

Single-phase AC current protector relays PAU (Under) & PAO (Over), -1 and -5 DIN-rail mounted

Introduction

These units monitor the AC current to a load and operate relays if the current goes below or above a set level. Front panel controls allow selection of:

- **Under (PAU)** - or **Over (PAO)**-current operation,
- current trip level and
- time delay before a trip triggers a relay response.


LEDs indicate power on and trip status. A relay with volt-free changeover contacts is fitted.

Two versions for each type are available for monitoring currents of up to 1A (PAU-1, PAO-1) and 5A (PAU-5, PAO-5)

The unit can be powered either by a separate auxiliary supply of 24-240V AC or DC or by the monitored supply, if suitable.

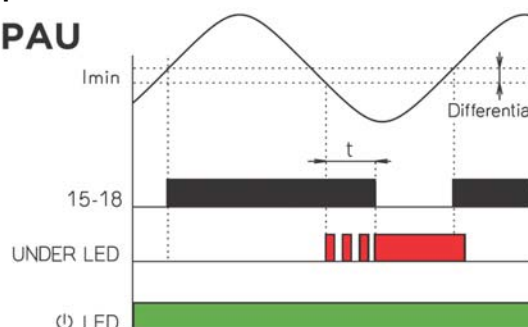
These instructions contain important safety information. Please read them thoroughly before commissioning, operation or maintenance of the unit.

Specification

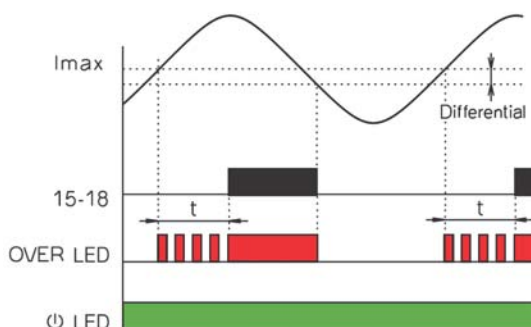
Parameter	PAU-1, PAO-1	PAU-5, PAO-5
Monitored supply:		
Load current rating I_n	1A	5A
Maximum overload - permanent	2A	10A
Maximum overload - for 3s max	20A	50A
Voltage rating	500V max.	
Operating frequency	45-65 Hz	
Current trip level – adjustable (I_n)	40-120% of I_n	
Trip time delay – adjustable	0.5 to 10s	
Hysteresis differential	Preset to 1% of range	
Auxiliary supply:		
AC frequency range	45-65 Hz	
Relay contacts:		
	1 x changeover, volt-free, for general switching operations	
Load capacity - AC	250V @ 8A, 2 kVA	
Load capacity - DC	30V 8A	
Insulation	4 kV/1 min	
Mechanical endurance	30x10 ⁵ operations	
Other Data:		
Dimensions	90 x 17.6 x 64 mm	
Weight	70g	
Maximum conductor size	2 x 2.5 mm ² or 1 x 4 mm ²	
Operating temperature	-20 to +55 °C	
Storage temperature	-30 to +70 °C	
Overvoltage category	III	
Pollution degree	2	
Environmental protection	IP40 for front panel IP10 for terminals.	
Standards	EN 60255-6, EN 60255-27, EN 61000-6-2, EN 61000-6-4	
	Class 2: Ensure any external circuits connected to the relay are provided with double or reinforced insulation.	

Operation

PAU



PAO



The time delay and differential trip levels help to prevent relay chatter as the monitored current level varies. As the relays have changeover contacts, the relay outputs can be inverted by wiring to the alternative terminals 15-16 or 25-26.

Under-current Mode (Model PAU)

While the monitored current is greater than the set level I_{min} , the relay is energised (NC contacts 15-16 are open) and the red LED is off.

If the current goes below the set level I_{min} , after the set time delay, the relay **de-energises**, contacts 15-16 close and the red LED lights. During the delay period, the LED flashes.

When the current returns above the set level I_{min} plus the under-current differential of 1%, the relay changes back without delay and the LED goes off.

Over-current Mode (Model PAO)

While the monitored current is less than the set level I_{max} , the relay is de-energised (NO contacts 15-18 are open) and the red LED is off.

If the current goes above the set level I_{max} , after the set time delay, the relay **energise**, contacts change over (contacts 15-18 close) and the red LED lights. During the delay period, the LED flashes.

When the current returns below the set level I_{max} minus the over-current differential of 1%, the relay changes back without delay and the LED goes off.

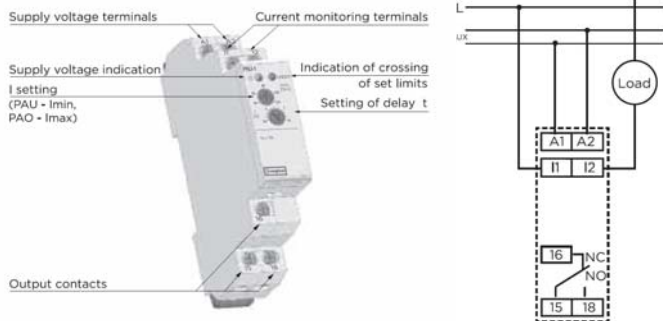
Note; Red LED indicates fault condition, not relay status

Installation

The unit is intended for mounting on a standard DIN rail. Hook the unit onto the top of the rail and press the bottom of the unit until it locks in place. To remove the unit from the rail, lever down the black tab at the bottom of the unit to release it from the rail.

The unit is intended for use in a reasonably stable ambient temperature within the range -20 to +55°C. Do not mount the unit where there is excessive vibration or in excessive direct sunlight.

PAU, PAO



NC = Normally closed. Contact closed when relay de-energised.
NO = Normally open. Contact open when relay de-energised.

Warnings:



Caution: Risk of Electric Shock

- During normal operation, voltages hazardous to life may be present at some of the terminals of this unit. Installation and servicing should be performed only by qualified, properly trained personnel abiding by local regulations. Ensure all supplies are de-energised before attempting connection or other procedures.
- It is recommended adjustments be made with the supplies de-energised, but if this is not possible, then extreme caution should be exercised.
- Terminals should not be user accessible after installation and external installation provisions must be sufficient to prevent hazards under fault conditions.
- This unit is not intended to function as part of a system providing the sole means of fault protection - good engineering practice dictates that any critical function be protected by at least two independent and diverse means.
- The unit does not have internal fuses therefore external fuses must be used for protection and safety under fault conditions.
- If this equipment is used in a manner not specified by the manufacturer, protection provided by the equipment may be impaired.

Safety

The unit was designed in accordance with BS EN 600255-6 and -27 – Permanently connected use, Normal condition. Insulation category III, pollution degree 2, basic insulation for rated voltage. Measurement Category III.

EMC Installation Requirements

This unit has been designed to provide protection against EM (electromagnetic) interference in line, in accordance with BS EN 61000-6-2 and -6-4. Precautions necessary to provide proper operation of this and adjacent equipment will be installation dependent and so the following can only be general guidance:

All of the above information, including drawings, illustrations and graphic designs, reflects our present understanding and is to the best of our knowledge and belief correct and reliable. Users, however, should independently evaluate the suitability of each product for the desired application. Under no circumstances does this constitute an assurance of any particular quality or performance. Such an assurance is only provided in the context of our product specifications or explicit contractual arrangements. Our liability for these products is set forth in our standard terms and conditions of sale.

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- Avoid routing wiring to this unit alongside cables and products that are, or could be, a source of interference.
- The auxiliary supply to the unit should not be subject to excessive interference. In some cases, a supply line filter may be required.
- To protect the product against incorrect operation or permanent damage, surge transients must be controlled. It is good EMC practice to suppress differential surges to 2kV or less at the source. The unit has been designed to automatically recover from typical transients, however in extreme circumstances it may be necessary to temporarily disconnect the auxiliary supply for a period of greater than 5 seconds to restore correct operation.
- Screened communication leads are recommended and may be required. These and other connecting leads may require the fitting of RF suppression components, such as ferrite absorbers, line filters etc., if RF fields cause problems.
- It is good practice to install sensitive electronic instruments that are performing critical functions in EMC enclosures that protect against electrical interference causing a disturbance in function.

Wiring

All connections are made to screw clamp terminals. Terminals are suitable for copper wires only and will accept one stranded 0.05 - 2.5mm² (30 - 12 AWG) or one solid core cable. Terminal screws should be tightened to 0.5 Nm. Choice of cable should meet local regulations. Instrument transformers used for connection to the meter must be of approved type, compliant with ANSI/IEEE C57.13 / IEC 60044-1 to provide isolation from measuring inputs.

For UL approved installation, use National Electrical Code (NEC) Class 1 wiring, rated at 600V for main terminals, 300V auxiliary / 60°C min rating.

Auxiliary Supply

The unit should ideally be powered from a dedicated supply. However it may be powered from the signal source, providing the source will always be within tolerance for the auxiliary supply.

24 to 240V AC or DC ±10% 1.22W 3VA. 45-65 Hz for AC

Fusing

A suitable switch or circuit breaker conforming to the relevant parts of IEC 60947-1 and IEC 60947-3 should be included in the building installation. It should be positioned so as to be easy to operate, in close proximity to the equipment, and clearly identified as the disconnecting device.

This unit must be fitted with external fuses in voltage and auxiliary supply lines. Voltage input lines must be fused with a quick blow fuse 1A maximum. Auxiliary supply lines must be fused with a slow blow fuse rated 1A maximum. Choose fuses of a type and with a breaking capacity appropriate to the supply and in accordance with local regulations.

For UL approved installations:

UL listed branch circuit fuses, suitable for the installation voltage, shall be provided and installed in accordance with national installation code – 1A slow blow AC or DC rated for auxiliary supply lines. 1A fast acting AC rated for the voltage measuring inputs.

Maintenance

In normal use, little or no maintenance is needed. Where used, ensure any CT secondary circuits are short circuited prior to carrying out installation or maintenance of the unit. As appropriate for service conditions, isolate electrical power, inspect the unit and remove any dust or other foreign material present. Periodically check all connections for freedom from corrosion and screw tightness, particularly if vibration is present.