

True power monitoring PMD s10



True power converter for single and three-phase electrical machinery

Approvals

	PMD s10
	◆

Unit features

- ▶ Relay output:
2 auxiliary changeover contacts (C/O)
- ▶ Analogue output for current and voltage
- ▶ Galvanic isolation of the analogue outputs
- ▶ Measuring range set automatically for current and voltage
- ▶ Menu-driven parameter setting
- ▶ Status indicators (LEDs) for:
 - Supply voltage (Power)
 - Switching threshold for overload (> max)
 - Switching threshold for underload (< min)
 - Output 1 (Out 1)
 - Output 2 (Out 2)
 - Fault
- ▶ Display for measured value indicator, diagnostics and menu navigation
- ▶ Operating cycle counter for K1 and K2

- ▶ Diagnostics: U_{max} and I_{max}
- ▶ Display of operating hours and load hours (resettable)
- ▶ Device parameters can be saved to chip card (write)
- ▶ Device parameters can be restored from the chip card (load)
- ▶ Suitable for use with frequency-controlled drives
- ▶ Suitable for current transformers

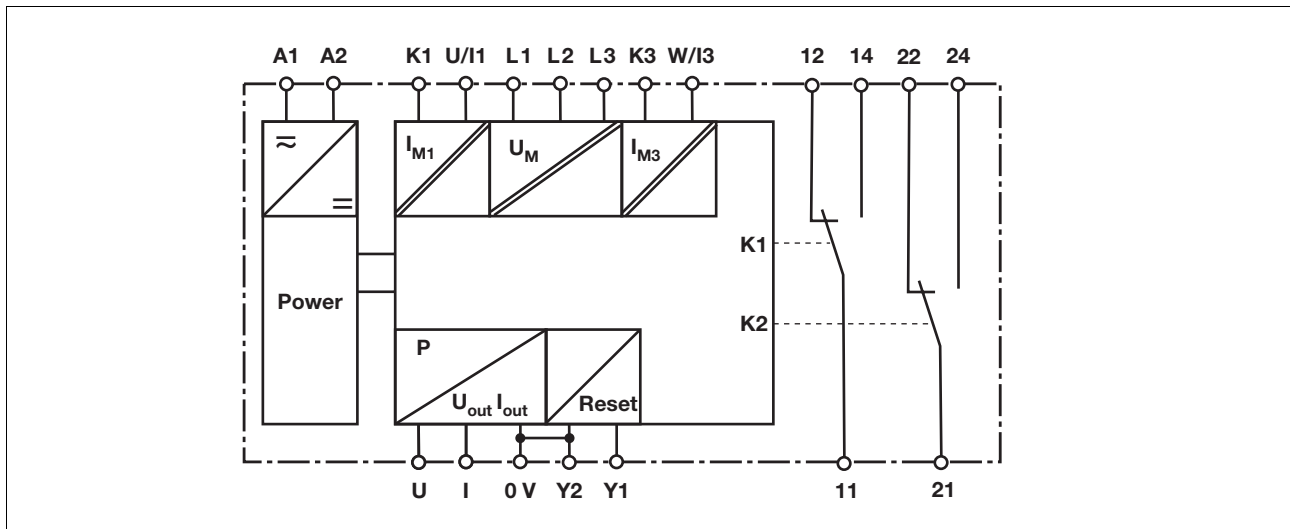
Unit description

The true power converter PMD s10 is used to measure and monitor the true power drawn and output by electrical loads.

The PMD s10 is designed for use as a:

- ▶ True power converter for single and three-phase electrical machines
- ▶ Trip device for underload and overload

Block diagram



True power monitoring PMD s10

Function description

The PMD s10 monitors the true power on a single, three phase or DC supply to ensure it doesn't exceed or drop below a certain value. The unit operates in accordance with the Aron circuit principle.

Relay outputs (K1 and K2)

K1 and K2 operate in normally energised mode. In their default state, auxiliary contacts 11-14 and 21-24 are closed and auxiliary contacts 11-12 and 21-22 are open. Normally energised mode is the default setting; this setting can be changed via the menu.

Analogue outputs (U_{out} and I_{out}):

The unit forms two output signals which are proportional to the true power. The limit value corresponds to P_{max} (see timing diagram). The status of the threshold monitoring function is displayed at the auxiliary contacts and LEDs, along with the analogue output

signals. The hysteresis of the switching thresholds can be set between 0 % ... 50 %.

Current transformer CT:

With continuous currents > 12 A, the measuring current must be measured via an external current transformer.

Po function (K1 overload):

If the measured true power exceeds the switching threshold P_o , the "> max" LED is lit. Once the response time has elapsed (t_r), the auxiliary contact switches (default: relay K1) and the "Out 1" LED is lit.

Pwo function (overload warning threshold):

Serves as a warning; for function description, see Po function (K1 overload)

Pu function (K2 underload):

If the measured true power drops below the switching threshold P_u , the "< min" LED is lit. Once the response time has elapsed (t_r), the auxiliary contact

switches (default: relay K2) and the "Out 2" LED is lit.

Pwu function (underload warning threshold):

Serves as a warning; for function description, see Pu function (K2 underload)

Start suppression time (t_{Start}):

The measurement is suppressed during the machine's start-up phase, in order to avoid spurious output signals. The start suppression time t_{Start} is infinitely variable.

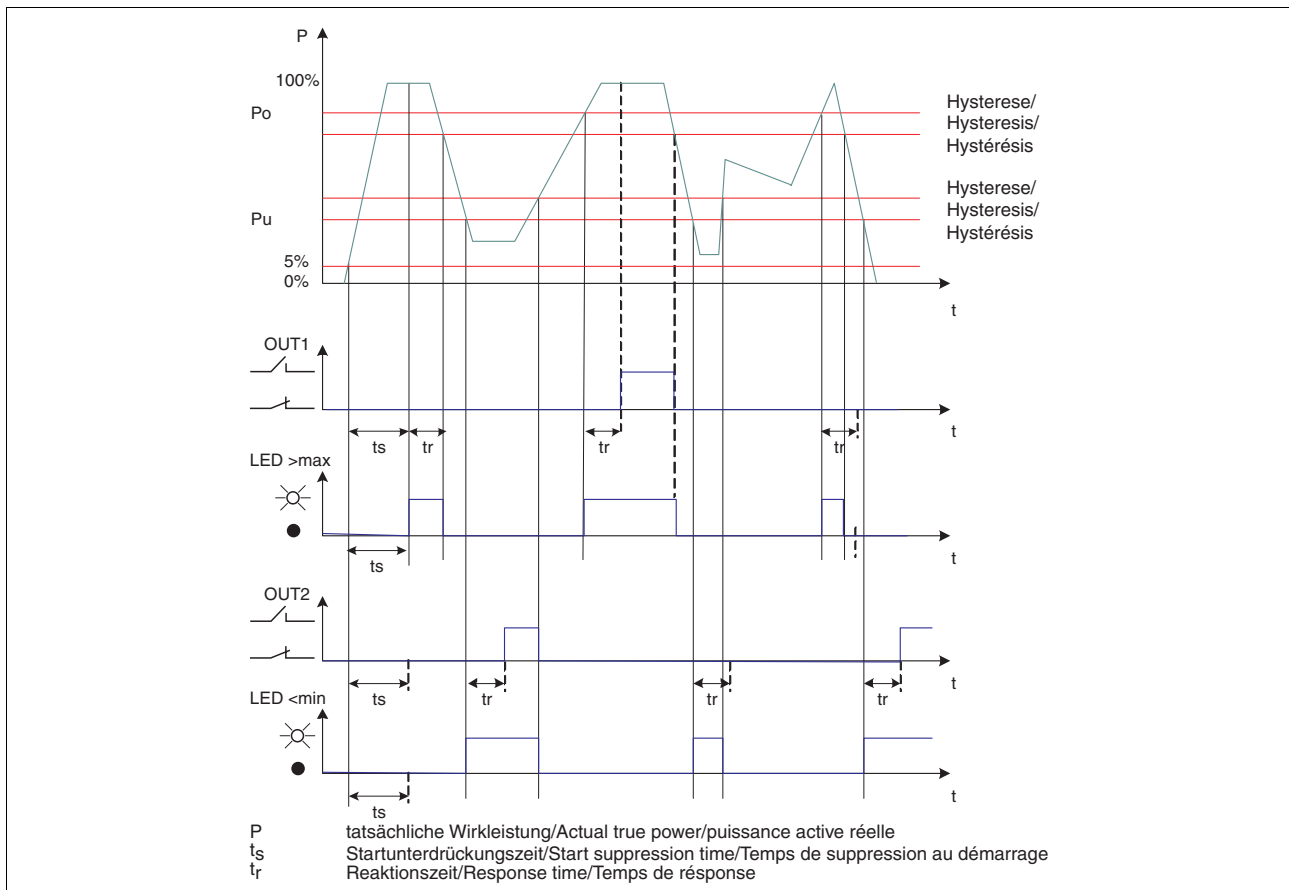
Response time (t_r):

With transient load fluctuations, the switching threshold can be suppressed. The response time t_r is infinitely variable.

Reset mode:

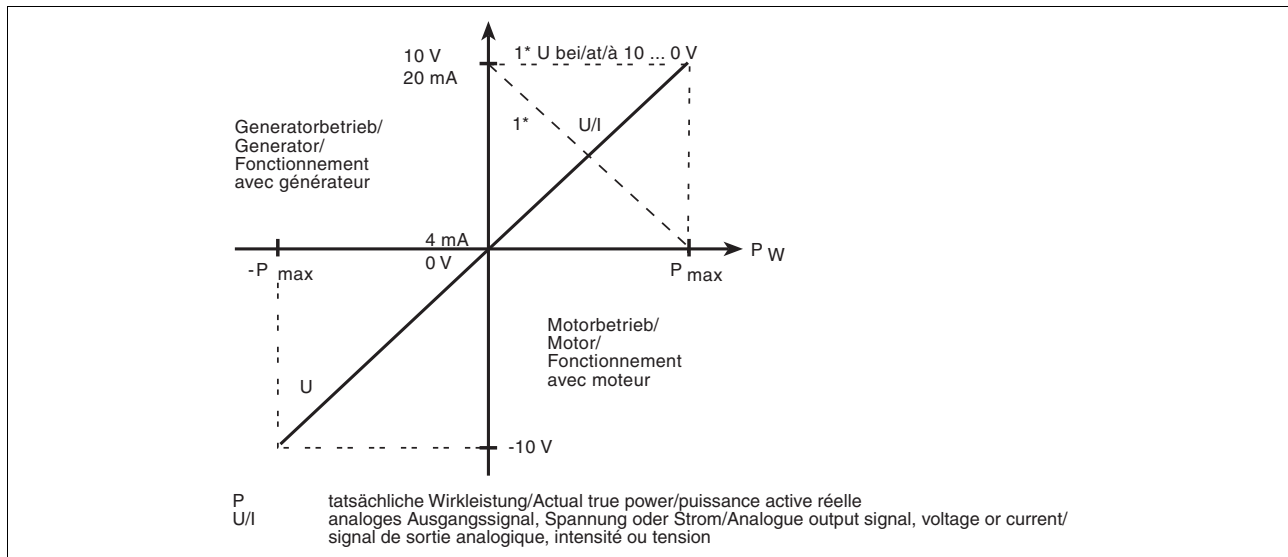
The fault status (value below P_u or above P_o) can be reset automatically or via an external reset button.

Timing diagram



True power monitoring PMD s10

Timing diagram



Wiring

Note:

- ▶ Only wire the unit when the supply voltage is switched off!
- ▶ Use copper wiring.
- ▶ To prevent contact welding, a fuse should be connected before the output contacts (see technical details).

- ▶ Ensure that the cables are laid carefully, because an open circuit in the measuring circuit will cause the unit function to fail.
- ▶ Information given in the "Technical details" must be followed.

NOTICE

Ensure that there is adequate fuse protection on the connection cables to terminals L1, L2, L3, K1, K3, A1 and A2!

Preparing for operation

- ▶ Connect the supply voltage U_B to A1/A2.
- ▶ Single-phase:
 - Measuring voltage U_M : Connect to terminals L1 and L2
 - Link terminals L1-K1
 - Measuring circuit: Connect phase L1 of the motors to terminal U/I1
- ▶ Three-phase:
 - Measuring voltage U_M : Connect to terminals L1, L2 and L3
 - Link terminals L1-K1, L3-K3
 - Measuring circuit: Connect phase L1 of the motor to terminal U/I1, phase L2 to terminal L2 and L3 to W/I3
- ▶ Please refer to the connection diagrams for details of how to connect **external current transformers**

and an **external reset** (see "Application").

- ▶ Connect the output contacts in accordance with the relevant application circuit.

NOTICE

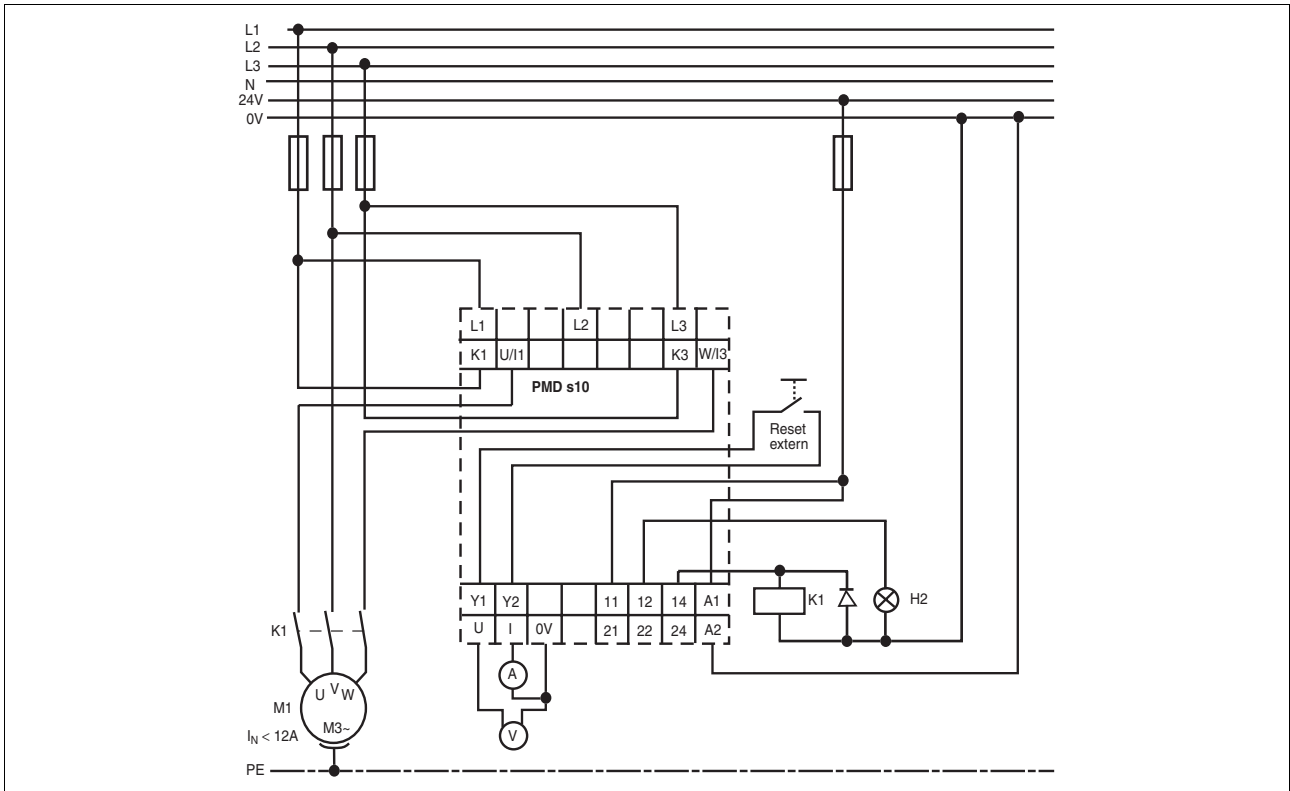
Only connect the unit as shown in the examples below! Do not connect unlabelled terminals.

The following circuit examples show typical applications for the true power converter PMD s10.

With continuous currents > 12 A, the measuring current must be measured via an external current transformer.

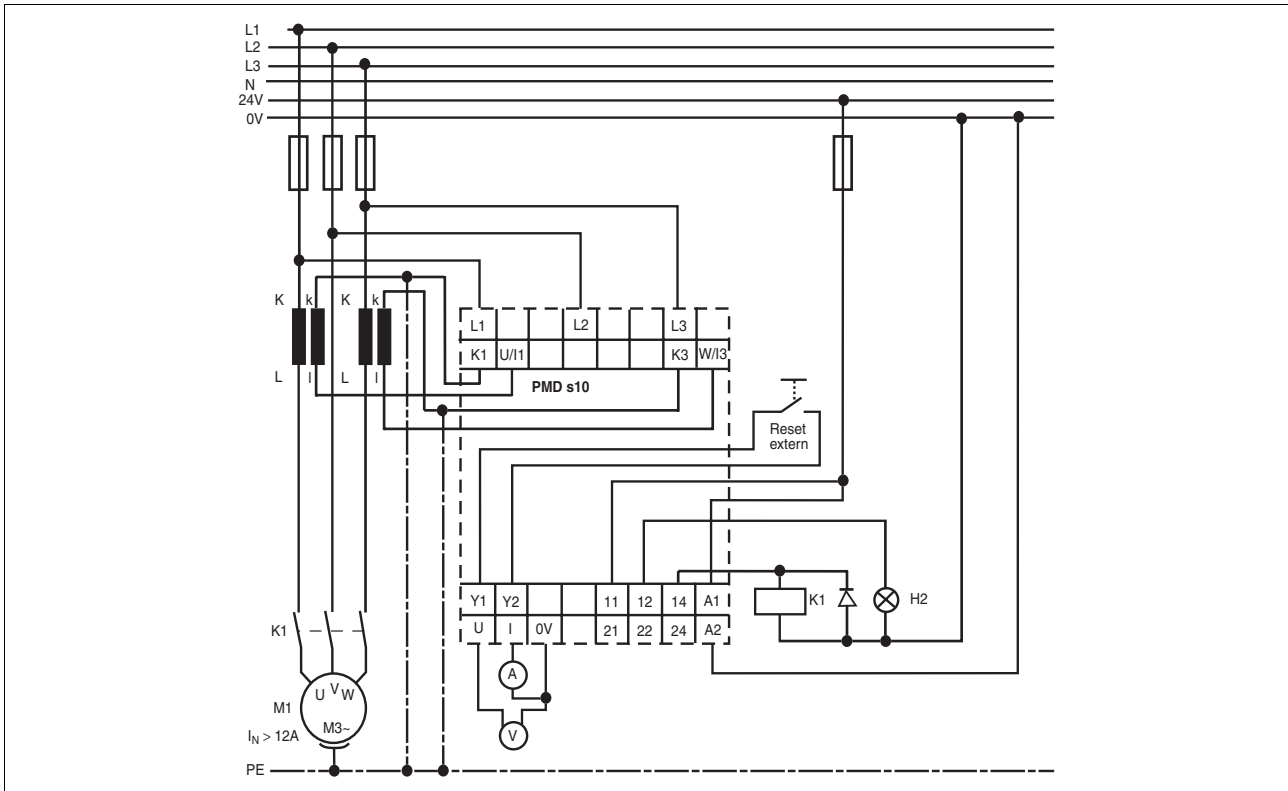
True power monitoring PMD s10

Circuit for three-phase motor



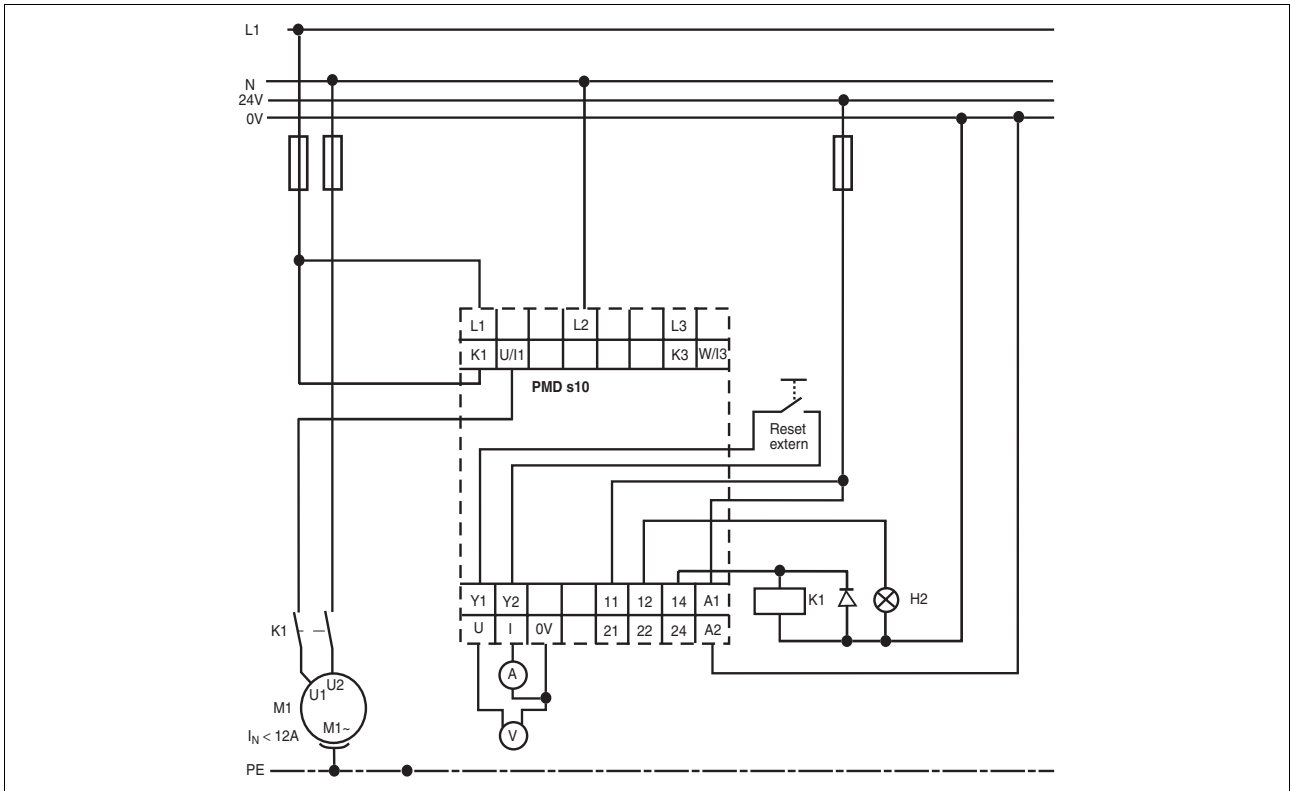
True power monitoring PMD s10

Circuit for three-phase motor with CT



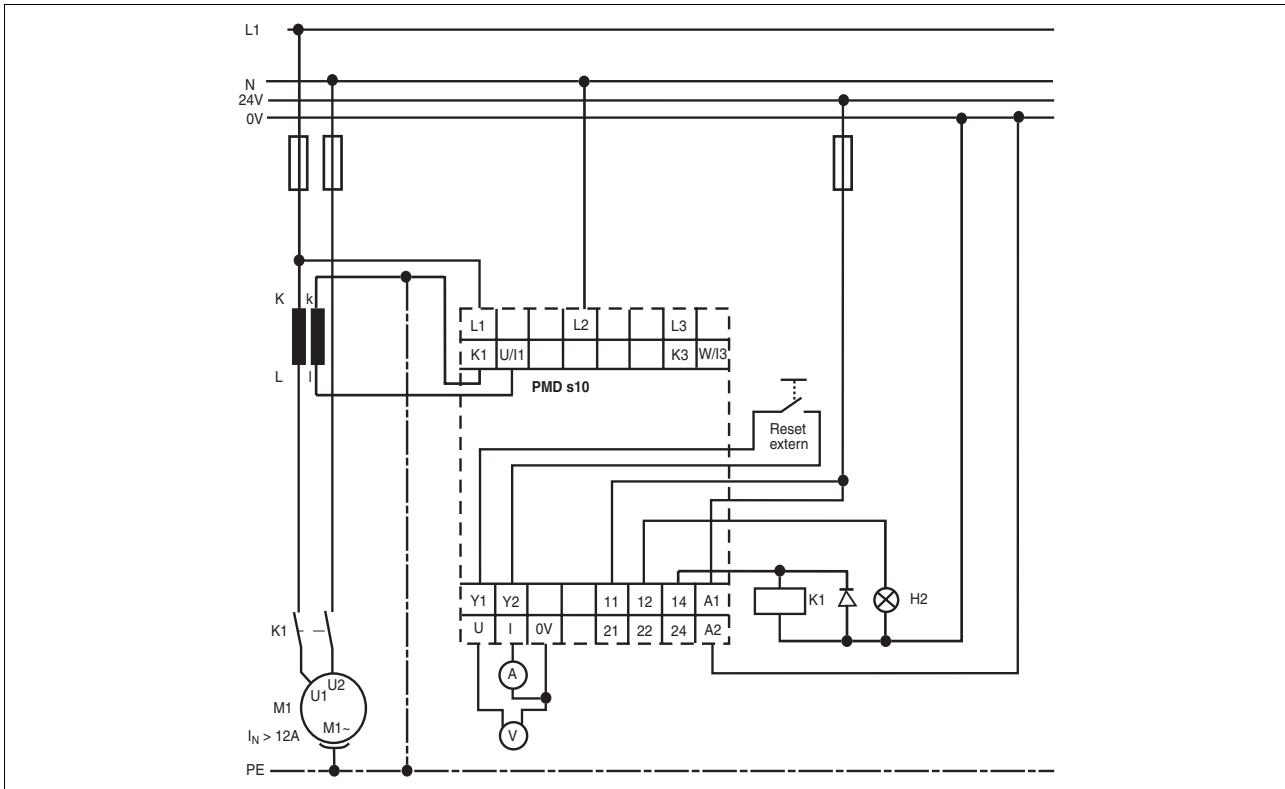
True power monitoring PMD s10

Circuit for motor (1 AC)



True power monitoring PMD s10

Circuit for motor (1 AC) with CT



Parameter setting

Parameters such as switching thresholds, start-up suppression time, reaction time and rest mode, for example, are set via a rotary knob.

A display indicates the current values plus the set values. The parameters can be saved on a chip card. This chip card can be used

as a backup copy of the parameters or can be used to transfer the parameters to another unit.

Installation

- ▶ The unit should be installed in a control cabinet with a protection type of at least IP54.
- ▶ Use the notch on the rear of the unit to attach it to a mounting rail.
- ▶ In environments exposed to heavy vibration or when installing on a vertical mounting rail (35 mm), the unit should be secured using a fixing element (e.g. retaining bracket or end angle).
- ▶ Push the unit upwards or downwards before lifting it from the mounting rail.

True power monitoring PMD s10

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Technical details	
Electrical data	
Supply voltage U_B AC/DC	24 - 240 V
Voltage tolerance	-20 %/+10 %
Power consumption at U_B AC	5.0 VA
Power consumption at U_B DC	3.0 W
Frequency range AC	50 - 60 Hz
Utilisation category in accordance with EN 60947-4-1	
Auxiliary contacts: AC1 at 240 V	I_{min} : 0.10 A , I_{max} : 5.0 A P_{max} : 1200 VA
Auxiliary contacts: DC1 at 24 V	I_{min} : 0.10 A , I_{max} : 5.0 A P_{max} : 120 W
Utilisation category in accordance with EN 60947-5-1	
Auxiliary contacts: AC15 at 230 V	I_{max} : 5.0 A
Auxiliary contacts: DC13 at 24 V (6 cycles/min)	I_{max} : 2.0 A
Contact material	AgNi10
External contact fuse protection ($I_K = 1$ kA) to EN 60947-5-1	
Blow-out fuse, quick	
Auxiliary contacts:	6 A
Blow-out fuse, slow	
Auxiliary contacts:	4 A
Circuit breaker 24 VAC/DC, characteristic B/C	
Auxiliary contacts:	4 A
Safety-related characteristic data	
PL in accordance with EN ISO 13849-1	PL c (Cat. 1)
Category in accordance with EN 954-1	Cat. 1
SIL CL in accordance with EN IEC 62061	SIL CL 1
PFH in accordance with EN IEC 62061	6.05E-07
SIL in accordance with IEC 61511	SIL 1
PFD in accordance with IEC 61511	5.30E-02
t_M in years	20
Times	
Typ. response time of analogue output at DC	20 ms
Response time of analogue output at 15 ... 60 Hz	70 - 16 ms
Response time of analogue output at 60 ... 400 Hz	16 ms
Response time t_r of auxiliary contact (selectable)	0.01 - 30.00 s
Start suppression time t_{start} (selectable)	0.0 - 30.0 s
Measuring circuit	
Measuring voltage U_M (AC/DC)	100 - 550 V
Measuring current I_M (AC/DC)	1 - 12 A
Frequency range	0, 15 - 400 Hz
Measuring range limit value (selectable)	1.0 W - 11.5 kW
Measuring range limit value P_{max} with external current transformer	100.0 W - 11.5 MW
Performance range of 1 A current transformer	1.5 - 7.5 VA
Performance range of 5 A current transformer	2.5 - 15.0 VA
Current transformer class	3
Max. measuring current AC/DC	12 A
Temperature coefficient	0.10 %/K

True power monitoring PMD s10

Output signals during motor operation			
Output voltage U_{out} 0... 10 V	0 - 10 V		
Output voltage U_{out} 10 ... 0 V	10 - 0 V		
Terminating impedance (apparent ohmic resistance) R_{out} min.	1 kOhm		
Output current I_{out} 4 ... 20 mA	4 - 20 mA		
Output current I_{out} 0 ... 20 mA	0 - 20 mA		
Terminating impedance (apparent ohmic resistance) R_{out} max.	0.5 kOhm		
Output signals during generator operation			
Output voltage U_{out}	0 - -10 V		
Terminating impedance (apparent ohmic resistance) R_{out} min.	1 kOhm		
Output current I_{out}	0 - -20 mA		
Terminating impedance (apparent ohmic resistance) R_{out} max.	0.5 kOhm		
Environmental data			
EMC	EN 61000-6-2, EN 61000-6-4		
Vibration to EN 60068-2-6			
Frequency	10 - 55 Hz		
Amplitude	0.35 mm		
Climatic suitability	EN 60068-2-78		
Airgap creepage in accordance with	IEC 60664-1		
Pollution degree	2		
Overvoltage category	III		
Rated insulation voltage	300 V		
Rated impulse withstand voltage			
Measuring circuit	6.0 kV		
Supply voltage, auxiliary contacts, analogue output	4.0 kV		
Ambient temperature	-10 - 55 °C		
Storage temperature	-25 - 85 °C		
Protection type			
Mounting (e.g. cabinet)	IP54		
Housing	IP40		
Terminals	IP20		
Mechanical data			
Housing material			
Housing	PC		
Front	PC		
Cross section of external conductors with screw terminals			
1 core flexible	0.25 - 2.50 mm ² , 24 - 12 AWG No. 760100		
with crimp connectors, without insulating sleeve	0.25 - 1.00 mm ² , 24 - 16 AWG No. 760100		
without crimp connectors or with TWIN crimp connectors	0.20 - 1.50 mm ² , 24 - 16 AWG No. 760100		
Torque setting with screw terminals	0.50 Nm No. 760100		
Cross section of external conductors with spring-loaded terminals: Flexible with/without crimp connectors	0.20 - 2.50 mm ² , 24 - 12 AWG No. 761100		
Stripping length	9 mm No. 761100		
Dimensions			
Height	100.0 mm No. 761100 98.0 mm No. 760100		
Width	45.0 mm		
Depth	120.0 mm		
Weight	370 g		
Order reference			
Type	Features	Terminals	Order no.
PMD s10	24 - 240 V AC/DC	With screw terminals	760 100
PMD s10 C	24 - 240 V AC/DC	With cage clamp terminals	761 100