ABL-pR power supplies

The ABL-pR range of power supplies is designed to provide the d.c. voltage necessary for the control circuits of most control system equipment. Split into five families, this range meets all the needs encountered in industrial, commercial and residential applications. Whether they are single-phase or 3-phase, electronic switch mode or conventional type with rectifier, they provide a quality of output current which is suitable for the loads supplied and compatible with the mains supply available in the equipment. Clear guidelines are given on selecting protection devices which are often used with them, and thus a comprehensive solution is provided which can be used in total safety.

Phaseo switch mode supplies

Switch mode power supplies are totally electronic and regulated. The use of electronics makes it possible to significantly improve the performance of these power supplies, which offer:
- compact size,
- integrated overload, short-circuit, overvoltage and undervoltage protection,
- a very wide range of permitted input voltages, without any adjustment,
- a high degree of output voltage stability,
- good performance,
- considerably reduced weight.

Phaseo power supplies are available in single-phase and 3-phase versions. They supply a voltage which is precise to 3%, whatever the load and whatever the type of mains supply, within a range of 85 to 364 V for single-phase, or 360 to 550 V for 3-phase. Conforming to IEC standards and UL and CSA approved, they are suitable for universal use. The inclusion of overload and short-circuit protection makes downstream protection unnecessary if discrimination is not required.
The products are also equipped with an output undervoltage control which causes the product to trip if the output voltage drops below 19 V, in order ensure that the voltage supplied is always usable by the actuators being supplied. All the products are fitted with an output voltage adjustment potentiometer (in the range 24 to 28.8 V) in order to be able to compensate for any line voltage drops in installations with long cable runs. These power supplies are designed for direct mounting on 35 mm and 75 mm 7 rails.

These power supplies are available in single-phase and 3-phase versions and are split into three families:

p The ABL-7RE family includes products that are excellent for typically industrial applications. They are extremely compact and very easy to install, as well as being attractively priced.

p The ABL-7RP family of products is more general-purpose. These supplies are fitted with an input filter (PFC) which enables them to be used in commercial and residential environments (conforming to standard IEC 1000-3-2).
In addition, they offer two operating modes for dealing with overloads and short-circuits:
- “AUTO” mode which ensures automatic restarting of the supply as soon as the fault is cleared;
- “MANU” mode which requires the supply to be reset before restarting is possible. Resetting is achieved by switching off the mains supply (on the product).

p The ABL-7RU family, for use on 3-phase mains supplies, is designed for applications that include high consumption loads. They can supply up to 960 W, in both industrial and commercial environments.

Filtered rectified power supplies

Filtered rectified power supplies are built using a safety transformer fitted with a bridge rectifier and filter capacitors. With no regulation system, of simple and rugged construction, their output voltage will withstand mains voltage variations and load variations while remaining within the range defined in standards IEC 1131-2. They are particularly suitable for applications with high current inrush.

These supplies are split into two families:

p The single-phase filtered rectified ABL-6RF family is suitable for connection to European 230/400 V and American 120/240 V single-phase supplies. An optional mounting plate for mounting on a 7 rail, simplifies their installation.

p The 3-phase filtered rectified ABL-6RT family is particularly suitable where a high power level is required for actuators and preactuators. In particular, for “All c 24 V” equipment, or for controlling d.c. valves and solenoid valves.

Characteristics : pages 14054/2 to 14054/5
References : pages 14056/2 and 14056/3
Dimensions : pages 14057/2 and 14057/3
Schemes : pages 14058/2 and 14058/3

Power supplies and transformers
Power supplies for d.c. control circuits

Using c 24 V

p Using c 24 V enables so-called protection installations (PELV) to be built. Using PELV is a measure designed to protect people from direct and indirect contact. Measures relating to these installations are defined in publication NFC 12-201 and in standard IEC 364-4-41.

p The application of these measures to the electrical equipment in machines is defined in standard NF EN 60204-1 and requires :
- that the voltage used is below 60 V d.c. in dry environments and below 30 V in damp environments.
- the connection of one side of the PELV circuit, or one point of the source, to the equipotential protection circuit associated with higher voltages.
- the usage of switchgear and control gear on which measures have been taken to ensure "safety separation" between power circuits and control circuits.

p A safety separation is necessary between power circuits and control circuits in PELV circuits. Its aim is to warn of the appearance of dangerous voltages in c 24 V safety circuits.

p The reference standards involved are :
- IEC 742, EN 60742, DIN/VDE 0551 T1 (safety transformers).
- IEC 664 (coordination of isolation).

Telemecanique power supplies meet these requirements.

p Moreover, to ensure that these products will operate correctly in relation to the demands of the reinforced isolation, it is recommended that the products be mounted and wired as indicated below :
- they should be placed on an earthed mounting plate or rail,
- they should be connected using flexible cables, with a maximum of two wires per connection, and tightening to nominal torque,
- conductors of the correct insulation class must be used.

p If the d.c. circuit is not connected to an equipotential protection conductor, an earth leakage detector will indicate any accidental insulation faults (see catalogue “Measurement and control relays" n° 29709).

Operating voltage

p The acceptable tolerances for the operating voltage are listed in publications IEC 1131-2 and DIN 19240.

p For nominal voltage Un = c 24 V, the extreme operating values are from - 15 % to + 20 % of Un, whatever the supply variations may be in the range - 10 % to + 6 % (defined by standard IEC 38) and load variations in the range In 0-100%.

Consequently the values are as follows :
- maximum voltage (peak) : 30 V
- nominal voltage : 24 V
- minimum voltage (peak) : 19.2 V

All Telemecanique c 24 V supplies have been designed to provide a voltage within this range.

p It may be necessary to use a voltage measurement relay to detect when the normal voltage limits are being surpassed and to deal with the consequences of this (see catalogue n° 29709).

Characteristics : pages 14054/2 to 14054/5
References : pages 14056/2 and 14056/3
Dimensions : pages 14057/2 and 14057/3
Schemes : pages 14058/2 and 14058/3

Power supplies and transformers
Power supplies for d.c. control circuits

Selection of power supplies

The characteristics to be taken into account when selecting a power supply are :
- the required output voltage and current,
- the mains voltage available in the installation.

An initial selection can be made using the table below.
This may however result in several products being selected as suitable.
Other selection criteria must therefore be taken into account.

p **The quality of the mains power supply**

Filtered rectified power supplies provide a non-regulated voltage, sensitive to load and mains power supply fluctuations. They can only be used where a good quality mains supply is available, with fluctuations limited to -10%...+10% of the nominal value.
Graphs showing the output voltage as a function of the rated current of the load and the input voltage for ABL-6RF and ABL-6RT supplies are given on page 14054/5.
If the quality of the mains supply is not suitable for a rectified power supply, a regulated supply must be used.
The Phaseo range is the solution because it guarantees precision to 3% on the output voltage, whatever the load current and the input voltage. In addition, the wide input voltage range of Phaseo power supplies allows them to be connected to all mains supplies within the nominal range, without any adjustment.
The Phaseo RP family can also be connected to c 110 and 220 V emergency supplies.

p **Harmonic pollution (power factor)**

The current drawn by a power supply is not sinusoidal. This leads to the existence of harmonic currents which pollute the mains supply. European standard EN 61000-3-2 limits the harmonic currents produced by power supplies. This standard covers all devices of more than 75 W, drawing up to 16 A per phase, and connected directly to the public mains power supply. Devices connected downstream of a private, low voltage, general transformer are therefore excluded.
By design, rectified power supplies produce very little harmonic current and can therefore be used on the public mains supply. However, switch mode supplies produce much more harmonic current and a filter circuit (Power Factor Correction or PFC) must therefore be added to comply with standard EN 61000-3-2.
Power supplies ABL-6RF, ABL-6RT and Phaseo ABL-7RP and ABL-7RU conform to standard EN 61000-3-2 and can therefore be connected directly to public mains power supplies.

p **Behaviour in the event of short-circuits**

In the event of an overload or short-circuit, rectified power supplies must be protected by an upstream fuse or circuit breaker to prevent their destruction. Models ABL-6RF2401, ABL-6RF2402 and ABL-6RF2405 are fitted, as standard, with a 5 mm x 20 mm glass fuse.
Phaseo power supplies, on the other hand, are fitted with electronic protection. This protection automatically resets as soon as the fault is cleared, so avoiding the need to take action or replace a fuse. In addition, with the Phaseo RP range, the user can select the reset method in the event of a fault:
- in the "AUTO" position, resetting is automatic,
- in the "MANU" position, resetting will take place after the fault has been cleared and after the mains power has been switched off and back on (on the power supply). This feature means that Phaseo RP can be used in installations where the risks associated with sudden restarting are high.

Characteristics : pages 14054/2 to 14054/5
References : pages 14056/2 and 14056/3
Dimensions : pages 14057/2 and 14057/3
Schemes : pages 14058/2 and 14058/3

Power supplies and transformers

Power supplies for d.c. control circuits

Selection table according to application characteristics

Technology		**Regulated switch mode**					**Filtered rectified**		
Rated mains supply voltage		a 100...240 V 50/60 Hz c 100... 250 V Wide range			100...240 V 50/60Hz Wide range	3x400...500 V 50/60 Hz Wide range	120-240 V ± 15 V 50/60 Hz	230-400 V ± 15 V 50/60 Hz	3x400 V ± 15 V 50/60 Hz
Permissible variation		85...264 V, 47...63 Hz c 85...250V			85...264 V 47...63 Hz	360...550 V 47...63 Hz	+/-10 % 47...63 Hz		
Output voltage		12 V	48 V	24 V			24 V		
Output current	**1 A**						**ABL-6RF2401G2**	**ABL-6RF2401**	
	2 A				**ABL-7RE2402**				
	2.5 A						**ABL-6RF2402G2**	**ABL-RF2402**	
	3 A		**ABL-7RP4803**	**ABL-7RP2403**	**ABL-7RE2403**				
	5 A	**ABL-7RP1205**		**ABL-7RP2405**	**ABL-7RE2405**		**ABL-6RF2405G2**	**ABL-6RF2405**	
	10 A			**ABL-7RP2410**	**ABL-7RE2410**	**ABL-7RU2410**		**ABL-6RF2410**	**ABL-6RT2410**
	15 A							**ABL-6RF2415**	
	20 A					**ABL-7RU2420**		**ABL-6RF2420**	**ABL-6RT2420**
	30 A					**ABL-7RU2430**			**ABL-6RT2430**
	40 A					**ABL-7RU2440**			**ABL-6RT2440**
EN61000-3-2		Yes			No	Yes	Yes		Yes
Integrated protection		Yes Automatic or manual restart			Yes Automatic restart		Yes from 1 to 5 A by fuse No above 5 A		No
Fault memory		Yes			No	No	Not applicable		Not applicable
Reference		**ABL-7RP**			**ABL-7RE**	**ABL-7RU**	**ABL-6RF**		**ABL-6RT**

Presentation : pages 14053/2 and 14053/3
Characteristics : pages 14054/2 to 14054/5
References : pages 14056/2 and 14056/3
Dimensions : pages 14058/2 and 14057/3