10	4JA	4MA	--	--	--
		Set value in A	51	100	--	--	--

1) Miniature circuit breaker on request.

2) Two-pole or single-pole motor starter protectors can be connected (3 conducting paths in series).

Short-time rating of control transformers $P_{shortt.}$[1] = f (p.f.) for $U_2 = 0.95 \times U_{2N}$

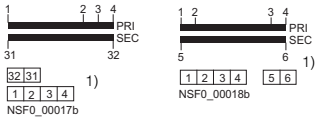
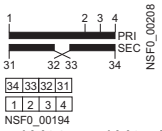
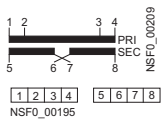
Trans-formers	Rated power P_n	Short-time rating $P_{shortt.}$[1] with p.f. of										Voltage rise in no-load operation (operating temperature)	Voltage drop on rated load (at 20 °C)	Short-circuit voltage (at 20 °C)
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1			
Type	kVA	kVA	kVA	kVA	kVA	kVA	kVA	kVA	kVA	kVA	kVA	u_A %	u_R %	u_Z %
4AM transformers														
4AM32 4	0.063	0.56	0.37	0.28	0.23	0.19	0.16	0.14	0.12	0.12	0.11	10	8.4	8.5
4AM34 4	0.1	0.96	0.62	0.46	0.37	0.31	0.26	0.23	0.21	0.19	0.17	10	7.7	7.7
4AM38 4	0.16	1.52	0.98	0.73	0.58	0.49	0.42	0.37	0.33	0.3	0.28	10.4	7.6	7.7
4AM40 4	0.25	2.5	1.62	1.24	1	0.85	0.74	0.66	0.59	0.54	0.51	7.2	5.4	5.4
4AM43 4	0.315	3.4	2.15	1.63	1.33	1.12	0.97	0.86	0.77	0.71	0.67	6.6	4.9	5
4AM46 4	0.4	3.51	2.53	2	1.67	1.44	1.26	1.13	1	0.95	0.92	5.7	4.3	4.4
4AM48 4	0.5	5.34	3.75	2.9	2.4	2	1.75	1.55	1.4	1.3	1.25	5	3.8	3.8
4AM52 4	0.63	5.05	3.85	3.15	2.7	2.35	2.1	1.9	1.75	1.65	1.6	4.7	3.6	3.7
4AM55 4	0.8	7.69	5.8	4.65	3.9	3.4	3	2.7	2.5	2.3	2.25	4	3	3.1
4AM57 4	1.0	12.1	8.85	7	5.85	5	4.4	3.95	3.6	3.3	3.2	3.2	2.5	2.5
4AM61 4	1.6	12.1	10.3	9	8.1	7.3	6.8	6.4	6.1	5.9	6.4	2.4	1.9	2.1
4AM64 4	2	15.8	13.5	11.9	10.7	9.7	9	8.5	8.1	7.9	8.6	2.1	1.7	1.9
4AM65 4	2.5	19.6	17.3	15.6	14.3	13.3	12.5	12	11.6	11.5	13.2	1.6	1.3	1.6
4AT transformers														
With one input voltage														
4AT30 3	4	31.2	25	20.9	18	16	14.4	13.2	12.2	11.6	11.7	3.8	2.7	2.9
4AT36 1	5	44.3	32.5	25.8	21.4	18.5	16.1	14.4	13.1	12.1	11.6	5.5	3.8	3.9
4AT36 3	6.3	40.7	33.4	28.4	24.9	22.5	20.3	18.7	17.5	16.7	16.9	4.3	3.1	3.3
4AT39 1	8	52.7	43.1	36.5	31.8	28.5	25.6	23.4	21.9	20.8	21.3	4.3	3.1	3.3
4AT39 3	10	42	37.7	34.4	31.9	30	28.4	27.3	26.7	26.8	29	3.5	2.5	3.3
In European voltage version or multi-voltage version														
4AT30 3	4	45.8	32.6	25.4	20.9	17.8	15.5	13.8	12.5	11.5	11	4.1	2.9	2.9
4AT36 1	5	48	36.7	27.9	22.6	19	16.5	14.6	13.1	12	11.2	5.9	4	4.1
4AT36 3	6.3	54.9	42.1	33.8	28.4	24.5	21.7	19.5	17.8	16.5	16.1	4.7	3.2	3.3
4AT39 1	8	70	53.6	43	36	31.1	27.5	24.8	22.6	21	20.4	4.6	3.2	3.3
4AT39 3	10	64.1	53.3	45.8	40.5	36.4	33.3	30.9	29.1	27.9	29.4	3.7	2.6	2.9
With selectable voltages														
4AT30 3	4	45.8	32.6	25.4	20.9	17.8	15.5	13.8	12.5	11.5	11	4.1	2.9	2.9
4AT36 1	5	48	36.7	27.9	22.6	19	16.5	14.6	13.1	12	11.2	5.9	4	4.1
4AT36 3	6.3	54.9	42.1	33.8	28.4	24.5	21.7	19.5	17.8	16.5	16.1	4.7	3.2	3.3
4AT39 1	8	70	53.6	43	36	31.1	27.5	24.8	22.6	21	20.4	4.6	3.2	3.3
4AT39 3	10	64.1	53.3	45.8	40.5	36.4	33.3	30.9	29.1	27.9	29.4	3.7	2.6	2.9
4AT43 0	11.2	117	85.8	67.8	56.3	48.3	42.4	37.9	34.5	31.9	30.7	4.1	2.9	2.9
4AT43 1	12.5	117	89.5	72.9	61.8	53.8	47.9	43.3	39.8	37.2	36.7	3.7	2.6	2.7
4AT43 2	14	111	90	75.9	66	58.7	53.1	48.8	45.5	43.2	44.2	3.3	2.3	2.5
4AT45 0	16	187	140	112	94	81.2	71.7	64.5	59	54.7	53.4	3.1	2.1	2.2

1) $P_{shortt.}$ applies to up to 300 contactor operations per hour. The specified rating is the typical maximum short-time rating.

General data

Schematics

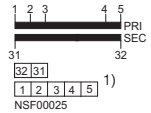
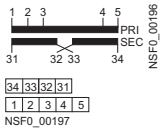
With one input voltage

Circuit diagrams and terminal assignments[1]	Rated input voltage U_{1N}	Rated output voltage U_{2N}	Terminals					
			Transformer type	Primary			Secondary	
				Terminals			Terminals	Links
	V	V		U_{1N}	U_{1N} +5 %	U_{1N} -5 %	U_{2N}	
 4AM (≤ 2.5 kVA) 4AT (4 kVA ... 16 kVA)	U_{1N} ±5 %	U_{2N}	4AM23 to 4AM65	1-3	1-4	1-2	31-32	--
			4AT30 to 4AT45	1-3	1-4	2-3	5-6	--
 4AM32 to 4AM65 (≤ 2.5 kVA)	U_{1N} ±5 %	2 x 115	4AM32 to 4AM65	1-3	1-4	1-2	230 V: 31-34[2] 115 V: 31-34[2]	32-33 31-32; 33-34
 4AT30 to 4AT39 (4 kVA ... 10 kVA)			4AT30 to 4AT39	1-3	1-4	2-3	230 V: 5-8 115 V: 5-8	6-7 5-6; 7-8

1) For Cage Clamp terminals, the ground connection is routed to the terminal. The order of terminal assignments then changes as follows .

2) Terminals 31–34 are duplicated in the Cage Clamp version.

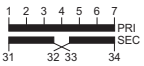
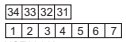
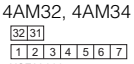
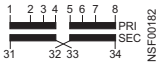
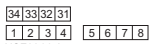
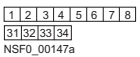
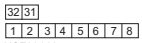
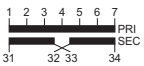
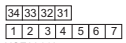
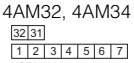
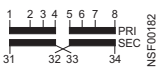
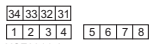
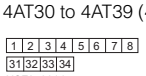
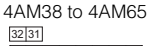
For European voltages

Circuit diagrams and terminal assignments[1]	Rated input voltage U_{1N}	Rated output voltage U_{2N}	Terminals					
			Transformer type	Primary			Secondary	
				Terminals			Terminals	Links
	V	V		U_{1N}	U_{1N} +15 V	U_{1N} −15 V	U_{2N}	
 4AM32 to 4AM65 (≤ 2.5 kVA)	400/230 ±15	24	4AM32 to 4AM65	400 V: 2-5 230 V: 2-4	1-5 1-4	3-5 3-4	24 V: 31-32	--
		42					42 V: 31-32	--
 4AM32 to 4AM65 (≤ 2.5 kVA)  4AT30 to 4AT39 (4 kVA ... 10 kVA)	400/230 ±15	2 × 115	4AM32 to 4AM65, 4AT30 to 4AT39	400 V: 2-5 230 V: 2-4	1-5 1-4	3-5 3-4	230 V: 31-34[2] 115 V: 31-34[2]	32-33 31-32; 33-34

1) For Cage Clamp terminals, the ground connection is routed to the terminal. The order of terminal assignments then changes as follows .

2) Terminals 31–34 are duplicated in the Cage Clamp version.

In multi-voltage version

Circuit diagrams and terminal assignments	Rated input voltage U_{1N}	Rated output voltage U_{2N}	Connections and links					
			Primary			Secondary		
			Rated voltage	Terminals	Links	Rated voltage	Terminals	Links
	V	V	V			V		
U_{1N} = 550-525-500-480-460-440-415-400-380-230-208								
 4AM32, 4AM34 (0.063 kVA; 0.1 kVA)  NSF00143	550-525-500-480-460-440-415-400-380-230-208	2 × 115	550 525 500 480 460 440 415 400 380 230 208	1-7 2-7 3-7 1-6 2-6 3-6 1-5 2-5 3-5 2-4 3-4	--	230 115	31-34	32-33 31-32; 33-34
 4AM32, 4AM34 (0.063 kVA; 0.1 kVA)  NSF00144		24				24	31-32	--
		42				42	31-32	--
 4AM38 to 4AM65 (0.16 kVA ... 2.5 kVA)  NSF00145b 4AT30 to 4AT39 (4 kVA ... 10 kVA)  NSF0_00147a	550-525-500-480-460-440-415-400-380-230-208	2 × 115	550 525 500 480 460 440 415 400 380 230 208	1-8	4-5 3-5 2-5 2-5 4-6 3-6 3-7 2-6 2-7 1-6; 4-8 1-7; 3-8	230 115	31-34	32-33 31-32; 33-34
 4AM38 to 4AM65 (0.16 kVA ... 2.5 kVA)  NSF00146		24				24	31-32	--
		42				42	31-32	--
U_{1N} = 600-575-550-525-500-480-460-440-415-400-240-230								
 4AM32, 4AM34 (0.063 kVA; 0.1 kVA)  NSF00143	600-575-550-525-500-480-460-440-415-400-240-230	2 × 115	600 575 550 525 500 480 460 440 415 400 240 230	1-7 2-7 3-7 1-6 2-6 3-6 1-5 2-5 3-5 3-5 1-4 2-4	--	230 115	31-34	32-33 31-32; 33-34
 4AM32, 4AM34 (0.063 kVA; 0.1 kVA)  NSF00144		24				24	31-32	--
		42				42	31-32	--
 4AM38 to 4AM65 (0.16 kVA ... 2.5 kVA)  NSF00145b 4AT30 to 4AT39 (4 kVA ... 10 kVA)  NSF0_00147a	600-575-550-525-500-480-460-440-415-400-240-230	2 × 115	600 575 550 525 500 480 460 440 415 400 240 230	1-8	4-5 4-6 4-7 3-5 3-6 3-7 3-7 2-5 2-6 2-7 1-7; 3-8 1-7; 3-8	230 115	31-34	32-33 31-32; 33-34
 4AM38 to 4AM65 (0.16 kVA ... 2.5 kVA)  NSF00146		24				24	31-32	--
		42				24	31-32	--

General data

Overview

4BT.. transformers

With the right transformer, the right voltage will be available at any conditions.

Our transformers are the right choice for each application: They work reliably, safely and worldwide under a wide range of different conditions.

The 4BT single-phase power transformers can be configured as matching, auto- or converter transformers according to DIN VDE 0532-6 with selectable input and output voltages.

Our transformers provide optimal protection through high permissible ambient temperatures of up to 55 °C.

Design

Standards

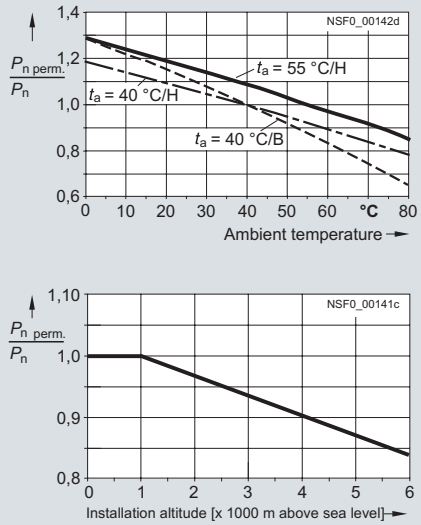
DIN VDE 0532-6

Rated power P_n at high ambient temperature – the characteristic for thermal load capacity

Reference conditions under which the transformers have the rated power P_n stated in the selection tables:

- Uninterrupted duty P_n
- Frequency AC 50 Hz ... 60 Hz
- Degree of protection IP00
- Installation height up to 1000 m above sea level and
- Ambient temperature t_a, type-dependent 40 °C or 55 °C.

Other installation and operating conditions than this will affect the permissible permanent load capacity. In the case of the 4BT transformers, for example, with a low ambient temperature of 40 °C instead of 55 °C, an increase in load of 8% is possible (see load characteristics).



Load characteristics: Permissible transformer permanent load in relation to the ambient temperature and the installation height

Design

Standard version

All 4BT transformers are supplied for screw fixing on a mounting plate.

Terminals

Screw terminals

The 4BT transformers are supplied for rated currents up to 81 A in the standard version with screw terminals.

For higher currents, the transformers are supplied with flat connectors or with threaded bolts.

Enclosure mounting

4BT transformers are also available in protective enclosures of the degree of protection IP20 and IP23.

Required specifications for requests and orders for 4BT transformers with selectable voltages

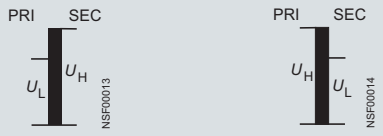
Rated power P_n (output division with separate SEC windings, $P_n = P_1 + P_2$, throughput rating = load rating for autotransformers), PRI and SEC voltages, frequency, vector group, degree of protection (power reduction with degrees of protection other than IP00), Order No. stem.

The Order No. stem is added to the Order No. for delivery.

Example:

Single-phase transformer with selectable voltages 160 kVA
PRI 415 V ± 5 %, SEC 115 V,
frequency 50 Hz ... 60 Hz,
degree of protection IP00,
shield winding,
Order No. stem 4BT62 1.

4BT autotransformers: determine the type rating $P_{n\,req.}$



$$P_{n\,req.} = P_{n\,load} \cdot \frac{U_H - U_L}{U_H}$$

(the single-phase example also applies for three-phase autotransformers)

Step-up transformer (left) and step-down transformer (right)

Thermistor transformer protection for 4BT power transformers

The windings of the power transformers can be protected from impermissible overheating by means of thermistor transformer protection. PTC thermistors are used which are wound into each shank of the transformer and connected in series. The rated response temperature is slightly above the limit temperature for uninterrupted duty.

Possible versions:

- Warning
- Disconnection
- Warning and disconnection

The connections for the temperature sensor are routed to terminals, two terminals each for warning and disconnection.

The 3RN tripping units are not included in the transformer scope of supply, for the relevant selection and ordering data see Catalog LV 1, Chapter 7 "Monitoring and Control Devices" – > "Monitoring Relays" –> "Thermistor Motor Protection".

Technical specifications

Transformers	Type	**4BT**
• Version		UI core
• Performance range (with IP00)	kVA	> 16 ... 250
• Approvals		cULus
Voltage range	V	≤ 1000 (up to 3.6 kV on request)
• Approvals for USA, Canada	V	≤ 600
Rated frequency	Hz	50 ... 60
Thermal class		H
• Acc. to UL/CSA		Class 180
Ambient conditions		Protection against harmful ambient conditions: complete impregnation in polyester resin Climate-proof for installation in rooms with an external climate to DIN 50010
Rated ambient temperature		
• At rated power	°C	55
• Maximum value (after power reduction depending on load characteristics, see "Design")	°C	80
• Minimum value	°C	–25
Relative air humidity		
• Mean value up to	%	80
• Maximum value for 30 days/year	%	95
• At 40 °C occasionally	%	100
Protection class		I
Degree of protection		
• Without enclosure		IP00
• With protective enclosure (acc. to "Selection and ordering data", see Catalog LV 1)		IP20 or IP23
• Version		IP20, IP23: sheet-steel enclosure coated with epoxy resin, color gray RAL 7032
Installation height		Up to 1000 m above sea level (above this, power reduction is necessary)
Protective devices		
• Internal		Can be designed with thermistor transformer protection for warning or disconnection, or warning and disconnection, see "Design".
• External		The transformers can be protected against short-circuits and overload on the primary or secondary side with circuit breakers. For reliable protection against short-circuits and touch, the cables between the output terminals of the transformer and the load must have a negligible line impedance. For more details see DIN VDE 0100 (Erection of low-voltage systems) Part 410, Part 520 (particularly section 525) and part 600 (similar to IEC 60364-4-41, -5-52 and -6). On request
Connection methods		The permissible conductor cross-sections are assigned to the specified terminal types.
• Terminal arrangement		Refer to DIN VDE 0298-4 and EN 60204 for the permissible conductor cross-sections for the specified current according to the installation type. The terminals used are finger-safe according to EN 50274.
• For terminal versions and connectable cross-sections (see "Project planning aids")		Other terminal sizes than standard versions on request.
Mounting position		The permissible mounting position for each version is shown in the "Project planning aids".

Selecting the fuse

Short-circuit protection on the primary or secondary side using DIAZED or LV HRC fuses with characteristic gL/gG for 4BT45 to 4BT65 power transformers in the performance range from 18 kVA to 250 kVA.

Determining the fuse size:

$$\text{Rated current} \frac{\text{Rated power}}{\text{Rated voltage}}$$

Minimum fuse current = Rated current x 1.2
Maximum fuse current = Rated current x 1.5

Example:

4BT59 power transformer,
degree of protection IP00,
rated power P_n = 100 kVA,
rated voltage U_{1N} = 400 V,
rated current I_n = ?

$$I_n = \frac{P_n}{U_{1N}} = \frac{100000\ \text{VA}}{400\ \text{V}} = 250\ \text{A}$$

Minimum fuse current = 250 A x 1.2 = 300 A
Maximum fuse current = 250 A x 1.5 = 375 A

Selected fuse size: 315 A

Further technical specifications can be found on the Internet at http://www.siemens.com/sirius-supplying.

General data

Operation characteristics

- According to DIN VDE 0532-6
- t_a = 55 °C/H

Trans-formers	Rated power P_n 50 Hz ... 60 Hz 1000 m above sea level Degree of protection IP00	Core size	Voltage rise in no-load operation (operating temperature) u_A approx.	Voltage drop on rated load[1] u_R approx.	Short-circuit voltage[1] u_Z approx.	Degree of efficiency η approx.
Type	kVA		%	%	%	%
4BT45 0	18	UI 240/107	2.7	2.6	2.7	97
4BT47 0	20	UI 240/137	2.6	2.5	2.5	97
4BT47 1	22.5	UI 240/137	2.3	2.2	2.5	97
4BT47 2	25	UI 240/137	2.1	2	2.1	97
4BT51 0	28	UIS 265/107	4.3	4.1	4.8	95
4BT52 0	31.5	UIS 265/120	3.9	3.8	4.4	96
4BT53 0	35.5	UIS 265/135	3.6	3.5	4.1	96
4BT54 0	40	UIS 305/125	3.7	3.5	3.9	96
4BT54 1	45	UIS 305/125	3.3	3.2	3.8	96
4BT55 0	50	UIS 305/140	3.1	2.9	3.5	97
4BT56 0	63	UIS 305/160	2.5	2.5	3.2	97
4BT58 1	80	UIS 370/150	3.1	3	3.9	97
4BT59 0	100	UIS 370/170	2.6	2.5	3.7	97
4BT60 1	125	UIS 370/195	2.1	2.1	3.6	97
4BT62 1	160	UIS 455/175	2.1	2	3.7	98
4BT63 0	200	UIS 455/200	1.7	1.7	3.7	98
4BT65 0	250	UIS 455/260	1.5	1.5	3	98

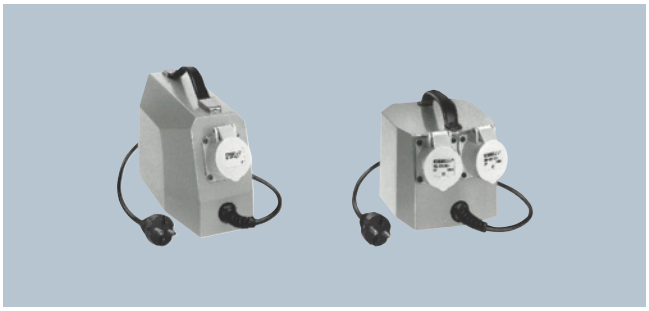
Higher ratings and other conditions on request.

Calculation of power loss P_V

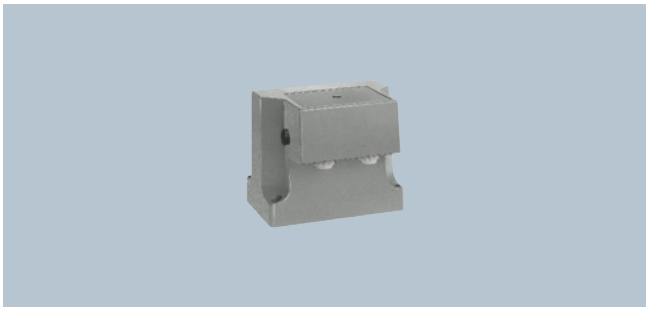
$$P_V = \frac{P_n\,(100 - \eta)}{\eta}\ \text{[kW]}$$

1) Winding reference temperature: 115 °C.

Overview



4AX22 12 (left) and 4AX22 14 (right)

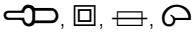


4AX23 11

The 4AX22 and 4AX23 safety transformers are resin-enclosed.

- Protection class II (For more safety transformers, see "Safety, Isolating, Control and Mains Transformers")
- Vector group Ii0
- Conditionally short-circuit resistant
- t_a = 40 °C/E

4AX22 portable version

- Highly rugged
- Degree of protection IP44
- EN 61558-2-6, -2-9
- 

4AX23 stationary version

- Degrees of protection IP44 and IP65
- EN 61558-2-6
- 

Design

The 4AX22 and 4AX23 single-phase safety transformers are fully resin-enclosed.

4AX22 portable version

These devices are characterized by extreme ruggedness.

There is a connecting cable with a vulcanized power plug on the input side. The secondary connection can be fitted with one or two CEE socket outlets according to the rating. The output plugs are supplied loose with the safety transformer.

A primary fuse that can be replaced from the outside protects against short-circuit and overload. The carrying handle makes it easy to move the unit around. The transformer is equipped with rubber feet that prevent slipping and absorb shocks.

4AX23 stationary version

The device contains one cable gland each with strain relief for the input and for the output.

A primary fuse that can be replaced, protects against short-circuits and overload. Mounting holes in the enclosure make mounting easy.

The safety transformers can be supplied in a special version with a CEE socket outlet. This reduces the degree of protection from IP65 to IP44. The output plug is supplied loose with the safety transformer.

Technical specifications

Transformers	Type	**4AX22**	**4AX23**
• Version		Resin-enclosed, portable	Resin-enclosed, stationary
• Performance range (with IP00)	kVA	0.1 ... 1	0.1 ... 1
Voltage range	V	≤ 230	
Rated frequency	Hz	50 ... 60	
Thermal class		E	
Ambient conditions		For external climate acc. to DIN 50010	
Rated ambient temperature			
• At rated power	°C	+40	
• Maximum value	°C	+60	
• Minimum value	°C	–25	
Protection class		II	
Degree of protection		IP44	IP44, IP65
Installation height		Up to 1000 m above sea level	
Protective devices, internal		Fuse links: G up to 5 A, D01 up to 16 A	G up to 6.3 A, D01 up to 16 A
Connection methods		See "Selection and ordering data" in Catalog LV 1	
Mounting position		Any position	

4AX24 Isolating Transformers

Resin-enclosed

Overview

4AX24 13

The 4AX24 portable isolating transformers are completely resin-enclosed.

- EN 61558-2-4
- ⧈, ⊟
- t_a = 40 °C/E
- Degree of protection IP44
- Protection class II (For more safety transformers, see "Safety, Isolating, Control and Mains Transformers")
- Vector group Ii0
- Conditionally short-circuit resistant

Design

The 4AX24 single-phase isolating transformers are completely resin-enclosed.

There is a connecting cable with a vulcanized rubber plug on the input side. The secondary connection is designed as a two-pole socket outlet with a hinged lid (without grounding contact).

A primary fuse that can be replaced from the outside protects against short-circuit and overload.

The carrying handle makes it easy to move the unit around. The transformer is equipped with rubber feet that prevent slipping and absorb shocks.

Technical specifications

Transformers	Type	**4AX24**
• Version		Resin-enclosed, portable
• Performance range (with IP00)	kVA	0.16 ... 2.5
Voltage range	V	≤ 230
Rated frequency	Hz	50 ... 60
Thermal class		E
Ambient conditions		For external climate acc. to DIN 50010
Rated ambient temperature		
• At rated power	°C	+40
• Maximum value	°C	+60
• Minimum value	°C	–25
Protection class		II
Degree of protection		IP44
Installation height		Up to 1000 m above sea level
Protective devices, internal		Fuse links: G up to 10 A, D01 up to 16 A
Connection methods		See "Selection and ordering data" in Catalog LV 1
Mounting position		Any position

Overview

- According to EN 61558-2-15
- Protection class I
- With static shield between the primary and secondary winding with insulated connection
- With thermistor transformer protection for warning of thermal overload[1)]
- With central tap for insulation monitoring
- Short-circuit voltage $u_z \leq 3$ %
- No-load supply current $i_0 \leq 3$ %
- Inrush current max. 8 × I_{1N}
- t_a = 55 °C/H

4AT special version for medical premises

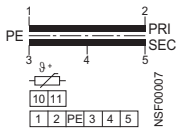
1) 3RN tripping units for PTC sensors must be ordered separately, see Chapter 7, "Monitoring and Control Devices".

Technical specifications

Transformers	Type	**4AT**
• Version		UI core
• Performance range (with IP00)	kVA	> 2.5 ... 8
Voltage range	V	230
Rated frequency	Hz	50 ... 60
Thermal class		H
Ambient conditions		Protection against harmful ambient conditions: complete impregnation in polyester resin Climate-proof for installation in rooms with an external climate to DIN 50010
Rated ambient temperature • At rated power	°C	55
Relative air humidity		
• Mean value up to	%	80
• Maximum value for 30 days/year	%	95
• At 40 °C occasionally	%	100
Protection class		I
Degree of protection		
• Without enclosure		IP00
• With protective enclosure (acc. to "Selection and ordering data", see Catalog LV 1)		IP23
• Version		IP23: sheet-steel enclosure coated with epoxy resin, color gray RAL 7032
Installation height		Up to 1000 m above sea level (above this, power reduction is necessary)
Protective devices		
• Internal		With thermistor transformer protection for warning
• External		The transformers have to be protected against short-circuits on the secondary side with circuit breakers (see "Selection and ordering data" in the Catalog LV 1). For reliable protection against short-circuits and touch, the cables between the output terminals of the transformer and the load must have a negligible line impedance. For more details see DIN VDE 0100 (Erection of low-voltage systems) Part 410, Part 520 (particularly section 525) and part 600 (similar to IEC 60364-4-41, -5-52 and -6) . Assigned protective devices (see "Selection and ordering data" in Catalog LV 1)
Connection methods		The permissible conductor cross-sections are assigned to the specified terminal types.
• Terminal arrangement		Refer to DIN VDE 0298-4 and EN 60204 for the permissible conductor cross-sections for the specified current according to the installation type. The terminals used are finger-safe according to EN 50274.
Mounting position		Any position

Further technical specifications can be found on the Internet at http://www.siemens.com/sirius-supplying.

Schematics

Circuit diagram and terminal assignment	**Rated input voltage U_{1N}**	**Rated output voltage U_{2N}**	**Connections and links**		
			Transformer type	Primary U_{1N}	Secondary U_{2N}
	V	V			
	230	230 115	**4AT**	1-2	3-5 4

Insulation monitoring: terminal 4
PTC sensors: terminal 10-11
Shield winding: PE terminal (insulated)

4FL voltage regulators, transformer type

Overview

4FL

- According to DIN VDE 0552
- Degree of protection IP21
- t_a = 40 °C/E

Design

The transformer-type voltage regulator supplies electrical loads with a constant voltage despite mains variations.

The advantage of a voltage regulator with a variable-ratio transformer is proportional changing of the sinewave, i. e. the voltage regulator is characterized in that the rms value, mean value and the peak value are held at constant ratios.

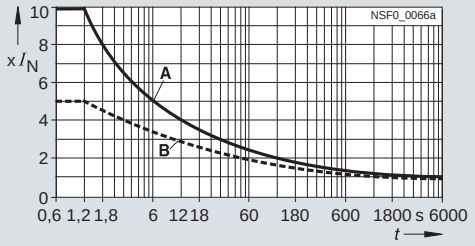
A perfect rms value is required, for example, by loads for which the loading is determined by the thermal limits. Strongly capacitive loads in DC units respond to the mean value. A slightly capacitive load is, however, influenced by the peak value. These factors are, however, only guaranteed for sinusoidal AC voltages and this can only be achieved easily by means of a variable-ratio transformer.

Voltage regulators stabilize the mains voltage U_1 regardless of the frequency and power factor to the rated value of output voltage U_{2N} within the set control accuracy (±1 % of U_{2N}). The correcting time from the upper or lower limit to the rated value is between 1.5 s and 2.5 s. The curve shape of the supplied voltage is not changed.

The output voltage U_2 is compared in the electronic step controller with a set reference voltage. In the event of a deviation in voltage greater than the set response value, the electronic step controller compensates the deviation with an accuracy of ±1 % using a servo motor and adjustable moving contact on the variable-ratio transformer.

Transformer-type voltage regulators:

- Are electrically connected to the network
- Can be overloaded temporarily (see characteristic curve)
- Can be installed in a sheet-steel enclosure to IP21 complete with any additional components
- Have a degree of efficiency of between 95 % and 98 %
- Are not maintenance-free
- For the values for control range and control deviation, see "Selection and ordering data" in Catalog LV 1.



Reference temperature:
Curve A: winding temperature = ambient temperature
Curve B: winding temperature = operating temperature

Overload capability (guide values)

Ambient conditions

4FL transformer-type voltage regulators are climate proof for installation in rooms with an internal climate according to DIN 50010.

Limit values:

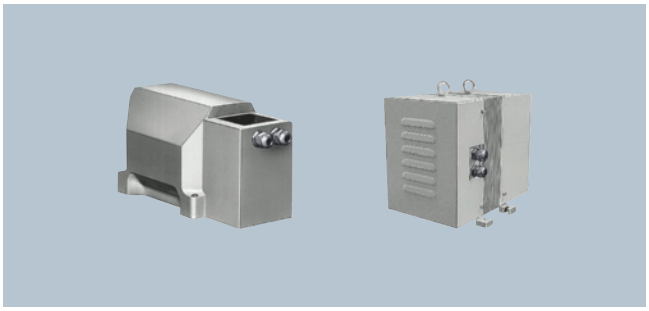
- Ambient temperature at
  - Rated power +40 °C,
  - Minimum value –25 °C.
- Relative air humidity
  - At 40 °C up to 85 %,
  - Annual average up to 65 %
  - Condensation not permitted

Short-circuit and overload protection

Transformer-type voltage regulators must be protected with gL/gG fuses on the primary side against damage caused by short-circuits. The fuse rated current must be determined according to the highest primary current (present with the lowest input voltage). Overload and short-circuit protective devices according to the rated load current must be provided on the output side. An overload relay is integrated in the control circuit, the trip contacts (break or make) must be connected on a switch that automatically disconnects the transformer voltage regulator from the network in the event of a fault.

4FK voltage regulators, magnetic type

Overview



4FK31 to 4FK34 (figure on the left) and
4FK35 to 4FK38 (figure on the right)

- According to EN 61558-2-12
- With sinusoidal output voltage
- Settling time 40 ms
- t_a = 40 °C

Design

The correcting time for the voltage regulators is about 40 ms, whereby they can bridge mains voltage interruptions of up to a half-wave. The stabilizing effect is based on a tuned anti-resonant circuit with an iron-core reactor that is forced into saturation (see Schematics). This iron-core reactor is responsible for the distorted output voltage (harmonic distortion from 3 % to 4 %). Magnetic type voltage regulators are frequency dependent due to the anti-resonant circuit.

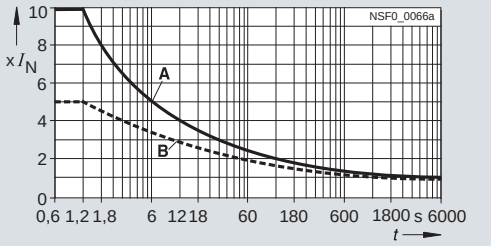
Voltage regulators are designed for resistive loads and harmonized. If the load has a power factor that lies outside the specification, the output voltage will be reduced for an inductive load and increased for a capacitive load. Inductive loads can be compensated by using appropriate compensation capacitors. It is also possible to construct voltage regulators that are adapted to a different power factor.

Magnetic type voltage regulators have outputs that are short-circuit resistant, i. e. when the outputs are short-circuited, the current rises to 1.3 to 1.5 times the value. The input current only changes insignificantly. Due to this characteristic, a voltage stabilizer cannot rupture a melting fuse. The load can be protected by a motor-protective circuit breaker at the output that is set to rated current. Magnetic type voltage regulators have, as a result of the high inductance in the iron core, inrush currents between 10 times and 30 times the rated current. For this reason, a slow-acting line fuse should be used at the input.

The characteristics of magnetic type voltage regulators can be summarized as follows:
- Settling of mains voltage variations.
- Maintaining the output voltage at a constant value despite load variations.
- Electrical isolation of the output voltage from the input voltage, transformation of the input voltage to the required output voltage.
- Limitation of the output current in the event of an overload or short-circuit to approximately 1.3 or 1.6 × I_n (see Current/voltage characteristic curve), short-circuit resistant.
- Filtering of high-frequency faults (damping of 35 dB up to 100 kHz) and suppression of voltage peaks. Filtering of distorted input voltages, harmonic distortion factor of the output from 3 % to 4 % at rated load.

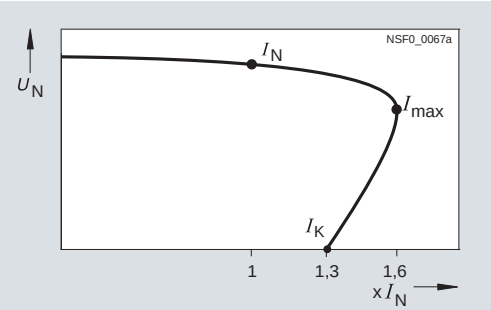
- Maintenance-free
- No moving parts
- Bridges mains voltage interruptions of up to a half-wave
- Due to the anti-resonant circuit, magnetic type voltage regulators are frequency-dependent

It must be taken into account that the operating temperature and the noise generation is higher for a magnetic type voltage stabilizer than for an isolating transformer.



Reference temperature:
Curve A: winding temperature = ambient temperature
Curve B: winding temperature = operating temperature

Overload capability (guide values)



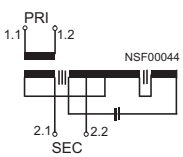
Current/voltage characteristic curve

Ambient conditions

4FK magnetic type voltage regulators are climate proof for installation in rooms with an internal climate according to DIN 50010.

Limit values:
- Ambient temperature at
  - Rated power +40 °C,
  - Minimum value –25 °C.
- Relative air humidity
  - At 40 °C up to 100 %,
  - Annual average up to 85 %
  - Condensation not permitted

Schematics



Project planning aids

Dimensional drawings

4AM, 4AT safety, isolating, control and mains transformers < 16 kVA

4AM safety, isolating, control and mains transformers < 16 kVA and
4AM safety, isolating, control and mains transformers and autotransformers with selectable voltages < 16 kVA

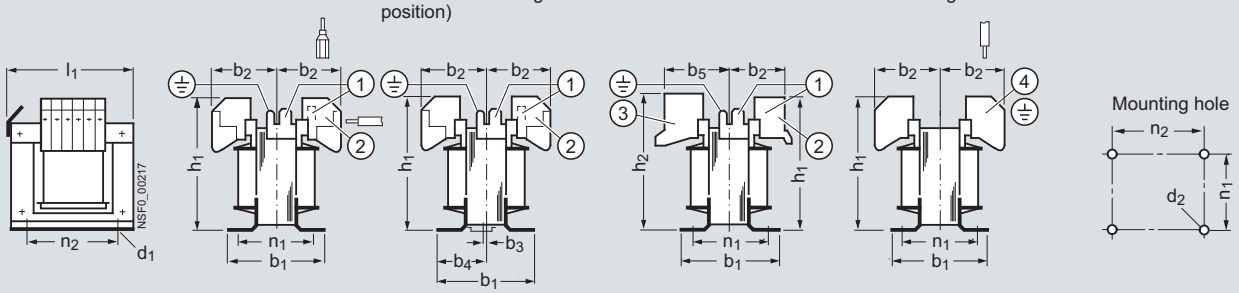
4AM23 to 4AM65
for any mounting position

4AM23 and 4AM26, 4AM43 to 4AM65
For any position, standard version

4AM32 to 4AM40
For any position, standard version (with integrated standard rail mounting, horizontal mounting position)

4AM23 to 4AM65
For any position, version with 10 mm², terminal up to 44 A

4AM23 to 4AM65
For any position, version with Cage Clamp terminals, same as standard version but b_2 +2 mm, cable routing from above



(1) Flat connectors DIN 46244-A 6,3-0,8
(2) Screw terminals
24 A:
solid 0,5 mm² … 6 mm²,
finely stranded 0,5 mm² … 4 mm²

(3) Screw terminals
44 A:
solid 1,0 mm² … 16 mm²,
finely stranded 1,5 mm² … 10 mm²

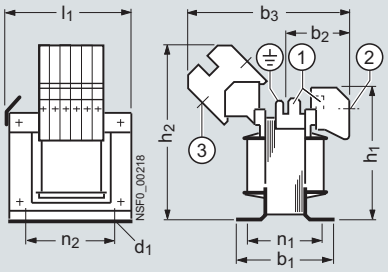
(4) Cage Clamp terminals
(also ground terminals)
24 A:
solid and finely stranded 0,08 mm² … 4 mm²

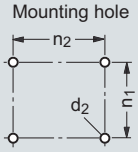
Type	Rated power kVA[1)]	Designation according to DIN 41302	b_1	b_2	b_3	b_4	b_5	d_1	d_2	h_1	h_2	l_1	n_1	n_2	Max. number of terminals per side 24 A	44 A
4AM23	0,025	EI 60/20	50	39	--	--	53	3,6 x 6	M3	75	86	62	39	44	5	4
4AM26	0,04	EI 66/22	56	40	--	--	54	4,5 x 8	M4	79	90	68	42	50	5	4
4AM32	0,063	EI 84/28	76	45	2	34	59	4,8 x 8	M4	98	108	86	64	64	7	4
4AM34	0,1	EI 84/42	76	51	2	34	65	4,8 x 8	M4	98	108	86	64	64	7	4
4AM38	0,16	EI 96/44	102	52	5	44	66	5,8 x 9,3	M5	106	117	98	86	84	8	6
4AM40	0,25	EI 96/58	102	59	5	44	73	5,8 x 9,3	M5	106	117	98	86	84	8	6
4AM43	0,315	EI 105/60	103	60	--	--	74	5,8 x 12	M5	111	122	107	83	80,5	8	6
4AM46	0,4	EI 120/52	102	57	--	--	71	5,8 x 12	M5	121	132	122	85	90	10	6
4AM48	0,5	EI 120/72	123	67	--	--	81	5,8 x 12	M5	121	132	122	104	90	10	6
4AM52	0,63	EI 150N/48	111	55	--	--	69	7 x 15	M6	144	155	152	90	122	14	10
4AM55	0,8	EI 150N/65	128	63	--	--	77	7 x 15	M6	144	155	152	106	122	14	10
4AM57	1	EI 150N/90	154	66	--	--	90	7 x 15	M6	144	155	152	134	122	14	10
4AM61	1,6	EI 174/82	155	69	--	--	83	7 x 15	M6	164	175	176	126	145	16	10
4AM64	2	EI 174/102	177	79	--	--	93	7 x 15	M6	164	175	176	146	145	16	10
4AM65	2,5	EI 192/110	188	88	--	--	102	9 x 16	M8	180	191	194	164	160	16	10

[1)] The rated power is only applicable to transformers with separate windings (not to autotransformers).

4AM, 4AT safety, isolating, control and mains transformers < 16 kVA (continued)

4AM23 to 4AM65
for any mounting position, with terminals ≤ 60 A
by means of terminal strip





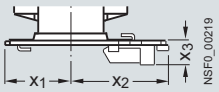
① Flat connectors DIN 46244-A 6,3-0,8
② Screw terminal
24 A:
solid 0,5 mm² … 6 mm²,
finely stranded 0,5 mm² … 4 mm²
③ Screw terminal
60 A:
solid 1,0 mm² … 16 mm²,
stranded 10 mm² … 25 mm²,
finely stranded 2,5 mm² … 16 mm²
> 61 A:
see flat connectors

Type	Rated power kVA[1]	Designation according to DIN 41302	b_1	b_2	b_3	d_1	d_2	h_1	h_2	l_1	n_1	n_2	Max. number of terminals per side 24 A	60 A
4AM23	0,025	EI 60/20	50	39	102	3,6 x 6	M3	75	104	62	39	44	5	4
4AM26	0,04	EI 66/22	56	40	104	4,5 x 8	M4	79	108	68	42	50	5	4
4AM32	0,063	EI 84/28	76	45	112	4,8 x 8	M4	98	127	86	64	64	7	4
4AM34	0,1	EI 84/42	76	51	126	4,8 x 8	M4	98	127	86	64	64	7	4
4AM38	0,16	EI 96/44	102	52	128	5,8 x 9,3	M5	106	135	98	86	84	8	6
4AM40	0,25	EI 96/58	102	59	142	5,8 x 9,3	M5	106	135	98	86	84	8	6
4AM43	0,315	EI 105/60	103	60	143	5,8 x 12	M5	111	140	107	83	80,5	8	6
4AM46	0,4	EI 120/52	102	57	137	5,8 x 12	M5	121	150	122	85	90	10	6
4AM48	0,5	EI 120/72	123	67	157	5,8 x 12	M5	121	150	122	104	90	10	6
4AM52	0,63	EI 150N/48	111	55	134	7 x 15	M6	144	173	152	90	122	14	8
4AM55	0,8	EI 150N/65	128	63	152	7 x 15	M6	144	173	152	106	122	14	8
4AM57	1	EI 150N/90	154	66	176	7 x 15	M6	144	173	152	134	122	14	8
4AM61	1,6	EI 174/82	155	69	165	7 x 15	M6	164	192	176	126	145	16	10
4AM64	2	EI 174/102	177	79	185	7 x 15	M6	164	192	176	146	145	16	10
4AM65	2,5	EI 192/110	188	88	203	9 x 16	M8	180	208	194	164	160	16	10

[1] The rated power is only applicable to transformers with separate windings (not to autotransformers).

Standard rail mounting for 4AM transformers in a special version with a preassembled adapter plate

For horizontal mounting position



4AM32, 4AM34, 4AM38 and 4AM40 transformers are supplied as standard for both screw mounting and with integrated standard rail mounting, see dimensional drawings 4AM.
If using standard rail mounting, the mounting position is horizontal.

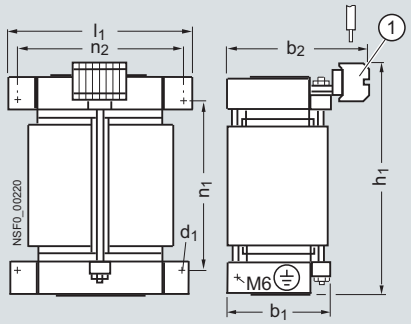
Type	x_1 max.	x_2 max.	x_3	Stand. mount. rail mm
4AM23	$b_1/2$ +2	$b_1/2$ +21	9	35 x 7,5
4AM26	$b_1/2$ +5	$b_1/2$ +21	9	35 x 7,5
4AM43	$b_1/2$ +3	$b_1/2$ +8	15	35 x 15
4AM46 to 4AM48	$b_1/2$ +3	$b_1/2$ +3	15	35 x 15

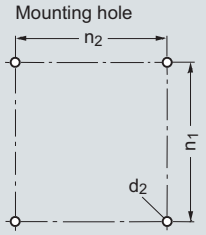
Project planning aids

4AM, 4AT safety, isolating, control and mains transformers < 16 kVA (continued)

4AT safety, isolating, control and mains transformers < 16 kVA and 4AT safety, isolating, control and mains transformers and transformers with selectable voltages < 16 kVA

4AT30 to 4AT43
for any mounting position





(1) Screw terminal
18 A:
solid 0,5 mm² … 6 mm²,
finely stranded 0,5 mm² … 4 mm²
23 A:
solid 0,75 mm² … 10 mm²,
finely stranded 1,5 mm² … 6 mm²
43 A:
solid 1,0 mm² … 16 mm²,
stranded 10 mm² … 25 mm²,
finely stranded 2,5 mm² … 16 mm²
81 A:
solid 4,0 mm² … 16 mm²,
stranded 10 mm² … 50 mm²,
finely stranded 6 mm² … 35 mm²
> 81 A:
see flat-type and threaded pin terminals

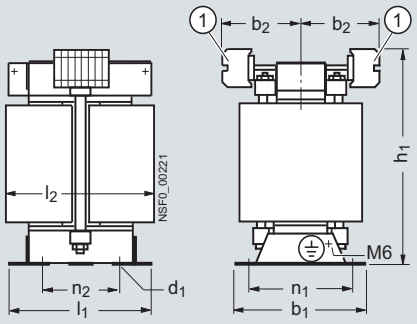
Permissible permanent load for 4AT36 and 4AT39 for arrangement on horizontal surfaces:

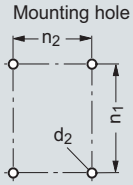
0,95 · P_n at t_a = 55 °C
P_n at t_a = 45 °C

Type	Rated power kVA[1]	Designation according to DIN 41302	b_1	b_2	d_1	d_2	h_1	l_1	n_1	n_2	Max. number of terminals per side 18 A	23 A	43 A	81 A
4AT30	4	UI 150/75	147	205	9 x 14	M8	263	214	200	190	20	18	13	8
4AT36	5; 6,3	UI 180/75	180	238	9 x 14	M8	315	244	240	220	24	22	16	10
4AT39	8; 10	UI 210/70	185	243	11 x 16	M10	365	285	280	260	29	26	19	11
4AT43	12,5; 14	UI 240/80	195	253	11 x 16	M10	415	325	320	290	33	33	22	13

1) The rated power is only applicable to transformers with separate windings (not to autotransformers).

4AT30 to 4AT43
for arrangement on horizontal surfaces, special constructions can only be supplied for transformers with selectable data





(1) Screw terminal
18 A:
solid 0,5 mm² … 6 mm²,
finely stranded 1,5 mm² … 4 mm²
23 A:
solid 0,75 mm² … 10 mm²,
finely stranded 1,5 mm² … 6 mm²
43 A:
solid 1,0 mm² … 16 mm²,
stranded 10 mm² … 25 mm²,
finely stranded 2,5 mm² … 16 mm²
81 A:
solid 4,0 mm² … 16 mm²,
stranded 10 mm² … 50 mm²,
finely stranded 6 mm² … 35 mm²
> 81 A:
see flat-type and threaded pin terminals

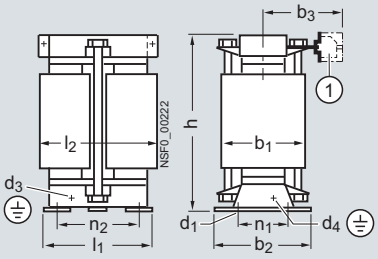
Type	Rated power kVA[1]	Designation according to DIN 41302	b_1 max.	b_2 min.	b_2 max.	d_1	d_2	h_1 max.	l_1	l_2 max.	n_1	n_2	Max. number of terminals per side 18 A	23 A	43 A	81 A
4AT30	4	UI 150/75	155	109	117	10 x 18	M8	270	164	200	118	124	20	18	13	8
4AT36	5; 6,3	UI 180/75	169	114	122	10 x 18	M8	320	194	240	138	144	24	22	16	10
4AT39	8; 10	UI 210/70	174	111	119	12 x 18	M10	370	226	280	141	176	29	26	19	11
4AT43	12,5; 14	UI 240/80	194	116	124	15 x 22	M12	420	256	310	155	196	33	30	22	13

1) The rated power is only applicable to transformers with separate windings (not to autotransformers).

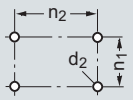
4AT safety, isolating, control and mains transformers ≤ 16 kVA,
4BT power transformers ≥ 18 kVA

4AT safety, isolating, control and mains transformers and autotransformers with selectable voltages ≤ 16 kVA
4BT power transformers and autotransformers with selectable voltages ≥ 18 kV

4AT45, 4BT45 to 4BT65
for arrangement on horizontal surfaces



Mounting hole



(1) Screw terminal

Terminal size	Screw terminal for cross-section solid mm²	stranded mm²	finely strand. mm²	Current carrying capacity A
4	0,5 … 6	--	1,5 … 4	18
6	2,5 … 10	--	1,5 … 6	23
16	1,5 … 16	10 … 25	4 … 16	43
35	10 … 16	10 … 50	10 … 35	81

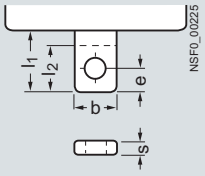
> 81 A:
see flat-type and threaded pin terminals

Type	Rated power kVA[1]	Type size in conformance with DIN 41302	b1	b2	b3 ± 3 with terminal size (4) 6	16	35	d1	d2	d3	d4	h	l1	l2	n1	n2	Max. number of terminals per side 4	6	16	35
4AT safety, isolating, control and mains transformers and autotransformers with selectable voltages ≤ 16 kVA																				
4AT45	16	UI 240/107	221	221	126	134	146	15 x 22	M12	--	M6	420	256	320	182	196	33	30	22	13
4BT power and autotransformers with selectable voltages ≥ 18 kVA																				
4BT45	18	UI 240/107	230	221	152	163	174	15	M12	--	M6	420	256	310	182	196	33	30	22	13
4BT47	20; 22,5; 25	UI 240/137	260	251	172	178	190	15	M12	--	M6	420	256	310	212	196	33	30	22	13
4BT51	28	UIS 265/107	267	207	147	155	167	12,5	M10	M12	--	515	285	370	170	225	--	36	26	16
4BT52	31,5	UIS 265/120	280	220	153	161	173	12,5	M10	M12	--	515	285	370	183	225	--	36	26	16
4BT53	35,5	UIS 265/135	295	235	161	169	181	15	M10	M12	--	515	285	370	198	225	--	36	26	16
4BT54	45	UIS 305/125	295	245	166	174	186	15	M12	M12	--	585	330	420	198	260	--	36	26	16
4BT55	50	UIS 305/140	310	260	173	181	193	15	M12	M12	--	585	330	420	213	260	--	36	26	16
4BT56	63	UIS 305/160	330	280	183	191	203	15	M12	M12	--	585	330	420	233	260	--	36	26	16
4BT58	80	UIS 370/150	330	290	180	188	200	15	M12	M12	--	665	400	520	241	320	--	46	32	20
4BT59	100	UIS 370/170	350	310	190	198	210	15	M12	M12	--	665	400	520	261	320	--	46	32	20
4BT60	125	UIS 370/195	375	335	203	211	223	15	M12	M12	--	665	400	520	286	320	--	46	32	20
4BT62	160	UIS 455/175	405	315	193	201	213	21	M16	M12	--	760	495	650	261	395	--	56	40	24
4BT63	200	UIS 455/200	430	340	205	213	225	21	M16	M12	--	760	495	650	298	395	--	56	40	24
4BT65	250	UIS 455/260	490	400	235	243	255	21	M16	M12	--	760	495	650	253	395	--	56	40	24

[1] The rated power is only applicable to transformers with separate windings

Flat-type and threaded pin terminals

4AM, 4AT, 4BT flat connectors with through-hole

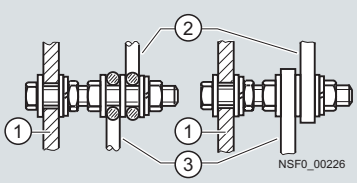


Flat connector on the transformer winding with through-hole for rail or cable lug.
Terminal covers for protection against accidental contact, free busbar connections up to 800 A (DIN VDE 0106-100) must be ordered separately.

Type	Terminal size A	b = l2	With hole For screw	e	l1	s
4AM, 4AT, 4BT	100	16	M6	8	25	2,5
	200	20	M8	10	30	3
	400	25	M10	12,5	35	5
	630	30	M10	15	40	6
	800	30	M12	15	40	8
	1000	40	M12	20	50	8

For terminal covers, see Catalog LV 1, Chapter 3 "Controls – Contactors and Contactor Assemblies, Accessories and Components", Order No. depends on the 3TX6 5.6-3B flat connector.

Threaded bolts on 4AT, 4BT insulating strip



Round wire or cable lug Rail or cable lug

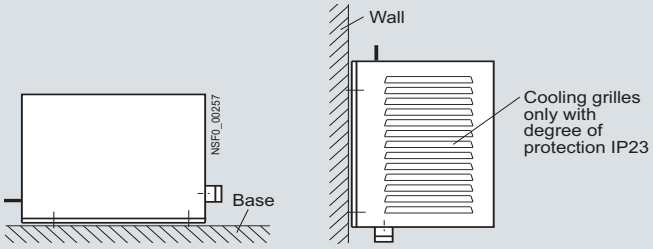
(1) Insulating strip
(2) External connection
(3) Internal connection

Type	Terminal size A	Threaded bolt	For conductor cross-sections mm²
4AT, 4BT	200	M8	≤ 50
	315	M10	≤ 120
	500	M12	≤ 300

Project planning aids

Protective enclosure with 4AM, 4AT safety, isolating, control and mains transformers ≤ 16 kVA, for degree of protection IP23 and IP54

4AM23 to 4AM65, 4AT30 to 4AT43 mounting positions



Horizontal, with degree of protection IP54

Vertical, with degree of protection IP23 and IP54

Type	Mounting position	Degree of prot.	
		IP23	IP54
4AM, 4AT30 to 4AT43[1)]	horizontal		x
	vertical	x	x

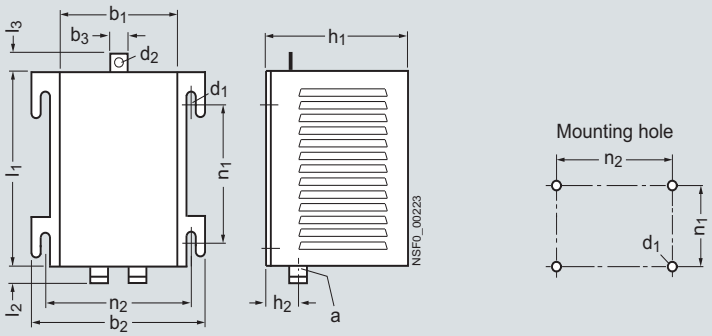
x = permissible

[1)] The 4AT43 transformers are available only with degree of protection IP23.

Sheet-steel enclosure, epoxy-resin coated, for degree of protection IP23 and IP54[1)]

cULus

4AM23 to 4AM65, 4AT30 to 4AT43

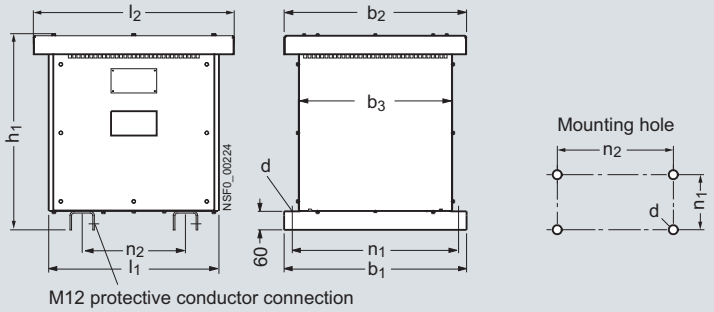


Type	a	b_1	b_2	b_3	d_1	d_2	h_1	h_2	l_1	l_2	l_3	n_1	n_2
4AM23 to 4AM34	2 x M25	112	149	--	5,8	--	135	35	155	35	--	125	137
4AM38 to 4AM57	2 x M25	187	224	--	5,8	--	230	42	245	35	--	200	212
4AM61 to 4AM65, 4AT30, 4AT36	2 x M32	305	351	--	9	--	330	56	395	45	--	335	333
4AT39, 4AT43[1)]	2 x M32	395	460	50	13	35	465	60	555	45	50	480	430

[1)] The 4AT43 transformers are available only with degree of protection IP23.

Protective enclosure with dry transformers > 16 kVA, for degree of protection IP20 and IP23

Sheet-steel enclosure, epoxy-resin coated
4AT45, 4BT45 to 4BT65
for arrangement on horizontal surfaces

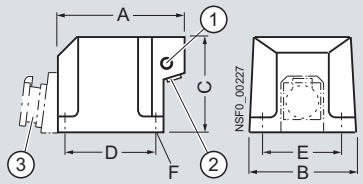


Type	b_1	b_2	b_3	h_1	d	l_1	l_2	n_1	n_2
4AT45, 4BT45 and 4BT47	600	600	507	645	15	560	660	570	340
4BT51 to 4BT53	600	600	507	735	15	560	660	570	316
4BT54 to 4BT56	600	600	507	825	15	800	900	570	465
4BT58 to 4BT60	730	730	637	905	19	1120	1220	696	630
4BT62 to 4BT65	900	900	807	1005	21	1120	1220	858	720

Project planning aids

4AX22, 4AX23 safety transformers, resin-enclosed, 4AX24 isolating transformers, resin-enclosed

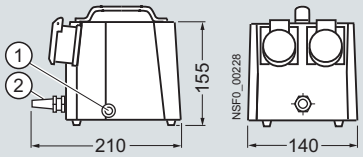
4AX23 10 to 4AX23 16
safety transformer, stationary,
for mounting in any position, suitable for construction sites



1 Fuse
2 Cable gland
3 Version with CEE socket outlet

Type	P_n A	A	B	C	D	E	F
4AX23 10	0,1	115	130	100	64	115	5
4AX23 11	0,16	145	145	125	84	125	5
4AX23 13	0,25	168	145	125	108	125	5
4AX23 14	0,4	180	176	152	103	151	6
4AX23 15	0,63	200	176	152	120	151	6
4AX23 16	1	220	210	175	137	178	6

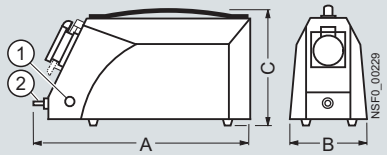
4AX22 12
safety transformer, portable,
with 2 CEE socket outlets, suitable for construction sites



1 Fuse
2 Connecting cable 2.5 mm

Safety and isolating transformer, portable,
suitable for construction sites

4AX22 10, 4AX22 14 to 4AX22 16
with 1 CEE socket outlet,
4AX24 11 to 4AX24 18
with 1 SCHUKO socket outlet

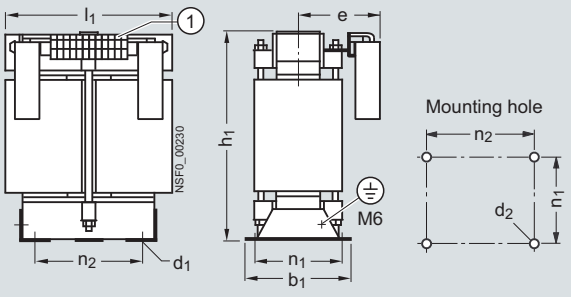


1 Fuse
2 Connecting cable 2.5 mm

Safety transformer Type	Isolating transformer Type	P_n A	A	B	C
4AX22 10	--	0,1	235	95	115
--	**4AX24 11**	0,16	235	95	115
--	**4AX24 13**	0,25	280	100	150
4AX22 14	**4AX24 14**	0,4	280	115	150
4AX22 15	**4AX24 15**	0,63	280	130	150
4AX22 16	**4AX24 16**	1	340	140	200
--	**4AX24 17**	1,6	340	160	200
--	**4AX24 18**	2,5	340	190	200

4AT isolating transformers for the supply of medical premises

4AT30 to 4AT36
for any mounting position



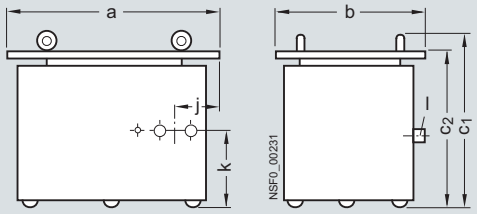
1 Screw terminal:
solid 1,0 mm² … 16 mm²,
stranded 10 mm² … 25 mm²,
finely stranded 2.5 mm² … 16 mm²,
Terminal size 16

Type	P_n kVA	Design. according to DIN 41302	b_1	d_1	d_2	e	h_1 max.	l_1	n_1	n_2
4AT30	2,5	UI 150/75	155	10 x 18	M8	133	270	200	118	124
4AT36	3,15; 4	UI 180/75	169	10 x 18	M8	142	310	240	138	144
4AT39	5; 6,3	UI 210/70	174	12 x 18	M10	143	370	270	141	176
4AT43	8	UI 240/80	194	15 x 22	M10	148	415	300	155	196

4FL, 4FK voltage regulators

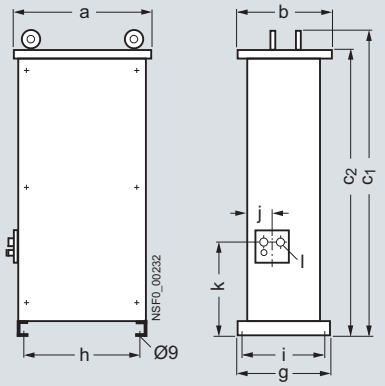
4FL voltage regulators, transformer type

4FL
degree of protection IP21



Type	a	b	c_1	c_2	j	k	l
4FL10 to 4FL14, 4FL16, 4FL17, 4FL20 to 4FL22, 4FL24, 4FL26, 4FL29	490	360	--	430	140	70	M25
4FL25, 4FL27, 4FL28, 4FL30 10, 4FL33, 4FL37	700	500	560	510	145	260	M50

4FL
degree of protection IP21

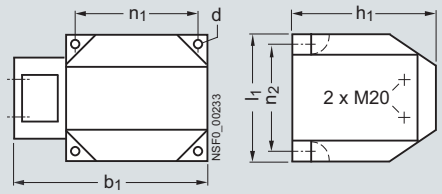


Type	a	b	c_1	c_2	g	h	i	j	k	l
4FL30 20, 4FL34	505	380	1065	1010	380	360	360	120	395	M50
4FL41	505	380	1065	1010	380	360	360	120	395	M63
4FL39, 4FL44, 4FL48	720	470	1355	1290	470	450	450	140	440	M63

Project planning aids

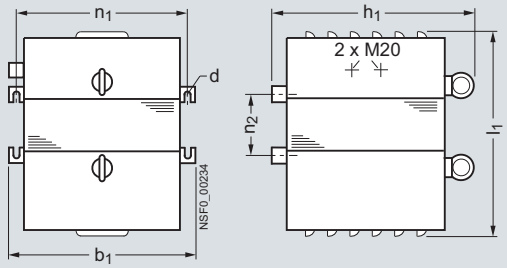
4FK voltage regulators, magnetic type

4FK31 to 4FK34
degree of protection IP65, for any mounting position



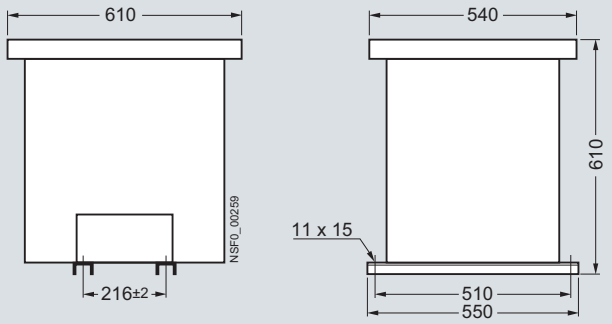
Type	Rated power kVA	b_1	d	h_1	l_1	n_1	n_2
4FK31	0,12	250	5	160	120	162	100
4FK32	0,25	305	5	170	140	200	118
4FK33	0,5	305	5	180	155	200	134
4FK34	0,75	320	6	185	185	198	166

4FK35 to 4FK38
degree of protection IP20, for any mounting position



Type	Rated power kVA	b_1	d	h_1	l_1	n_1	n_2
4FK35	1	265	9	325	330	240	83
4FK36	1,5	265	9	325	345	240	96
4FK37	2	265	9	325	370	240	122
4FK38	2,5	265	9	325	415	240	167

4FK39 to 4FK44
degree of protection IP21, for horizontal mounting position



Overview

4AP../4AU.. transformers

With the right transformer, the right voltage will be available at any conditions.

Our transformers are the right choice for each application: They work reliably, safely and worldwide under a wide range of different conditions.

The transformers are configured in user-friendly combinations as isolating, control and mains transformers according to EN 61558-2-4, -2-2, -2-1, or as safety, control and mains transformers according to EN 61558-2-6, -2-2, -2-1, or as autotransformers according to EN 61558-2-13 with selectable input and output voltages.

Note:
Mains transformers with ≤50 V on the output side are, in the case of SIRIUS transformers, always designed as safety transformers.

Our transformers provide optimal protection through high permissible ambient temperatures up to 40 °C or 55 °C, a high short-time rating in the case of control transformers, fuseless construction and due to its safety standard "Safety inside" EN 61558.

Design

Standards

EN 61558-2-6, -2-4, -2-2, -2-1, -2-13

The standard EN 61558 is the European edition of the international standard IEC 61558 (Safety of power transformers, power supply units and similar).

Some of the transformers are subject to more stringent manufacturing and testing conditions in view of these changes.

Transformers for general applications always have double or reinforced insulation with SELV voltages (can be touched, maximum 50 V AC and 120 V DC), i. e. these transformers are exclusively safety transformers.

Furthermore, all transformers are supplied with information on the protective elements with which they are protected against short-circuit and overload.

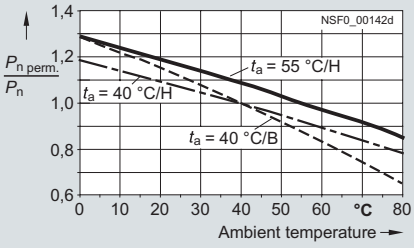
The SIRIUS transformer series contains the combined features of safety, isolating, control and mains transformers, i. e. one transformer for (virtually) all applications. SIRIUS transformers comply with the highest requirements (and with regard to safety the most stringent requirements) of the transformer versions contained in this catalog. A SIRIUS transformer is the right one whatever the application.

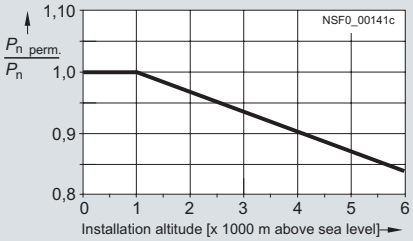
Rated power P_n at high ambient temperature – the characteristic for thermal load capacity

Reference conditions under which the transformers have the rated power P_n stated in the selection tables:

- Uninterrupted duty P_n
- Frequency AC 50 Hz ... 60 Hz
- Degree of protection IP00
- Installation height up to 1000 m above sea level and
- Ambient temperature t_a, type-dependent 40 °C or 55 °C.

Other installation and operating conditions than this will affect the permissible permanent load capacity. In the case of the 4AP transformers, for example, with a low ambient temperature of 30 °C an increase in load of 8 % is possible (see "Load Characteristics").





Load characteristics: Permissible transformer permanent load in relation to the ambient temperature and the installation height

Short-time rating $P_{shortt.}$ of control transformers – the characteristic variable for the dynamic capacity

The most important selection criterion for control transformers is their short-time rating $P_{shortt.}$.

This is required for switching on electromagnetic loads, e. g. contactors with high making current in relation to the holding current. According to EN 61558-2-2 "Special requirements for control transformers" the output voltage with this load should not drop more than 5 % in relation to the rated voltage in order to ensure safe switching.

Depending on their application, control transformers 4AP and 4AU ≤ 16 kVA are optimized for high short-time ratings with comparatively low ratings and thus small size.

General data

Low inrush current – primary-side short-circuit and overload protection with standard circuit breakers

4AP and 4AU three-phase transformers in the performance range ≤ 16 kVA are matched to protective devices that reliably protect the transformers in the event of short-circuits or overloads.

Standard 3RV and 3VF circuit breakers offer optimum protection. This way, the transformers are protected on the primary side against both short-circuits and overload, without the possibility of false tripping on startup. The low inrush current, the short-circuit current and the thermal load capacity on overload are matched to the tripping characteristics of the circuit breakers.

It is also possible to protect the transformers on the secondary side against short-circuits and overloads with circuit breakers or miniature circuit breakers with C characteristics.

Note:
The specified primary-side circuit breakers are for protecting the primary side of transformers in the event of short-circuits and overload on the secondary side. In the event of a possible short-circuit on the feeder lines between the protective device and the primary side of the transformer, the rated short-circuit breaking capacity of the circuit breaker must be taken into account with regard to the maximum possible prospective short-circuit current at the place of installation. For these device assignments, see the tables in the "Technical specifications".

Design

All 4AP and 4AU three-phase transformers are supplied for screw fixing on a mounting plate.

Terminals

The 4AP transformers up to a rated current of 60 A and the 4AU transformers up to a rated current of 43 A in the standard version are supplied with screw terminals.

For higher currents, the transformers are supplied with flat connectors or with threaded bolts.

Enclosure mounting

4AP and 4AU transformers are also available in protective enclosures of the degree of protection IP23 and IP54.

Required specifications for requests and orders for 4AP and 4AU transformers with selectable voltages

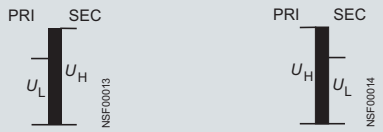
Rated power P_n (output division with separate SEC windings, $P_n = P_1 + P_2$, throughput rating = load rating for autotransformers), PRI and SEC voltages, frequency, vector group, degree of protection (power reduction with degrees of protection other than IP00), Order No. stem.

The Order No. stem is added to the Order No. for delivery.

Example:

Three-phase transformer with selectable voltages 16 kVA
PRI 415 V ± 5 %, SEC 115 V,
frequency 50 Hz ... 60 Hz,
degree of protection IP00,
shield winding,
Order No. stem 4AU39 3.

4AP and 4AU autotransformers: determine the type rating $P_{n\ req.}$



$$P_{n\ req.} = P_{n\ load} \cdot \frac{U_H - U_L}{U_H}$$

(the single-phase example also applies for three-phase autotransformers)

Step-up transformer (left) and step-down transformer (right)

Technical specifications

Transformers	Type	**4AP**	**4AU**
• Version		3UI core	3UI core
• Performance range (with IP00)	kVA	0.16 ... 5	> 5 ... 16
• Approvals		cULus	
Voltage range	V	≤ 690	
• Approvals for USA, Canada	V	≤ 600	
Rated frequency	Hz	50 ... 60	
Thermal class		B	H
• Acc. to UL/CSA		Class 130	Class 180
Ambient conditions		Protection against harmful ambient conditions: complete impregnation in polyester resin Climate-proof for installation in rooms with an external climate to DIN 50010	
Rated ambient temperature			
• At rated power	°C	40	55
• Maximum value (after power reduction depending on load characteristics, see "Design")	°C	80	
• Minimum value	°C	– 25	
Relative air humidity			
• Mean value up to	%	80	
• Maximum value for 30 days/year	%	95	
• At 40 °C occasionally	%	100	
Protection class		I	
Degree of protection			
• Without enclosure		IP00	
• With protective enclosure (acc. to "Selection and ordering data", see Catalog LV 1)		IP23 or IP54	
• Version		IP23, IP54: sheet-steel enclosure coated with epoxy resin, color gray RAL 7032	
Installation height		Up to 1000 m above sea level (above this, power reduction is necessary)	
Protective devices			
• External		The transformers can be protected against short-circuits and overload on the primary and secondary side with circuit breakers. For reliable protection against short-circuits, overload and touch, the cables between the output terminals of the transformer and the load must have a negligible line impedance. For more details see DIN VDE 0100 (Erection of low-voltage systems) Part 410, Part 520 (particularly section 525) and Part 600 (similar to IEC 60364-4-41, -5-52 and -6). Assigned protective devices (see "Primary-side short-circuit and overload protection with motor starter protectors")	
Connection methods		The permissible conductor cross-sections are assigned to the specified terminal types.	
• Terminal arrangement (see "Schematics")		Refer to DIN VDE 0298-4 and EN 60204 for the permissible conductor cross-sections for the specified current according to the installation type. The terminals used are finger-safe according to EN 50274.	
• For terminal versions and connectable cross-sections (see "Project planning aids")		Other terminal sizes than standard versions on request.	
Mounting position		The permissible mounting position for each version is shown in the "Project planning aids".	

Further technical specifications can be found on the Internet at http://www.siemens.com/sirius-supplying.

General data

Rated outputs at different ambient temperatures

- With electrically isolated windings
- Degree of protection IP00
- According to EN 61558, cULus

Transformers	Rated power P_n	Permissible transformer load depending on the ambient temperature t_a of							
		60 °C	55 °C	50 °C	45 °C	40 °C	35 °C	30 °C	25 °C
Type	kVA	kVA	kVA	kVA	kVA	kVA	kVA	kVA	kVA
4AP transformers									
4AP17 4	0.16	0.134	0.141	0.147	0.154	0.160	0.166	0.173	0.178
4AP18 4	0.25	0.210	0.220	0.230	0.240	0.250	0.260	0.270	0.278
4AP19 4	0.4	0.336	0.352	0.368	0.384	0.400	0.416	0.432	0.444
4AP20 4	0.63	0.529	0.554	0.580	0.605	0.630	0.655	0.680	0.699
4AP21 4	1	0.840	0.880	0.920	0.960	1	1.04	1.08	1.11
4AP25 4	1.6	1.34	1.41	1.47	1.54	1.60	1.66	1.73	1.78
4AP27 4	2.5	2.10	2.20	2.30	2.40	2.50	2.60	2.70	2.78
4AP30 4	4	3.36	3.52	3.68	3.84	4	4.16	4.32	4.44
4AP30 5	5	4.20	4.40	4.60	4.80	5.50	5.20	5.40	5.55
4AU transformers									
4AU30 3	6.3	6.11	6.30	6.49	6.68	6.93	7.12	7.31	7.50
4AU36 1	8	7.76	8	8.24	8.48	8.80	9.04	9.28	9.52
4AU36 3	10	9.70	10	10.3	10.6	11	11.3	11.6	11.9
4AU39 1	12.5	12.1	12.5	12.9	13.3	13.8	14.1	14.5	14.9
4AU39 3	16	15.5	16	16.5	17	17.6	18.1	18.6	19

Operation characteristics

- According to EN 61558-2-6, EN 61558-2-4, EN 61558-2-1

Transformers	Rated power P_n 50 Hz ... 60 Hz 1000 m above sea level Degree of protection IP00	Core size	Voltage rise in no-load operation (operating temperature) u_A approx.	Voltage drop on rated load[1] u_R approx.	Short-circuit voltage[1] u_Z approx.	Degree of efficiency η approx.
Type	kVA		%	%	%	%
4AP transformers: t_a = 40 °C/B						
4AP17 4	0.16	3UI 60/30	13.3	10.1	10.1	85
4AP18 4	0.25	3UI 75/25	11.7	8.9	9	87
4AP19 4	0.4	3UI 75/40	11.8	8.5	8.5	87
4AP20 4	0.63	3UI 90/30	9.3	6.8	6.8	89
4AP21 4	1	3UI 90/50	6.4	4.8	4.8	92
4AP25 4	1.6	3UI 114/62	4.9	3.6	3.6	93
4AP27 4	2.5	3UI 132/70	4.5	3.4	3.4	94
4AP30 4	4	3UI 150/75	3.5	2.6	2.7	95
4AP30 5	5	3UI 150/75	2.8	2.1	2.2	96
4AU transformers: t_a = 55 °C/H						
4AU30 3	6.3	3UI 150/75	3.8	2.6	2.6	96
4AU36 1	8	3UI 180/75	5.1	3.6	3.6	94
4AU36 3	10	3UI 180/75	4.1	2.9	3	95
4AU39 1	12.5	3UI 210/70	4.1	2.9	3.1	95
4AU39 3	16	3UI 210/70	3.2	2.3	2.8	96

Higher ratings and other conditions on request.

Calculation of power loss P_V

$$P_V = \frac{P_n\,(100 - \eta)}{\eta}\ \text{[kW]}$$

1) Winding reference temperature: 20 °C.

Primary-side short-circuit and overload protection with motor starter protectors

Trans-formers	Rated power P_n	Motor starter protector version: Motor protection	Rated input voltage U_{1N} in V																
Type	kVA	Type	520	500	480	460	440	420	400	380	360	300	288	277	265	254	242	230	220	208
4AP transformers																				
4AP17 4	0.16	3RV10 11-□□□10	0DA	0DA	0EA	0EA	0EA	0EA	0EA	0EA	0FA	0GA	0GA	0GA	0HA	0HA	0HA	0HA	0HA	0HA
		Set value in A	0.26	0.26	0.29	0.29	0.29	0.31	0.32	0.34	0.4	0.48	0.52	0.54	0.55	0.55	0.56	0.56	0.58	0.62
4AP18 4	0.25	3RV10 11-□□□10	0FA	0FA	0FA	0FA	0FA	0GA	0GA	0GA	0HA	0JA	0JA	0JA	0JA	0KA	0KA	0KA	0KA	0KA
		Set value in A	0.4	0.4	0.44	0.44	0.44	0.47	0.49	0.51	0.6	0.75	0.75	0.8	0.85	0.9	0.9	0.9	0.9	0.94
4AP19 4	0.4	3RV10 11-□□□10	0HA	0HA	0JA	0JA	0JA	0JA	0JA	0JA	0KA	1AA	1AA	1AA	1AA	1BA	1BA	1BA	1BA	1BA
		Set value in A	0.62	0.62	0.7	0.7	0.71	0.75	0.78	0.82	1	1.2	1.2	1.3	1.3	1.4	1.4	1.4	1.4	1.5
4AP20 4	0.63	3RV10 11-□□□10	0KA	0KA	1AA	1AA	1AA	1AA	1AA	1AA	1BA	1CA	1CA	1CA	1CA	1CA	1DA	1DA	1DA	1DA
		Set value in A	0.95	0.95	1.1	1.1	1.1	1.2	1.2	1.3	1.5	1.8	1.9	2	2	2	2.2	2.2	2.2	2.3
4AP21 4	1	3RV10 11-□□□10	1BA	1BA	1CA	1CA	1CA	1CA	1CA	1CA	1DA	1EA	1EA	1EA	1EA	1EA	1EA	1EA	1FA	1FA
		Set value in A	1.5	1.5	1.7	1.8	1.8	1.8	2	2	2.3	2.8	2.9	3.1	3.2	3.2	3.2	3.2	3.5	3.5
4AP25 4	1.6	3RV10 11-□□□10	1DA	1DA	1EA	1EA	1EA	1EA	1EA	1FA	1FA	1GA	1GA	1GA	1GA	1GA	1HA	1HA	1HA	1HA
		Set value in A	2.3	2.3	2.8	2.8	2.8	2.8	3	3.5	3.5	4.5	4.5	4.9	5	5	5.5	5.5	5.5	5.6
4AP27 4	2.5	3RV10 11-□□□10	1FA	1FA	1FA	1GA	1GA	1GA	1GA	1HA	1HA	1JA	1JA	1JA	1JA	1JA	1JA	1JA	1KA	1KA
		Set value in A	3.6	3.6	4	4.5	4.5	4.5	4.5	5.8	5.8	7	7	7.5	7.5	8	8	8	9	9
4AP30 4	4	3RV10 11-□□□10	1HA	1HA	1HA	1JA	1JA	1JA	1JA	1JA	1KA	--	--	--	--	--	--	--	--	--
		3RV10 21-□□□10	--	--	--	--	--	--	--	--	--	4AA	4AA	4AA	4AA	4AA	4AA	4BA	4BA	4BA
		Set value in A	5.7	5.7	6	7	7	7	7.2	8	9	11	11	12	12	13	13	14	14	14
4AP30 5	5	3RV10 11-□□□10	1JA	1JA	1JA	1KA	1KA	1KA	--	--	--	--	--	--	--	--	--	--	--	--
		3RV10 21-□□□10	--	--	--	--	--	--	1KA	4AA	4AA	4AA	4BA	4BA	4BA	4BA	4CA	4CA	4CA	4CA
		Set value in A	7.2	7.2	8	9	9	9	9	11	11	13	14	15	15	16	17	17	17	17
4AU transformers																				
4AU30 3	6.3	3RV10 11-□□□10	1KA	1KA	1KA	1KA	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		3RV10 21-□□□10	--	--	--	--	1KA	4AA	4AA	4AA	4AA	4BA	4BA	4BA	4CA	4CA	4CA	4DA	4DA	4DA
		Set value in A	9	9	10	10	10	11	11	12	13	15	16	16	17	18	19	20	20	22
4AU36 1	8	3RV10 21-□□□10	4AA	4AA	4AA	4AA	4AA	4BA	4BA	4BA	4BA	4CA	4CA	4CA	4DA	4DA	4DA	--	--	--
		3RV10 31-□□□10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4EA	4EA	4EA
		Set value in A	12	12	13	13	13	14	15	15	16	20	20	21	22	23	24	25	26	28
4AU36 3	10	3RV10 21-□□□10	4BA	4BA	4BA	4BA	4CA	4CA	4CA	4CA	4CA	4DA	4DA	--	--	--	--	--	--	--
		3RV10 31-□□□10	--	--	--	--	--	--	--	--	--	--	--	4EA	4EA	4FA	4FA	4FA	4FA	4FA
		Set value in A	15	15	16	16	17	17	18	19	20	25	25	26	27	28	30	31	32	34
4AU39 1	12.5	3RV10 21-□□□10	4CA	4CA	4CA	4CA	4DA	4DA	4DA	4DA	4DA	--	--	--	--	--	--	--	--	--
		3RV10 31-□□□10	--	--	--	--	--	--	--	--	--	4FA	4FA	4FA	4FA	4FA	4FA	4FA	4FA	4GA
		Set value in A	9	19	20	20	20	22	22	23	25	30	31	32	34	35	37	39	40	43
4AU39 3	16	3RV10 21-□□□10	4DA	4DA	4DA	4DA	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		3RV10 31-□□□10	--	--	--	--	4EA	4FA	4FA	4FA	4FA	4FA	4FA	4FA	4HA	4HA	4HA	4HA	4HA	4HA
		Set value in A	24	24	25	25	26	28	28	30	31	38	39	40	43	44	47	49	50	50

General data

Secondary-side short-circuit and overload protection with motor starter protector or miniature circuit breaker[1)]

Transformers	Rated power P_n	Motor starter protectors		
		Version: Motor protection	Rated output voltage U_{2N} in V	
Type	kVA	Type	400	230
4AP transformers				
4AP17 4	0.16	3RV10 11-□□□10 Set value in A	0DA 0.27	0FA 0.5
4AP18 4	0.25	3RV10 11-□□□10 Set value in A	0FA 0.42	0HA 0.75
4AP19 4	0.4	3RV10 11-□□□10 Set value in A	0HA 0.7	0KA 1.2
4AP20 4	0.63	3RV10 11-□□□10 Set value in A	0KA 1.1	1BA 1.9
4AP21 4	1	3RV10 11-□□□10 Set value in A	1BA 1.7	1DA 3
4AP25 4	1.6	3RV10 11-□□□10 Set value in A	1DA 2.7	1FA 5
4AP27 4	2.5	3RV10 11-□□□10 Set value in A	1FA 4.2	1HA 7.5
4AP30 4	4	3RV10 11-□□□10 Set value in A	1HA 6.7	1KA 12
4AP30 5	5	3RV10 11-□□□10 3RV10 21-□□□10 Set value in A	1JA -- 8.5	-- 4AA 15
4AU transformers				
4AU30 3	6.3	3RV10 11-□□□10 3RV10 21-□□□10 Set value in A	1KA -- 11	-- 4BA 19
4AU36 1	8	3RV10 21-□□□10 Set value in A	4AA 14	4DA 24
4AU36 3	10	3RV10 21-□□□10 3RV10 31-□□□10 Set value in A	4BA -- 17	-- 4EA 29
4AU39 1	12.5	3RV10 21-□□□10 3RV10 31-□□□10 Set value in A	4CA -- 21	-- 4FA 37
4AU39 3	16	3RV10 31-□□□10 Set value in A	4EA 27	4HA 47

1) Miniature circuit breaker on request.

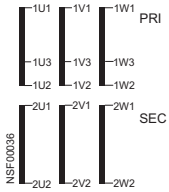
Short-time rating of control transformers $P_{shortt.}$[1)] = f (p.f.) for $U_2 = 0.95 \times U_{2N}$

Trans-formers	Rated power P_n	Short-time rating $P_{shortt.}$[1)] with p.f. of										Voltage rise in no-load operation (operating temperature)	Voltage drop on rated load (at 20 °C)	Short-circuit voltage (at 20 °C)
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1			
Type	kVA	kVA	kVA	kVA	kVA	kVA	kVA	kVA	kVA	kVA	kVA	u_A %	u_R %	u_Z %
4AP transformers														
4AP20 4	0.63	4.5	3.3	2.6	2.1	1.8	1.6	1.4	1.3	1.2	1.1	9.3	6.8	6.8
4AP21 4	1	9.3	6.5	5	4.1	3.5	3	2.7	2.4	2.2	2.1	6.4	4.8	4.8
4AP25 4	1.6	21	14	10	8.3	6.9	5.9	5.2	4.7	4.2	3.9	4.9	3.6	3.6
4AP27 4	2.5	37	24	17	14	11	9.9	8.7	7.8	7	6.5	4.5	3.4	3.4
4AP30 4	4	60	40	30	24	20	18	16	14	13	12	3.5	2.6	2.7
4AP30 5	5	53	41	34	29	25	22	20	19	18	17	2.8	2.1	2.2
4AU transformers														
4AU30 3	6.3	64.5	48.5	39	32.5	28	25	22.5	20.5	19	18.5	3.5	2.6	2.6
4AU36 1	8	83	58.5	45	37	31.5	27.5	24	22	20	19	5.1	3.6	3.6
4AU36 3	10	80.5	63	52	44	39	35	31.5	29	27.5	27	4.1	2.9	3
4AU39 1	12.5	104	80.5	66	56	49	44	39.5	36	34.5	34	4.1	2.9	3.1
4AU39 3	16	85	74	66	60	55	51.5	48.5	46.5	46	51	3.2	2.3	2.8

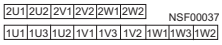
1) $P_{shortt.}$ applies to up to 300 contactor operations per hour.

Schematics

In two-voltage version

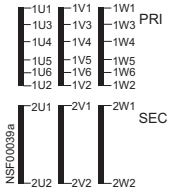
Circuit diagrams and terminal assignments	Rated input voltage U_{1N} V	Rated output voltage U_{2N} V	Connections and links: Rated voltage V	Terminals	Links[1]
 Vector group IIIiii0	Y 500-400 / Δ 289-230	Y 400/ Δ 230	**Primary**		
			500 400	1U1-1V1-1W1	1U2-1V2-1W2 1U3-1V3-1W3
			289		1U1-1W2, 1V1-1U2, 1W1-1V2
			230		1U1-1W3, 1V1-1U3, 1W1-1V3
			Secondary		
			400 230	2U1-2V1-2W1 2U1-2V1-2W1	2U2-2V2-2W2 2U1-2W2, 2V1-2U2, 2W1-2V2

4AP17 to 4AP30

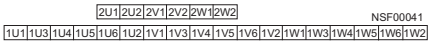


4AU30 to 4AU39

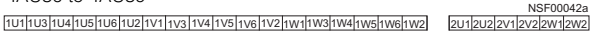
Multi-voltage version

Circuit diagrams and terminal assignments	Rated input voltage U_{1N} V	Rated output voltage U_{2N} V	Connections and links: Rated voltage V	Terminals	Links[1]
 Vector group IIIiii0	Y 520-500-480-460-440-420-400-380-360/ Δ 300-289-277-266-254-240-230-220-208	Y 400/ Δ 230	**Primary**		
			520 500 480 460 440 420 400 380 360	1U1-1V1-1W1 1U1-1V1-1W1 1U1-1V1-1W1 1U3-1V3-1W3 1U3-1V3-1W3 1U3-1V3-1W3 1U4-1V4-1W4 1U4-1V4-1W4 1U4-1V4-1W4	1U2-1V2-1W2 1U6-1V6-1W6 1U5-1V5-1W5 1U2-1V2-1W2 1U6-1V6-1W6 1U5-1V5-1W5 1U2-1V2-1W2 1U6-1V6-1W6 1U5-1V5-1W5
			300 289 277 266 254 240 230 220 208	1U1-1V1-1W1 1U1-1V1-1W1 1U1-1V1-1W1 1U3-1V3-1W3 1U3-1V3-1W3 1U3-1V3-1W3 1U4-1V4-1W4 1U4-1V4-1W4 1U4-1V4-1W4	1U2-1V1, 1V2-1W1, 1W2-1U1 1U6-1V1, 1V6-1W1, 1W6-1U1 1U5-1V1, 1V5-1W1, 1W5-1U1 1U2-1V3, 1V2-1W3, 1W2-1U3 1U6-1V3, 1V6-1W3, 1W6-1U3 1U5-1V3, 1V5-1W3, 1W5-1U3 1U2-1V4, 1V2-1W4, 1W2-1U4 1U6-1V4, 1V6-1W4, 1W6-1U4 1U5-1V4, 1V5-1W4, 1W5-1U4
			Secondary		
			400 230	2U1-2V1-2W1 2U1-2V1-2W1	2U2-2V2-2W2 2U2-2V1, 2V2-2W1, 2W2-2U1

4AP20 to 4AP30



4AU30 to 4AU39



1) Y/Δ disconnecting links are not included in the scope of supply.

General data

Overview

4BU.. transformers

With the right transformer, the right voltage will be available at any conditions.

Our transformers are the right choice for each application: They work reliably, safely and worldwide under a wide range of different conditions.

4BU three-phase power transformers

- Are available as matching transformers with one input/output voltage according to DIN VDE 0532-6
- And can be configured as matching, auto- or converter transformers according to DIN VDE 0532-6 with selectable input and output voltages.

Our transformers provide optimal protection through high permissible ambient temperatures of up to 40 °C or 55 °C.

Design

Standards

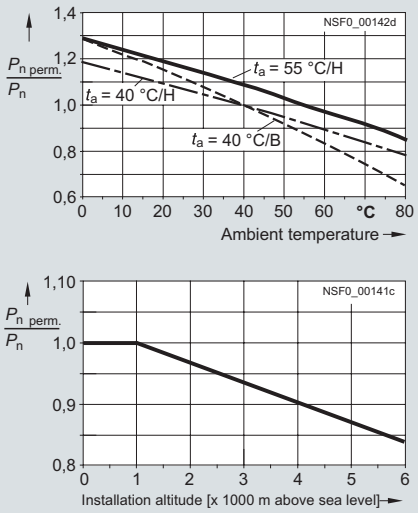
DIN VDE 0532-6

Rated power P_n at high ambient temperature – the characteristic for thermal load capacity

Reference conditions under which the transformers have the rated power P_n stated in the selection tables:

- Uninterrupted duty P_n
- Frequency AC 50 Hz ... 60 Hz
- Degree of protection IP00
- Installation height up to 1000 m above sea level and
- Ambient temperature t_a, type-dependent 40 °C or 55 °C.

Other installation and operating conditions than this will affect the permissible permanent load capacity. In case of the 4BU transformers, for example, with a low ambient temperature of 40 °C instead of 55 °C, an increase in load of 8 % is possible (see "Load Characteristics").



Load characteristics: permissible transformer permanent load in relation to the ambient temperature and the installation height

Design

All 4BU three-phase power transformers are supplied for screw fixing on a mounting plate.

Terminals

The 4BU transformers are supplied for rated currents up to 81 A in the standard version with screw terminals.

For higher currents, the transformers are supplied with flat connectors or with threaded bolts.

Enclosure mounting

4BU transformers are also available in protective enclosures with degree of protection IP20 and IP23.

Required specifications for requests and orders for 4BU transformers with selectable voltages

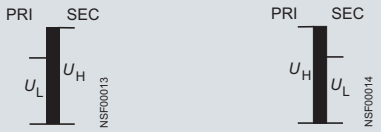
Rated power P_n (output division with separate SEC windings, $P_n = P_1 + P_2$, throughput rating = load rating for autotransformers), PRI and SEC voltages, frequency, vector group, degree of protection (power reduction with degrees of protection other than IP00), Order No. stem.

The Order No. stem is added to the Order No. for delivery.

Example:

Three-phase power transformer 180 kVA
PRI 415 V ± 5 %, SEC 115 V,
frequency 50 Hz ... 60 Hz,
degree of protection IP00, shield winding,
Order No. stem 4BU60 32 (without UL), 4BU60 33 (with cULus)

4BU autotransformers: determine the type rating $P_{n\,req.}$



$$P_{n\,req.} = P_{n\,load} \cdot \frac{U_H - U_L}{U_H}$$

(the single-phase example also applies for three-phase autotransformers)

Step-up transformer (left) and step-down transformer (right)

Thermistor transformer protection for 4BU power transformers

The windings of the power transformers can be protected from impermissible overheating by means of thermistor transformer protection. PTC thermistors are used which are wound into each shank of the transformer and connected in series. The rated response temperature is slightly above the limit temperature for uninterrupted duty.

Possible versions:

- Warning
- Disconnection
- Warning and disconnection

The connections for the temperature sensor are routed to terminals, two terminals each for warning and disconnection.

The 3RN tripping units are not included in the transformer scope of supply, for the relevant selection and ordering data see Catalog LV 1, Chapter 7 "Monitoring and Control Devices" –> "Monitoring Relays" –> "Thermistor Motor Protection".

Technical specifications

Transformers	Type	**4BU**
• Version		3UI core
• Performance range (with IP00)	kVA	> 16 ... 400 (up to 2000 kVA on request)
• Approvals		cULus optional
Voltage range	V	≤ 1000 (up to 3.6 kV on request)
• Approvals for USA, Canada	V	≤ 600
Rated frequency	Hz	50 ... 60
Thermal class		H
• Acc. to UL/CSA		Class 180
Ambient conditions		Protection against harmful ambient conditions: complete impregnation in polyester resin Climate-proof for installation in rooms with an external climate to DIN 50010
Rated ambient temperature		
• At rated power	°C	40 and optionally 55
• Maximum value (after power reduction depending on load characteristics, see "Design")	°C	80
• Minimum value	°C	–25
Relative air humidity		
• Mean value up to	%	80
• Maximum value for 30 days/year	%	95
• At 40 °C occasionally	%	100
Protection class		I
Degree of protection		
• Without protective enclosure		IP00
• With protective enclosure (acc. to "Selection and ordering data", see Catalog LV 1)		IP20 or IP23
• Version		IP20, IP23: sheet-steel enclosure coated with epoxy resin, color gray RAL 7032
Installation height		Up to 1000 m above sea level (above this, power reduction is necessary)
Protective devices		
• Internal		Can be designed with thermistor transformer protection for warning or disconnection or warning and disconnection, see "Design"
• External		The transformers can be protected against short-circuits and overload on the primary or secondary side with circuit breakers. For reliable protection against short-circuits and touch, the cables between the output terminals of the transformer and the load must have a negligible line impedance. For more details see DIN VDE 0100 (Erection of low-voltage systems) Part 410, Part 520 (particularly section 525) and part 600. On request
Connection methods		The permissible conductor cross-sections are assigned to the specified terminal types.
• Terminal arrangement		Refer to DIN VDE 0298-4 and EN 60204 for the permissible conductor cross-sections for the specified current according to the installation type. The terminals used are finger-safe according to EN 50274.
• For terminal versions and connectable cross-sections (see "Project planning aids")		Other terminal sizes than standard versions on request.
Mounting position		The permissible mounting position for each version is shown in the "Project planning aids".

Selecting the fuses:

Short-circuit protection on the primary or secondary side using DIAZED or LV HRC fuses with characteristic gL/gG for 4BU43 to 4BU65 power transformers in the performance range from 18 kVA to 400 kVA.

Determining the fuse size:

$$\text{Rated current} \quad \frac{\text{Rated power}}{\text{Rated voltage}}$$

Minimum fuse current = Rated current x 1.2
Maximum fuse current = Rated current x 1.5

Example:

4BU56 power transformer,
degree of protection IP00,
rated power P_n = 100 kVA,
rated voltage U_{1N} = 400 V,
rated current I_n = ?

$$I_n = \frac{P_n}{U_{1N}} = \frac{100000\ \text{VA}}{400\ \text{V}} = 250\ \text{A}$$

Minimum fuse current = 144.3 A x 1.2 = 173 A
Maximum fuse current = 144.3 A x 1.5 = 216 A

Selected fuse size: 200 A

Further technical specifications can be found on the Internet at http://www.siemens.com/sirius-supplying.

General data

Operation characteristics

- According to DIN VDE 0532-6
- t_a = 40 °C/H

Transformers Type	Rated power P_n 50 Hz ... 60 Hz 1000 m above sea level Degree of protection IP00 kVA	Core size	Voltage rise in no-load operation (operating temperature) u_A approx. %	Voltage drop on rated load[1] u_R approx. %	Short-circuit voltage[1] u_Z approx. %	Degree of efficiency η approx. %
			4BU.. .2/4BU.. .3[2]	4BU.. .2/4BU.. .3[2]	4BU.. .2/4BU.. .3[2]	4BU.. .2/4BU.. .3[2]
4BU43 3.	18	3UI 230/80	4.2/4.0	3.9/3.7	4.0/3.8	95
4BU43 4.	20	3UI 230/80	3.8/3.6	3.5/3.4	3.7/3.5	96
4BU43 5.	22.5	3UI 230/80	3.4/3.2	3.1/3.0	3.4	96
4BU45 3.	25	3UI 230/107	3.3/3.1	3.0/2.9	3.1/3.0	96
4BU45 4.	28	3UI 230/107	2.9/2.8	2.7/2.6	2.9/2.8	96
4BU47 3.	31.5	3UI 230/137	2.7/2.6	2.5/2.4	2.6/2.5	96/97
4BU47 4.	35.5	3UI 230/137	2.4/2.3	2.2	2.4/2.3	97
4BU47 5.	40	3UI 230/137	2.1/2.0	2.0/1.9	2.3/2.2	97
4BU52 3.	45	3UIS 220/120	3.4/3.2	3.1/3.0	3.9/3.8	96
4BU53 3.	50	3UIS 220/135	3.1/2.9	2.8/2.7	3.5	96/97
4BU53 4.	56	3UIS 220/135	2.7/2.6	2.5/2.4	3.6/3.5	97
4BU54 3.	63	3UIS 305/125	4.0/3.9	3.7/3.6	4.3/4.2	95/96
4BU54 4.	71	3UIS 305/125	3.6/3.4	3.3/3.2	4.2	96
4BU55 3.	80	3UIS 305/140	3.3/3.1	3.0/2.9	3.9	96
4BU56 3.	91	3UIS 305/160	3.0/2.9	2.8/2.7	3.6	96/97
4BU56 4.	100	3UIS 305/160	2.7/2.6	2.5	3.7	97
4BU58 3.	112	3UIS 395/150	4.4/4.2	4.0/3.9	4.9/4.8	95
4BU58 4.	125	3UIS 395/150	3.9/3.8	3.6/3.5	4.9/4.8	96
4BU58 5.	140	3UIS 395/150	3.5/3.4	3.2/3.1	5.1/5.0	96
4BU59 3.	160	3UIS 395/170	3.2/3.1	3.0/2.9	4.7	96
4BU60 3.	180	3UIS 395/195	3.0/2.9	2.8/2.7	4.3/4.2	97
4BU62 3.	200	3UIS 455/175	2.8/2.6	2.6/2.5	3.8/3.7	97
4BU62 4.	225	3UIS 455/175	2.4/2.3	2.3/2.2	4.0	97
4BU62 5.	250	3UIS 455/175	2.2/2.1	2.1/2.0	4.5	97
4BU63 3.	280	3UIS 455/200	2.1/2.0	1.9	4.0/4.5	97/98
4BU63 4.	315	3UIS 455/200	1.8/1.7	1.7	4.7	98
4BU64 3.	355	3UIS 455/230	1.7/1.6	1.6/1.5	4.2/4.3	98
4BU65 3.	400	3UIS 455/260	1.6/1.5	1.5/1.4	4.0/4.3	98

Higher ratings and other conditions on request.

Calculation of power loss P_V

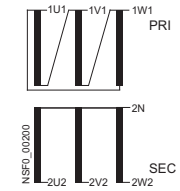
$$P_V = \frac{P_n\,(100 - \eta)}{\eta}\ \text{[kW]}$$

1) Winding reference temperature: 115 °C.

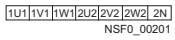
2) 4BU.. .2 without **cULus** approval; 4BU.. .3 with **cULus** approval.

Schematics

Vector group Dyn5



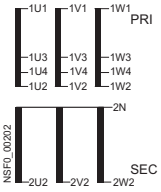
Up to 81 A: terminals



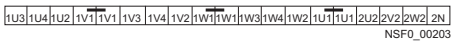
> 81 A flat connectors, see "Project planning aids".

Rated input voltage U_{1N} V	Rated output voltage U_{2N} V	Connections and links: Rated voltage V	Terminals	Links
		Primary		
Δ 480		480	1U1-1V1-1W1	--
Δ 440		440	1U1-1V1-1W1	--
Δ 400		400	1U1-1V1-1W1	--
		Secondary		
	Y 400	400	2U2-2V2-2W2	--
	Y 208	208	2U2-2V2-2W2	--

Vector group Dyn5 ±5 %



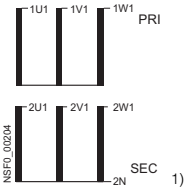
Up to 81 A: terminals



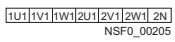
> 81 A flat connectors, see "Project planning aids".

Rated input voltage U_{1N} V	Rated output voltage U_{2N} V	Connections and links: Rated voltage V	Terminals	Links
		Primary		
Δ 504-480-456		504	1U1-1V1-1W1	1U2-1V1; 1V2-1W1; 1W2-1U1
		480		1U4-1V1; 1V4-1W1; 1W4-1U1
		456		1U3-1V1; 1V3-1W1; 1W3-1U1
Δ 462-440-418		462	1U1-1V1-1W1	1U2-1V1; 1V2-1W1; 1W2-1U1
		440		1U4-1V1; 1V4-1W1; 1W4-1U1
		418		1U3-1V1; 1V3-1W1; 1W3-1U1
Δ 420-400-380		420	1U1-1V1-1W1	1U2-1V1; 1V2-1W1; 1W2-1U1
		400		1U4-1V1; 1V4-1W1; 1W4-1U1
		380		1U3-1V1; 1V3-1W1; 1W3-1U1
		Secondary		
	Y 400	400	2U2-2V2-2W2	--
	Y 208	208	2U2-2V2-2W2	--

Vector group Yyn0



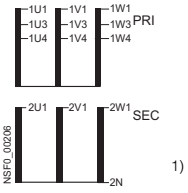
Up to 81 A: terminals



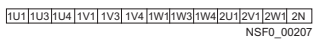
> 81 A flat connectors, see "Project planning aids".

Rated input voltage U_{1N} V	Rated output voltage U_{2N} V	Connections and links: Rated voltage V	Terminals	Links
		Primary		
Y 480		480	1U1-1V1-1W1	--
Y 440		440	1U1-1V1-1W1	--
Y 400		400	1U1-1V1-1W1	--
		Secondary		
	Y 400	400	2U1-2V1-2W1	--
	Y 208	208	2U1-2V1-2W1	--

Vector group Yyn0 ±5 %



Up to 81 A: terminals



> 81 A flat connectors, see "Project planning aids".

Rated input voltage U_{1N} V	Rated output voltage U_{2N} V	Connections and links: Rated voltage V	Terminals	Links
		Primary		
Y 504-480-456		504	1U1-1V1-1W1	--
		480	1U3-1V3-1W3	
		456	1U4-1V4-1W4	
Y 462-440-418		462	1U1-1V1-1W1	--
		440	1U3-1V3-1W3	
		418	1U4-1V4-1W4	
Y 420-400-380		420	1U1-1V1-1W1	--
		400	1U3-1V3-1W3	
		380	1U4-1V4-1W4	
		Secondary		
	Y 400	400	2U1-2V1-2W1	--
	Y 208	208	2U1-2V1-2W1	--

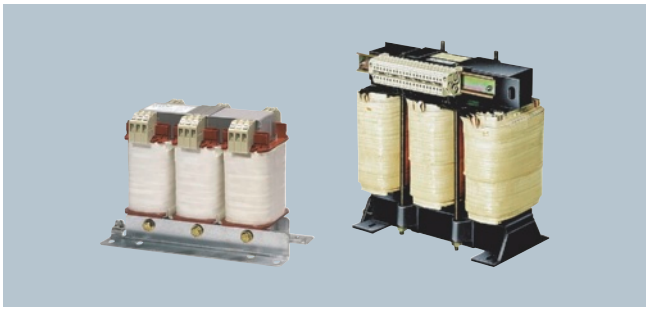
1) Yyn0; according to DIN VDE 0532 single-phase loading is permissible only up to 10 % of the rated current of a phase.

4AP, 4AU Autotransformers

For matching purposes according to EN 61558-2-13

Overview

- Shared input and output windings without electrical isolation
- Enable the voltage matching of electrical loads
- Designed for uninterrupted duty (100 % ON period)
- Vector group YNa0
- 4AP: t_a = 50 °C (T50/B), 4AU: t_a = 55 °C (T55/H)
- c UL us



4AP (left) and 4AU (right)

Technical specifications

Maximum rated output power P_n at different rated input voltages (degree of protection IP00)

With this version of the 4A... .2-8HA20-2XA0 autotransformers, higher ratings than the quoted ratings can be found in the following table depending on the input voltage.

Transformers	Output power P_n at input voltage				
	480 V	460 V	440 V	415 V	380 V
Type	kVA	kVA	kVA	kVA	kVA
4AP21 42-8HA20-2XA0	5	5.8	6.3	6.8	6.8
4AP25 52-8HA20-2XA0	9.1	10.5	11.4	12.3	12.3
4AP27 42-8HA20-2XA0	12.5	14.4	15.6	16.9	15.8
4AP27 52-8HA20-2XA0	16	18.4	20	21.6	20.3
4AP30 52-8HA20-2XA0	22.5	25.9	28.1	30.4	30.4
4AU30 32-8HA20-2XA0	31.5	36.2	39.4	42.5	42.5
4AU36 32-8HA20-2XA0	50	57.5	62.5	59.5	54.5

Primary-side short-circuit and overload protection with motor starter protectors

The otherwise customary consideration of the inrush current plays a subordinate role for an autotransformer. For this reason, it is possible to proceed as follows when selecting the motor starter protectors:

$$I_{1N} = \frac{P_{n\,load}}{U_{1N} \times \sqrt{3}}$$

The motor starter protector resulting for this PRI current I_{1N} can be selected.

Example:

Type 4AP27
Connection PRI U_{1N} = 480 V

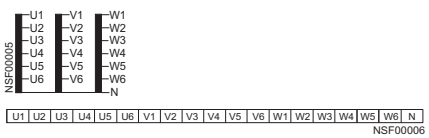
$$I_{1N} = \frac{15000\ \text{VA}}{480\ \text{V} \times \sqrt{3}} \times 1.1 = 19.9\ \text{A}$$

Motor starter protector:
3RV10 21-4CA10
Set value 20 A

For other motor starter protectors see Catalog LV 1, Chapter 5 "Protection Equipment".

Schematics

Circuit diagrams and terminal assignments



Rated voltage U_N for type		Connection
4A□□□ □2-8HA20-2X.0	4A□□□ □2-8JT10-2X.0	
V	V	
480	480	U1-V1-W1
460	460	U2-V2-W2
440	440	U3-V3-W3
415	415	U4-V4-W4
400	400 (380)[1)]	U5-V5-W5
380	230 (220)[1)]	U6-V6-W6

1) Operating with 3 AC 380 V at the input terminals results in an output voltage of 3 AC 220 V.

4FL voltage regulators, transformer type

Overview

4FL

- According to DIN VDE 0552
- Degree of protection IP21
- t_a = 40 °C/E

Design

The transformer-type voltage regulator supplies electrical loads with a constant voltage despite mains variations.

The advantage of a voltage regulator with a variable-ratio transformer is proportional changing of the sinewave, i. e. the voltage regulator is characterized in that the rms value, mean value and the peak value are held at constant ratios.

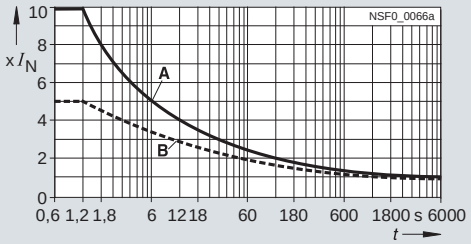
A perfect rms value is required, for example, by loads for which the loading is determined by the thermal limits. Strongly capacitive loads in DC units respond to the mean value. A slightly capacitive load is, however, influenced by the peak value. These factors are, however, only guaranteed for sinusoidal AC voltages and this can only be achieved easily by means of a variable-ratio transformer.

Voltage regulators stabilize the mains voltage U_1 regardless of the frequency and power factor to the rated value of output voltage U_{2N} within the set control accuracy (±1 % of U_{2N}). The correcting time from the upper or lower limit to the rated value is between 1.5 s and 2.5 s. The curve shape of the supplied voltage is not changed.

The output voltage U_2 is compared in the electronic step controller with a set reference voltage. In the event of a deviation in voltage greater than the set response value, the electronic step controller compensates the deviation with an accuracy of ±1 % using a servo motor and adjustable moving contact on the variable-ratio transformer.

Transformer-type voltage regulators:

- Are electrically connected to the network
- Can be overloaded temporarily (see characteristic curve)
- Can be installed in a sheet-steel enclosure to IP21 complete with any additional components
- Have a degree of efficiency of between 95 % and 98 %
- Are not maintenance-free
- For the values for control range and control deviation, see "Selection and ordering data" in Catalog LV 1.
- For symmetrical mains voltage: The voltage deviation is only monitored on one conductor and set for all three conductors.
- For asymmetrical mains voltage: the voltage deviation is monitored on each conductor and set individually for each conductor.
- The neutral conductor 1N must be connected. If no neutral conductor is present on the mains side, a neutral grounding transformer is required (on request).



Overload capability (guide values)

Ambient conditions

4FL transformer-type voltage regulators are climate proof for installation in rooms with an internal climate according to DIN 50010.

Limit values:

- Ambient temperature at
  - Rated power +40 °C,
  - Minimum value –25 °C.
- Relative air humidity
  - At 40 °C up to 85 %,
  - Annual average up to 65 %
  - Condensation not permitted

Short-circuit and overload protection

Transformer-type voltage regulators must be protected with gL/gG fuses on the primary side against damage caused by short-circuits. The fuse rated current must be determined according to the highest primary current (present with the lowest input voltage). Overload and short-circuit protective devices according to the rated load current must be provided on the output side. An overload relay is integrated in the control circuit, the trip contacts (break or make) must be connected on a switch that automatically disconnects the transformer voltage regulator from the network in the event of a fault.

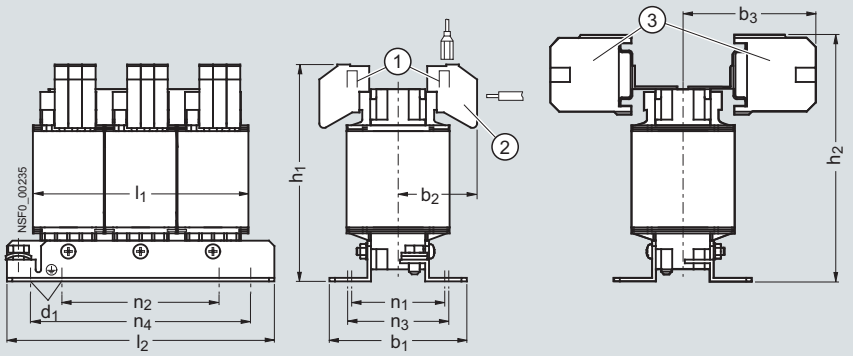
Project planning aids

Dimensional drawings

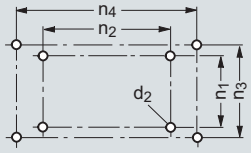
4AP, 4AU safety, isolating, control and mains transformers ≤ 16 kVA

4AP safety, isolating, control and mains transformers and 4AP safety, isolating, control and mains transformers and autotransformers with selectable voltages ≤ 16 kVA

4AP17 to 4AP25
for any mounting position,
fixing dimensions according to EN 60852-4 and DIN 41308-4



Mounting hole



1 Flat connectors DIN 46244-A 6,3-0,8

2 Screw terminal
24 A:
solid 0,5 mm² … 6 mm²,
finely stranded 0,5 mm² … 4 mm²

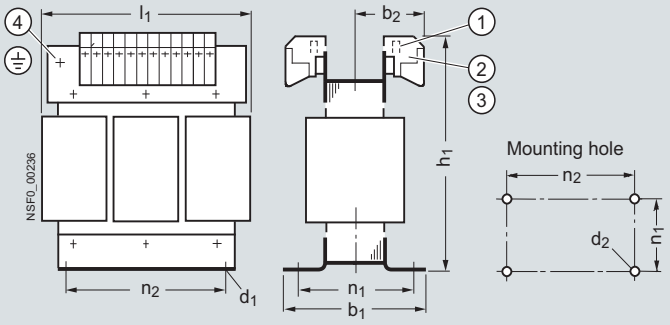
3 Screw terminal
32 A:
solid 0,75 mm² … 10 mm²,
finely stranded 1,5 mm² … 6 mm²
44 A:
solid 1 mm² … 16 mm²,
finely stranded 1 mm² … 10 mm²
60 A:
solid 1 mm² … 16 mm²,
stranded 10 mm² … 25 mm²,
finely stranded 2,5 mm² … 16 mm²
> 60 A:
see flat connectors

Type	Rated power	Design. According to	b_1	b_2 Max.	b_3	d_1	d_2	h_1 Max.	h_2 Max.	l_1	l_2	Mounting according to DIN 41308-4		Mounting according to EN 60852-4		Max. number of terminals per side			
	kVA[1]	DIN 41302										n_1	n_2	n_3	n_4	24 A	32 A	44 A	60 A
4AP17	0,16	3UI 60/30	76	58	76	4,8 x 9	M4	130	143	122	148	47	90	58	136	12	12	6	9
4AP18	0,25	3UI 75/25	73	56	73	5,8 x 11	M5	152	168	156	178	49	113	53	166	15	16	6	12
4AP19	0,4	3UI 75/40	88	64	81	5,8 x 11	M5	152	168	156	178	64	113	68	166	15	16	6	12
4AP20	0,63	3UI 90/30	99	59	76	7 x 12	M6	172	193	182	219	56	136	69	201	21	19	12	15
4AP21	1	3UI 90/50	119	69	86	7 x 12	M6	172	193	182	219	76	136	89	201	21	19	12	15
4AP25	1,6	3UI 114/62	131	76	92	7 x 12	M6	208	234	229	267	94	176	102	249	27	22	18	19

[1] The rated power is only applicable to transformers with separate windings (not to autotransformers).

4AP, 4AU safety, isolating, control and mains transformers ≤ 16 kVA (continued)

4AP27 and 4AP30
for any mounting position



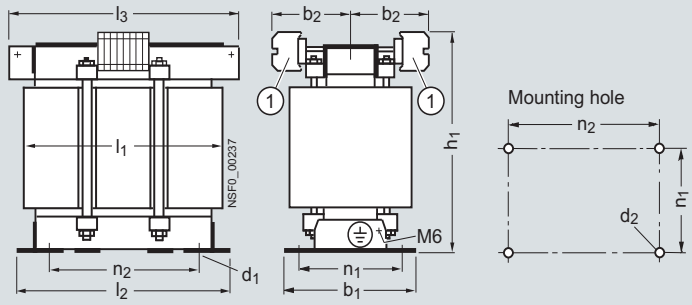
1 Flat connectors DIN 46244-A 6,3-0,8
2 Screw terminal
24 A:
solid 0,5 mm² … 6 mm²,
finely stranded 0,5 mm² … 4 mm²
3 Screw terminal
32 A:
solid 0,75 mm² … 10 mm²,
finely stranded 1,5 mm² … 6 mm²
60 A:
solid 1 mm² … 16 mm²,
stranded 10 mm² … 25 mm²,
finely stranded 2,5 mm² … 16 mm²
> 60 A:
see flat connectors
4 Grounding screw M6

Type	Rated power kVA[1]	Designation according to DIN 41302	b_1	b_2 Max.	d_1	d_2	h_1 Max.	l_1	Mounting according to DIN 41308 n_1	Mounting according to DIN 41308 n_2	Max. number of terminals per side 24 A	32 A	60 A
4AP27	2,5	3UI 132/70	133	103	10 x 18	M8	242	264	101	200	27	21	15
4AP30	4; 5	3UI 150/75	148	105	10 x 18	M8	271	300	118	224	27	21	15

1) The rated power is only applicable to transformers with separate windings (not to autotransformers).

4AU safety, isolating, control and mains transformers and
4AU safety, isolating, control and mains transformers and autotransformers with selectable voltages≤16 kVA

4AU30 to 4AU39
for any mounting position



1 Screw terminal:
18 A:
solid 0,5 mm² … 6 mm²,
finely stranded 1,5 mm² … 4 mm²
23 A:
solid 0,75 mm² … 10 mm²,
finely stranded 1,5 mm² … 6 mm²
43 A:
solid 1 mm² … 16 mm²,
stranded 10 mm² … 25 mm²,
finely stranded 2,5 mm² … 16 mm²
81 A:
solid or stranded 4 mm² … 16 mm²
> 81 A:
see flat-type and threaded pin terminals

Permissible permanent load for 4AU36 and 4AU39 for arrangement on vertical surfaces:
0,95 · P_n at t_a = 55 °C
P_n at t_a = 45 °C

Type	Rated power kVA[1]	Designation according to DIN 41302	b_1	b_2	d_1	d_2	h_1	l_1	l_2	l_3	n_1	n_2	Max. number of terminals per side 18 A	23 A	43 A	81 A
4AU30	6,3	3UI 150/75	155	129	10 x 18	M8	270	300	264	310	118	224	35	31	23	14
4AU36	8; 10	3UI 180/75	169	134	10 x 18	M8	320	360	314	360	138	264	43	38	28	17
4AU39	12,5; 16	3UI 210/70	174	131	12 x 18	M10	370	420	366	410	141	316	50	45	33	20

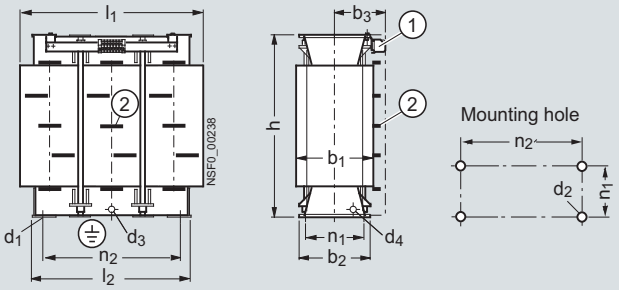
1) The rated power is only applicable to transformers with separate windings (not to autotransformers).

Project planning aids

4BU power transformers > 16 kVA

4BU matching transformers and transformers with selectable voltages > 16 kVA

4BU43 to 4BU65
for arrangement on horizontal surfaces



(1) Screw terminal

Terminal size	Screw terminal for cross-section			Current carr. capac.	
	Solid mm²	Stranded mm²	Fin. strand. mm²	t_a = 40 °C A	t_a = 55 °C A
4	0,5 … 6	--	1,5 … 4	24	18
6	2,5 … 10	--	1,5 … 6	32	23
16	1,5 … 16	10 … 25	4 … 16	60	43
35	10 … 16	10 … 50	10 … 35	114	81

(2) Schematic representation of flat connectors

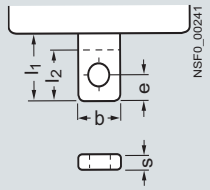
> 81 A/114 A:
see flat-type and threaded pin terminals

Type	Rated power kVA[1]	Type size according to DIN 41302	b_1	b_2	$b_3 \pm 3$ for terminal size 4	6	16	35	d_1	d_2	d_3	d_4	h	l_1	l_2	n_1	n_2	Max. number of terminals for terminal size 4	6	16	35
4BU43	18; 20; 22,5	3UI 230/80	203	194	153	157	160	170	15	M12	--	M6	422	450	400	155	340	44	36	24	18
4BU45	25; 28	3UI 230/107	230	221	162	166	169	179	15	M12	--	M6	422	450	400	182	340	44	36	24	18
4BU47	31,5; 35,5; 40	3UI 230/137	260	251	182	186	189	199	15	M12	--	M6	422	450	400	212	340	44	36	24	18
4BU52	45	3UIS 220/120	295	225	169	173	176	186	12,5	M10	M12	--	512	420	382	183	316	--	35	23	17
4BU53	50; 56	3UIS 220/135	310	240	176	180	183	193	12,5	M10	M12	--	512	420	382	198	316	--	35	23	17
4BU54	63; 71	3UIS 305/125	265	240	176	180	183	193	15	M12	M12	--	602	630	537	198	465	--	52	35	26
4BU55	80	3UIS 305/140	280	255	184	188	191	201	15	M12	M12	--	602	630	537	213	465	--	52	35	26
4BU56	91; 100	3UIS 305/160	300	275	194	198	201	211	15	M12	M12	--	602	630	537	233	465	--	52	35	26
4BU58	112; 125; 140	3UIS 395/150	315	269	191	195	198	208	15	M12	M12	--	686	855	712	227	630	--	70	45	35
4BU59	160	3UIS 395/170	335	289	201	205	208	218	15	M12	M12	--	686	855	712	247	630	--	70	45	35
4BU60	180	3UIS 395/195	360	314	213	217	220	230	15	M12	M12	--	686	855	712	272	630	--	70	45	35
4BU62	200; 225; 250	3UIS 455/175	360	305	209	213	216	226	21	M12	M12	--	780	975	812	256	720	--	70	45	35
4BU63	280; 315	3UIS 455/200	385	330	221	225	228	238	21	M12	M12	--	780	975	812	281	720	--	70	45	35
4BU64	355	3UIS 455/230	415	360	236	240	243	253	21	M12	M12	--	780	975	812	311	720	--	70	45	35
4BU65	400	3UIS 455/260	445	390	248	252	255	265	21	M12	M12	--	780	975	812	341	720	--	70	45	35

[1] The rated power is only applicable to transformers with separate windings (not to autotransformers).

Flat-type and threaded pin terminals

4AP, 4AU, 4BU flat connectors with through-hole

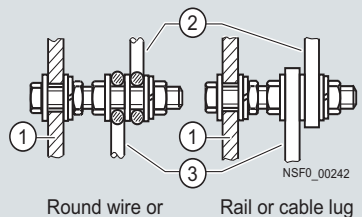


Flat connector on the transformer winding with through-hole for rail or cable lug.
Terminal covers for protection against accidental contact, free busbar connections up to 800 A (DIN VDE 0106-100) must be ordered separately.

Type	Terminal size A	$b = l_2$	With hole for screw	e	l_1	s
4AP, 4AU, 4BU	100	16	M6	8	25	2,5
	200	20	M8	10	30	3
	400	25	M10	12,5	35	5
	630	30	M10	15	40	6
	800	30	M12	15	40	8
	1000	40	M12	20	50	8

For terminal covers, see Catalog LV 1, Chapter 3 "Controls – Contactors and Contactor Assemblies, Accessories and Components", Order No. depends on the 3TX6 5.6-3B flat connector.

Threaded bolts on 4AU, 4BU insulating strip



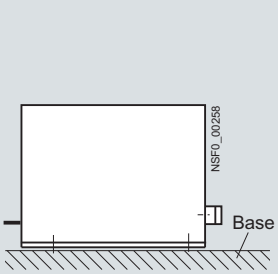
Round wire or cable lug Rail or cable lug

(1) Insulating strip
(2) External connection
(3) Internal connection

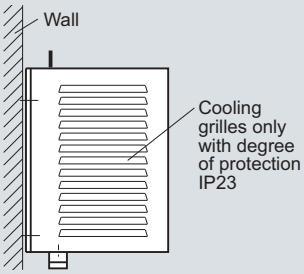
Type	Terminal size A	Threaded bolt	For conductor cross-sections mm²
4AU, 4BU	200	M8	≤ 50
	315	M10	≤ 120
	500	M12	≤ 300

Protective enclosure with 4AP, 4AU safety, isolating, control and mains transformers ≤ 16 kVA, for degree of protection IP23 and IP54

Mounting positions



Horizontal, with degree of protection IP54



Vertical, with degree of protection IP23 and IP54

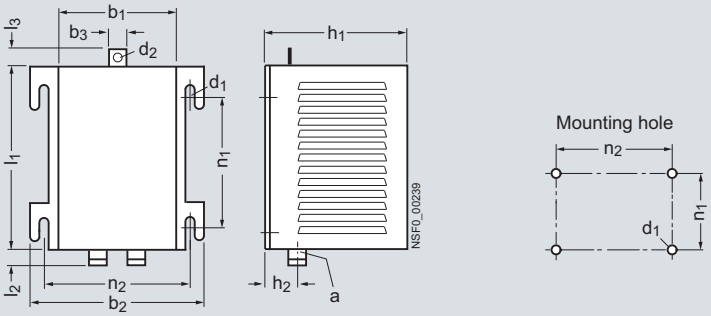
Type	Mounting position	Degree of protection IP23	IP54
4AP, 4AU	horizontal		x
	vertical	x	x

x = permissible

Sheet-steel enclosure, epoxy-resin coated, for degree of protection IP23 and IP54

cULus

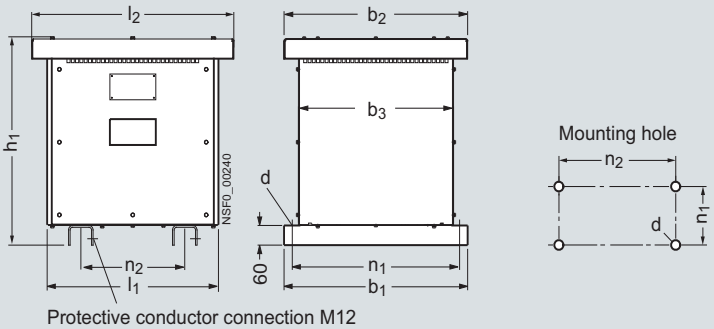
4AP17 to 4AP30, 4AU30 to 4AU39



Type	a	b_1	b_2	b_3	d_1	d_2	h_1	h_2	l_1	l_2	l_3	n_1	n_2
4AP17 to 4AP19	2 x M25	187	224	--	5,8	--	230	42	245	35	--	200	212
4AP20 to 4AP30, 4AU30	2 x M32	305	351	--	9	--	330	56	395	45	--	335	333
4AU36, 4AU39	2 x M32	395	460	50	13	35	465	60	555	45	50	480	430

Protective enclosure with dry transformers > 16 kVA, for degree of protection IP20 and IP23

Sheet-steel enclosure, epoxy-resin coated
4BU43 to 4BU65
for arrangement on horizontal surfaces



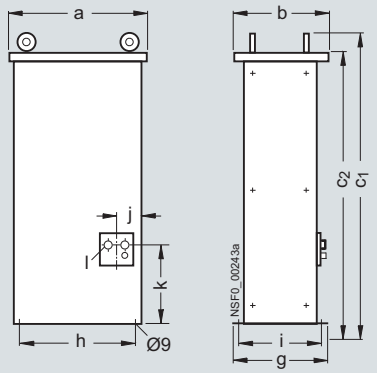
Type	b_1	b_2	b_3	h_1	d	l_1	l_2	n_1	n_2
4BU43 to 4BU47	600	600	507	645	15	560	660	570	340
4BU52 and 4BU53	600	600	507	735	15	560	660	570	316
4BU54 to 4BU56	600	600	507	825	15	800	900	570	465
4BU58 to 4BU60	730	730	637	905	19	1120	1220	696	630
4BU62 to 4BU65	900	900	807	1005	19	1120	1220	858	720

Project planning aids

4FL voltage regulators

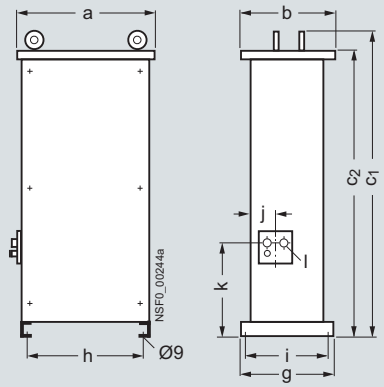
4FL voltage regulators, transformer type

4FL, degree of protection IP21



Type	a	b	c_1	c_2	g	h	i	j	k	l
4FL45 1, 4FL47	730	500	1665	1600	480	640	460	155	500	M50
4FL45 2, 4FL50, 4FL51, 4FL52, 4FL53	730	500	1665	1600	480	640	460	155	500	M63

4FL, degree of protection IP21



Type	a	b	c_1	c_2	g	h	i	j	k	l
4FL15, 4FL18, 4FL19, 4FL23, 4FL24, 4FL25, 4FL28	505	380	1065	1010	380	360	360	120	395	M25
4FL31, 4FL32, 4FL33, 4FL35, 4FL38	505	380	1065	1010	380	360	360	120	395	M32
4FL43	505	380	1065	1010	380	360	360	120	395	M40
4FL36, 4FL37	720	470	1355	1290	470	450	450	140	440	M32
4FL40, 4FL42	720	470	1355	1290	470	450	450	140	440	M40
4FL46, 4FL49	720	470	1355	1290	470	450	450	140	440	M50

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