

# Monitoring Relays 3-Phase Load Guard Types DWA01, PWA01

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DWA01



PWA01

- Cos  $\phi$  monitoring relays
- Measuring if power factor is within set limits
- Measure on own power supply (voltage) and current for balanced systems
- Measuring ranges for current: 5A and MI current transformers range
- Power ON delay 1, 2 or 6 s selectable
- Knob adjustable level on absolute scale
- Output: 8 A SPDT relay Normally Energized
- For mounting on DIN-rail in accordance with DIN/EN 50 022 (DWA01) or plug-in module (PWA01)
- 22.5 mm Euronorm housing (DWA01) or 36 mm plug-in module (PWA01)
- LED indication for power supply and output ON

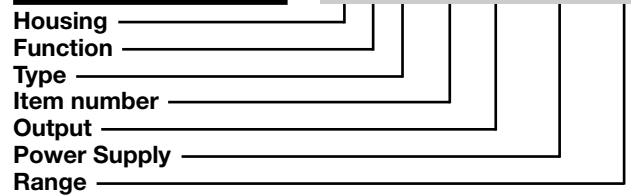
## Product Description

DWA01 and PWA01 are precise over or under cos  $\phi$  monitoring relays. The relays monitor their own power supply voltage and the current of a balanced 3-phase system.

For current measure direct connection, 5A standard current transformers and MI CT can be used. The LED's indicate the state of the alarm and the output relay.

## Ordering key

**DWA 01 C M48 5A**



## Type Selection

Mounting	Output	Supply: 208 to 240 VAC	Supply: 380 to 415 VAC	Supply: 380 to 480 VAC
DIN-rail	SPDT	<b>DWA 01 C M23 5A</b>		
Plug-in	SPDT	<b>PWA 01 C M23 5A</b>	<b>PWA 01 C M48 5A</b>	<b>DWA 01 C M48 5A</b>

## Input Specifications

Input			Note:
Voltage (Own power supply): 3 - phase	DWA01: PWA01: M23: DWA01CM48: PWA01CM48:	L1, L2, L3 5, 6, 7 208 to 240 VAC $\pm$ 15% 380 to 480 VAC $\pm$ 15% 380 to 415 VAC $\pm$ 15%	The input voltage cannot raise over 300 VAC with respect to ground (PWA01 only).
1 - phase	DWA01CM235A: PWA01CM235A:	L1, L3 5, 7 208 to 240 VAC $\pm$ 15%	<b>Hysteresis</b> ~ cos $\phi$ = 0,02 - fixed
Current	DWA01: PWA01:	5A: Y1, Y2 MI CT: Y1, Y3 5A: 7, 5 MI CT: 7, 6	

## Measuring ranges

	Level	
Power factor (cos $\phi$ )	0.1 to 0.99	
Direct input	<b>AACrms</b> 0.5 to 5 A	<b>Max. curr.</b> 30A 30s
Standard CT (examples)		
TADK 2 50 A/5 A	5 to 50 A	60 A
TAD 2 150 A/5 A	15 to 150 A	180 A
TAD 6 400 A/5 A	40 to 400 A	480 A
TAD 12 1000 A/5 A	100 to 1000 A	1200 A
TACO 200 6000 A/5 A	600 to 6000 A	7200 A
MI CT ranges	<b>AAC rms</b>	<b>Max. curr.</b>
MI 100	10 to 100 A	250 AAC
MI 500	50 to 500 A	750 AAC

## Output Specifications

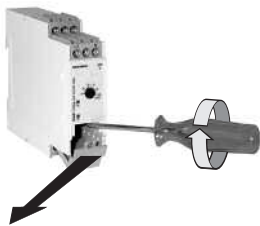
<b>Output</b>	SPDT relay
<b>Rated insulation voltage</b>	250 VAC
<b>Contact ratings (AgSnO<sub>2</sub>)</b>	$\mu$
Resistive loads	AC 1 8 A @ 250 VAC DC 12 5 A @ 24 VDC
Small inductive loads	AC 15 2.5 A @ 250 VAC DC 13 2.5 A @ 24 VDC
<b>Mechanical life</b>	$\geq 30 \times 10^6$ operations
<b>Electrical life</b>	$\geq 10^5$ operations (at 8 A, 250 V, cos $\phi$ = 1)
<b>Operating frequency</b>	$\leq 7200$ operations/h
<b>Dielectric strength</b>	
Dielectric voltage	$\geq 2$ kVAC (rms)
Rated impulse withstand volt.	4 kV (1.2/50 $\mu$ s)

## Supply Specifications

<b>Power supply</b> Rated operational voltage through terminals:	Overvoltage cat. III (IEC 60664, IEC 60038)
DWA01:	L1, L2, L3
PWA01:	5, 6, 7
M23	177 to 276 VAC 45 to 65 Hz
DWA01CM48	323 to 552 VAC 45 to 65 Hz
PWA01CM48	323 to 477 VAC 45 to 65 Hz
Dielectric voltage supply to output	None 2kV
<b>Rated operational power</b> Supplied by	13 VA @400VAC L1 and L3

## Function/Delay/Level Settings

**Level setting (cos  $\phi$ ):**  
Knob adjustable on absolute scale, from 0.1 to 0.99



### Setting of function and power ON delay

Adjust the desired function (over or underload monitoring) with DIP switch 1 and the power ON delay with DIP Switches 3 and 4 as shown on the below table. To access the DIP-switch open the plastic cover using a screwdriver as shown on the left.

NO	←	<b>Monitoring function</b>
1	<input type="checkbox"/>	ON: Under cos $\phi$ OFF: Over cos $\phi$
2	<input type="checkbox"/>	<b>Not used</b>
3	<input type="checkbox"/>	<b>Power ON delay</b> SW3 SW4 OFF OFF: 6 sec ON OFF: 2 sec ON ON: 1 sec
4	<input type="checkbox"/>	

## General Specifications

<b>Power ON delay</b>	1, 2, or 6 s $\pm$ 0.5 s
<b>Reaction time</b>	(input signal variation from -20% to +20% or from +20% to -20% of set value) Alarm ON delay < 400 ms Alarm OFF delay < 400 ms
<b>Accuracy</b>	(15 min warm-up time) Temperature drift $\pm$ 1000 ppm/ $^{\circ}$ C Repeatability $\pm$ 0.5% on full-scale
<b>Indication for</b>	Power supply ON LED, green Output ON LED, yellow
<b>Environment</b>	Degree of protection IP 20 Pollution degree 3 (DWA01), 2 (PWA01) Operating temperature @ Max. voltage, 50 Hz -20 to 60 $^{\circ}$ C, R.H. < 95% @ Max. voltage, 60 Hz -20 to 50 $^{\circ}$ C, R.H. < 95% Storage temperature -30 to 80 $^{\circ}$ C, R.H. < 95%
<b>Housing dimensions</b>	DIN-rail version 22.5 x 80 x 99.5 mm Plug-in version 36 x 80 x 94 mm
<b>Weight</b>	Approx. 200 g
<b>Screw terminals</b>	Tightening torque Max. 0.5 Nm acc. to IEC 60947
<b>Approvals</b>	UL, CSA
<b>CE-Marking</b>	Yes
<b>EMC</b>	Electromagnetic Compatibility Immunity According to EN 61000-6-2 Emission According to EN 61000-6-3

## Mode of Operation

DWA01 and PWA01 can be used for monitoring the actual load of asynchronous motors.

The relays measure the 3-phase supply voltage and the current of the phase L1 connected to an asynchronous motor.

The relay monitor the cosine of the angle between motor current and motor voltage (cos  $\phi$ ).

As cos  $\phi$  varies with the load of the motor, overload (or

underload) can be indirectly detected by DWA01 and PWA01.

The relation between the load and cos  $\phi$  depends on the type of motor.

As a guideline to ensure correct working conditions for a motor, the level could be set above (or below) the cos  $\phi$  marking on the motor. It is however recommended to make the adjustment in connection with a practical test. The relay has an inhibit

delay at power ON in order to avoid overload detection during motor start.

### Example 1:

Overload monitoring. The relay operates and the yellow LED is ON as long as cos  $\phi$  is below the set limit. The relay releases when it exceeds the set level.

### Example 2:

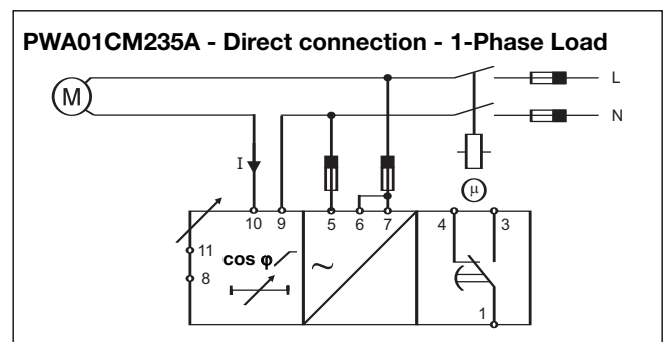
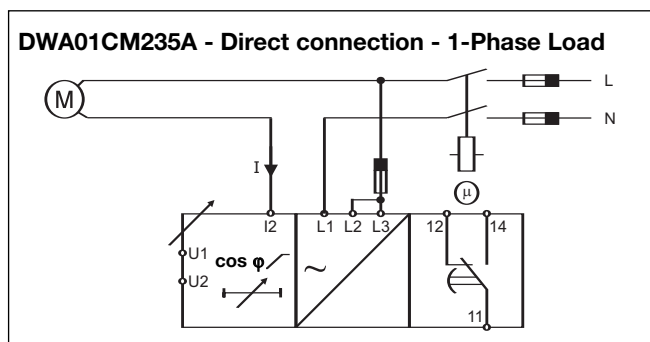
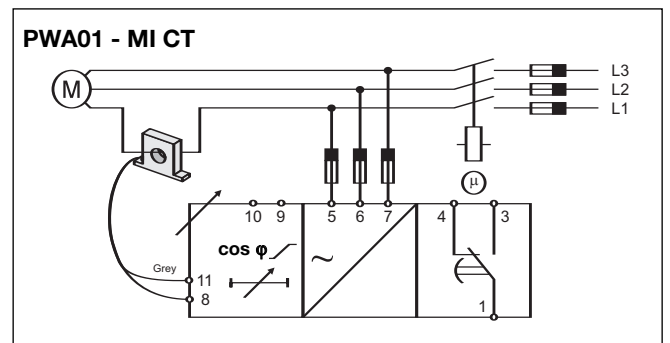
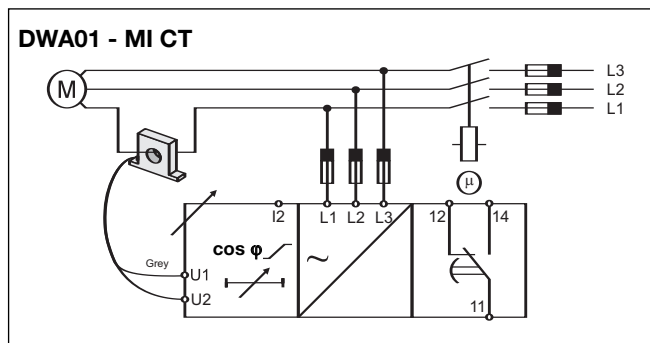
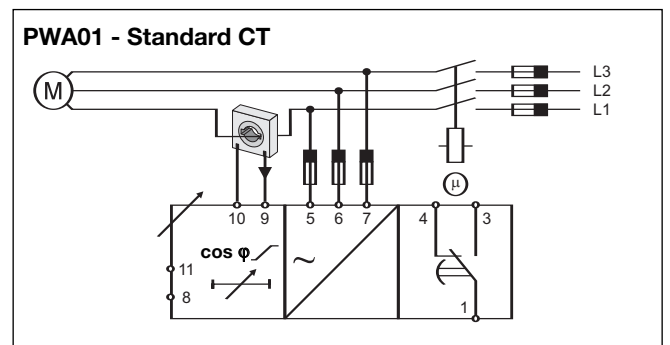
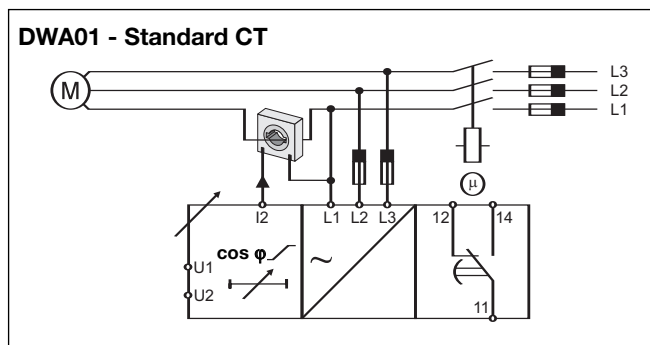
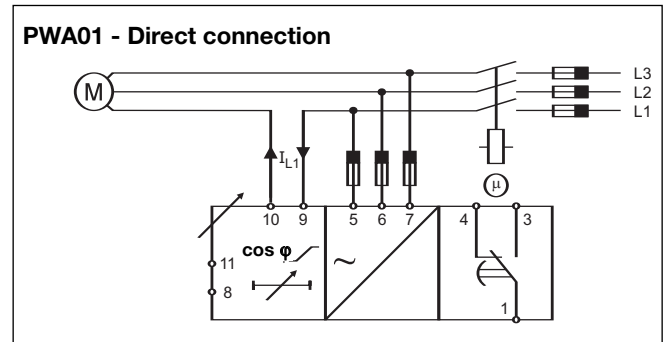
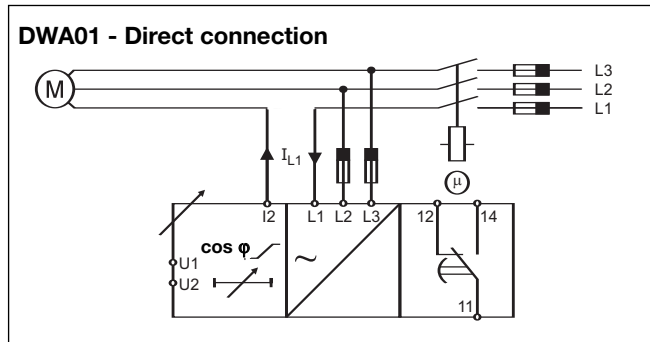
Underload monitoring. The relay operates and the

yellow LED is ON as long as cos  $\phi$  is above the set limit. The relay releases when it drops below the set level.

### Example 3:

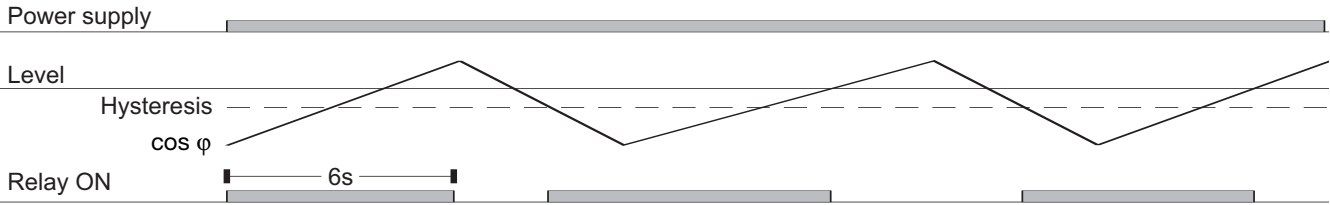
DWA01CM235A and PWA01CM235A can be used for monitoring the cos  $\phi$  of a 1-Phase load with 208 to 240 V AC mains voltage. In this case the power supply has to be connected between L1, L3 (or 5, 7) and L2 and L3 (or 6 and 7) have to be connected.

## Wiring Diagrams

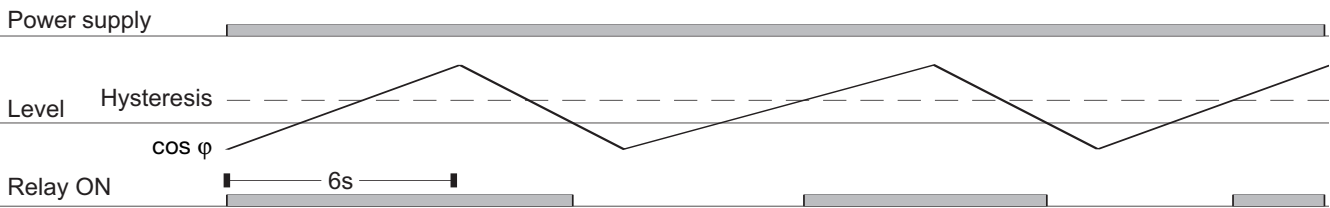


## Operation Diagrams

### Overload monitoring

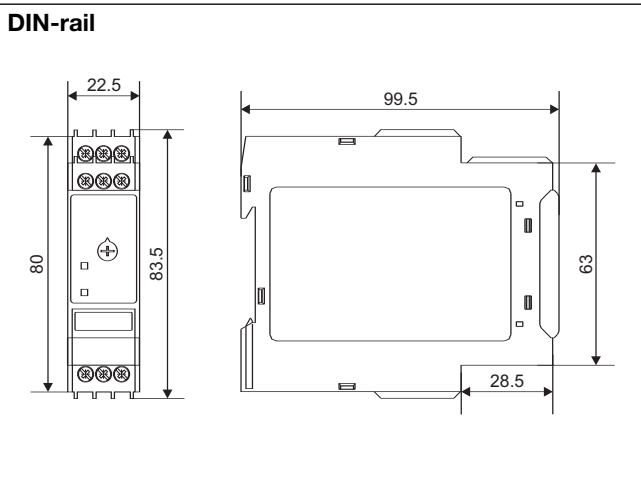


### Underload monitoring



## Dimensions

### DIN-rail



### Plug-in

