

# 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 their 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**

Housing	_____
Function	_____
Type	_____
Item number	_____
Output	_____
Power Supply	_____
Range	_____

## Type Selection

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

## Input Specifications

Input			Measuring ranges		
Voltage (Own power supply): 3 - phase	DWA01:	L1, L2, L3	Power factor (cos φ)	Level 0.1 to 0.99	
	PWA01:	5, 6, 7		AACrms 0.5 to 5 A	Max. curr. 30A 30s
	M23:	208 to 240 VAC ± 15%			
	DWA01CM48:	380 to 480 VAC ± 15%			
PWA01CM48:	380 to 415 VAC ± 15%				
1- phase	DWA01CM235A:	L1, L3	Direct input		
	PWA01CM235A:	5, 7		Standard CT (examples)	
Current		208 to 240 VAC ± 15%	TADK 2 50 A/5 A		5 to 50 A
	DWA01:	5A: L1, I2	CTD1 150 A/5 A	15 to 150 A	180 A
		MI CT: U1, U3	CTD4 400 A/5 A	40 to 400 A	480 A
	PWA01:	5A: 9, 10	TAD12 1000 A/5 A	100 to 1000 A	1200 A
		MI CT: 8, 11	TACO200 6000 A/5 A	600 to 6000 A	7200 A
			MI CT ranges		
			MI 100	10 to 100 A	250 AAC
			MI 500	50 to 500 A	750 AAC
			<b>Note:</b> The input voltage cannot raise over 300 VAC with respect to ground (PWA01 only).		
			<b>Hysteresis</b>	~ cos φ = 0,02 - fixed	

## Output Specifications

<b>Output</b>	SPDT relay
<b>Rated insulation voltage</b>	250 VAC
<b>Contact ratings</b> (AgSnO <sub>2</sub> )	μ
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>	≥ 30 x 10 <sup>6</sup> operations
<b>Electrical life</b>	≥ 10 <sup>5</sup> operations (at 8 A, 250 V, cos φ = 1)
<b>Operating frequency</b>	≤ 7200 operations/h
<b>Dielectric strength</b>	
Dielectric voltage	≥ 2 kVAC (rms)
Rated impulse withstand volt.	4 kV (1.2/50 μs)

## Supply Specifications

<b>Power supply</b>	Overvoltage cat. III (IEC 60664, IEC 60038)
Rated operational voltage through terminals:	
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>	13 VA @400VAC Supplied by L1 and L3

## General Specifications

<b>Power ON delay</b>	1, 2, or 6 s ± 0.5 s	<b>Housing</b>	
<b>Reaction time</b>	(input signal variation from -20% to +20% or from +20% to -20% of set value)	Dimensions	DWA01: 22.5 x 80 x 99.5 mm PWA01: 36 x 80 x 94 mm
Alarm ON delay	< 400 ms	Material	PA66 or Noryl
Alarm OFF delay	< 400 ms	<b>Weight</b>	Approx. 200 g
<b>Accuracy</b>	(15 min warm-up time)	<b>Screw terminals</b>	
Temperature drift	± 1000 ppm/°C	Tightening torque	Max. 0.5 Nm acc. to IEC 60947
Repeatability	± 0.5% on full-scale	<b>Product standard</b>	EN 60255-6
<b>Indication for</b>		<b>Approvals</b>	UL, CSA
Power supply ON	LED, green	<b>CE Marking</b>	L.V. Directive 2006/95/EC EMC Directive 2004/108/EC
Output ON	LED, yellow	<b>EMC</b>	
<b>Environment</b>		Immunity	According to EN 60255-26 According to EN 61000-6-2
Degree of protection	IP 20	Emissions	According to EN 60255-26 According to EN 61000-6-3
Pollution degree	3 (DWA01), 2 (PWA01)		
Operating temperature			
@ Max. voltage, 50 Hz	-20 to 60°C, R.H. < 95%		
@ Max. voltage, 60 Hz	-20 to 50°C, R.H. < 95%		
Storage temperature	-30 to 80°C, R.H. < 95%		

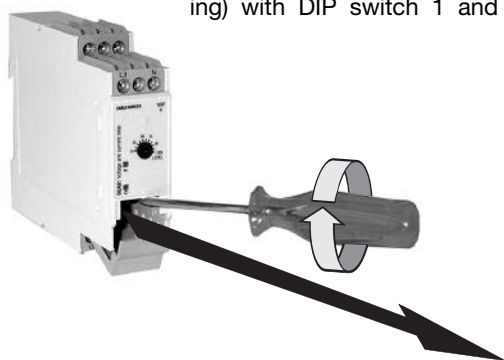
## Function/Delay/Level Settings

**Level setting (cos φ):**  
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.



ON 1	Monitoring function
2	ON: Under cos φ
3	OFF: Over cos φ
4	<b>Not used</b>
	<b>Power ON delay</b>
	SW3 SW4
	OFF OFF: 6 sec
	ON OFF: 2 sec
	ON ON: 1 sec

## 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 ( $\cos \varphi$ ).

As  $\cos \varphi$  varies with the load of the motor, overload (or underload) can be indirectly detected by DWA01 and

PWA01.

The relation between the load and  $\cos \varphi$  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  $\cos \varphi$  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  $\cos \varphi$  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  $\cos \varphi$  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  $\cos \varphi$  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.

## Operation Diagrams

### Overload monitoring

Power supply

Level

Hysteresis

$\cos \varphi$

Relay ON

6s

### Underload monitoring

Power supply

Level

Hysteresis

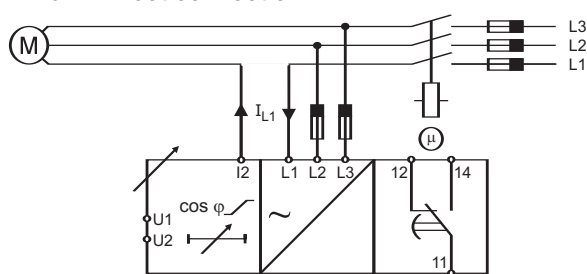
$\cos \varphi$

Relay ON

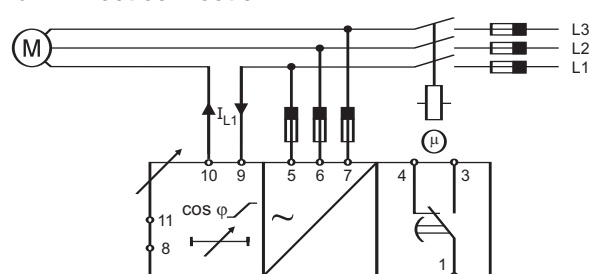
6s

## Wiring Diagrams

### DWA01 - Direct connection

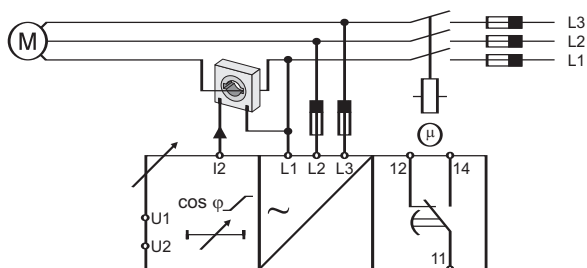


### PWA01 - Direct connection

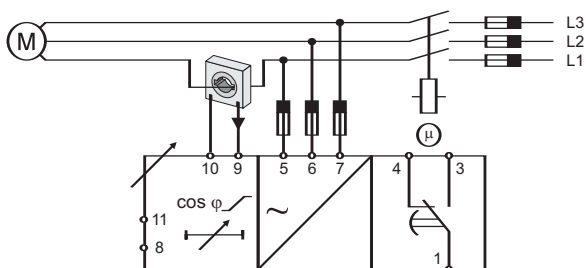


## Wiring Diagrams (cont.)

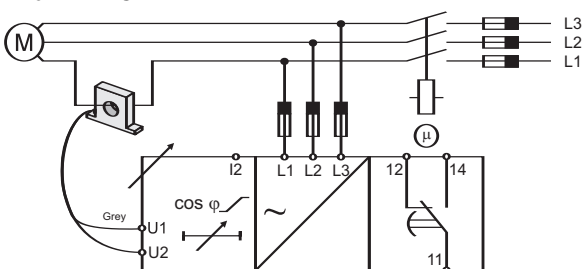
## DWA01 - Standard CT



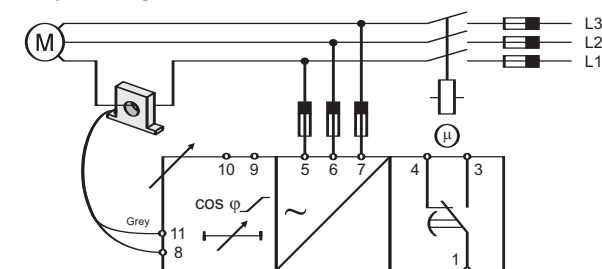
## PWA01 - Standard CT



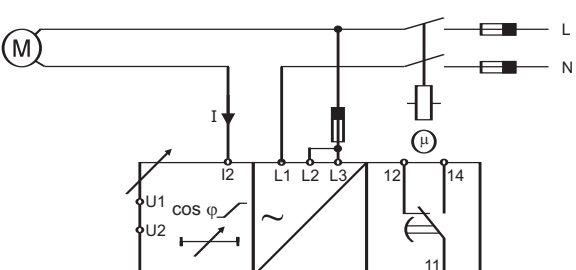
DWA01 - MI CT



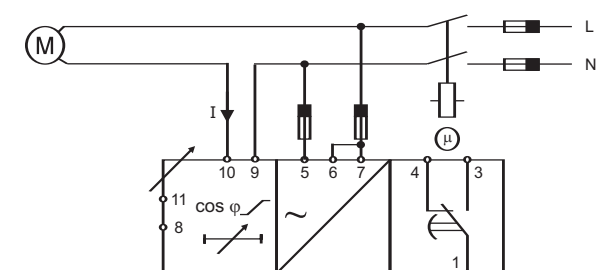
**PWA01 - MI CT**



**DWA01CM235A - Direct connection - 1-Phase Load**

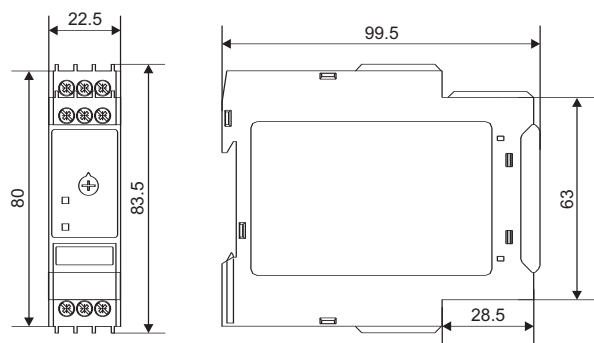


### PWA01CM235A - Direct connection - 1-Phase Load

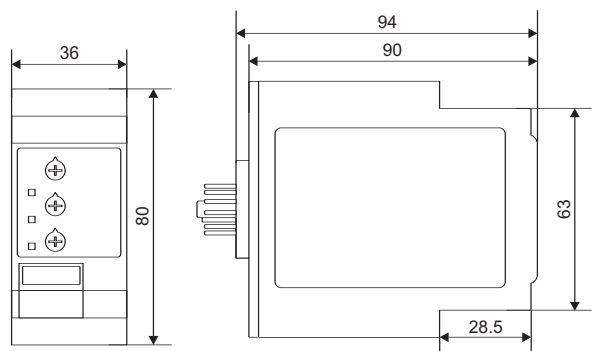


## Dimensions

DIN-rail



### Plug-in



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