Monitoring Relays
3-Phase Load Guard
Types DWA01, PWA01

CARLO GAVAZZI


DWA01


PWA01

- **Cos φ 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 φ 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**		**DWA 01 C M48 5A**
Plug-in	SPDT	**PWA 01 C M23 5A**	**PWA 01 C M48 5A**	

Input Specifications

Input		
Voltage (Own power supply):		
3 - phase	DWA01:	L1, L2, L3
	PWA01:	5, 6, 7
	M23:	208 to 240 VAC ± 15%
	DWA01CM48:	380 to 480 VAC ± 15%
	PWA01CM48:	380 to 415 VAC ± 15%
1- phase	DWA01CM235A:	L1, L3
	PWA01CM235A:	5, 7
		208 to 240 VAC ± 15%
Current	DWA01:	5A: Y1, Y2
		MI CT: Y1, Y3
	PWA01:	5A: 7, 5
		MI CT: 7, 6

Measuring ranges		
	Level	
Power factor (cos φ)	0.1 to 0.99	
	AACrms	**Max. curr.**
Direct input	0.5 to 5 A	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	**AAC rms**	**Max. curr.**
MI 100	10 to 100 A	250 AAC
MI 500	50 to 500 A	750 AAC

Note: The input voltage cannot raise over 300 VAC with respect to ground (PWA01 only).	
Hysteresis	~ cos φ = 0,02 - fixed

Output Specifications

Output		SPDT relay
Rated insulation voltage		250 VAC
Contact ratings ($AgSnO_2$)		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
Mechanical life		≥ 30 x 10^6 operations
Electrical life		≥ 10^5 operations (at 8 A, 250 V, cos φ = 1)
Operating frequency		≤ 7200 operations/h
Dielectric strength		
Dielectric voltage		≥ 2 kVAC (rms)
Rated impulse withstand volt.		4 kV (1.2/50 μs)

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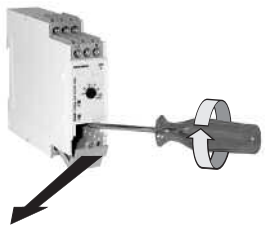
Supply Specifications

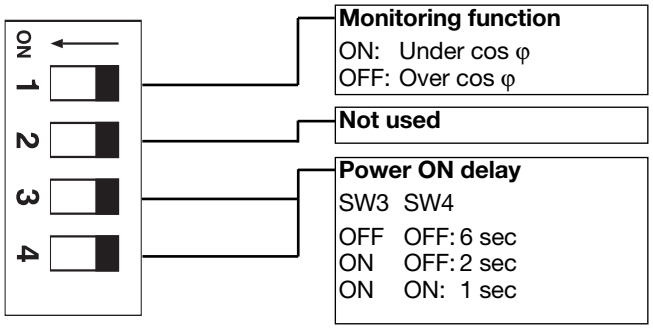
Power supply	Overvoltage cat. III
Rated operational voltage through terminals:	(IEC 60664, IEC 60038)
DWA01:	L1, L2, L3
PWA01:	5, 6, 7
M23	177 to 276 VAC 45 to 65 Hz
DWA01CM48	323 to 552 VAC 45 to 65 Hz
PWA01CM48	323 to 477 VAC 45 to 65 Hz
Dielectric voltage	None
supply to output	2kV
Rated operational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

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.



General Specifications

Power ON delay	1, 2, or 6 s ± 0.5 s
Reaction time	(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
Accuracy	(15 min warm-up time)
Temperature drift	± 1000 ppm/°C
Repeatability	± 0.5% on full-scale
Indication for	
Power supply ON	LED, green
Output ON	LED, yellow
Environment	
Degree of protection	IP 20
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%
Housing dimensions	
DIN-rail version	22.5 x 80 x 99.5 mm
Plug-in version	36 x 80 x 94 mm
Weight	Approx. 200 g
Screw terminals	
Tightening torque	Max. 0.5 Nm acc. to IEC 60947
Approvals	UL, CSA
CE-Marking	Yes
EMC	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 φ).
As cos φ 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 φ 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 φ 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.

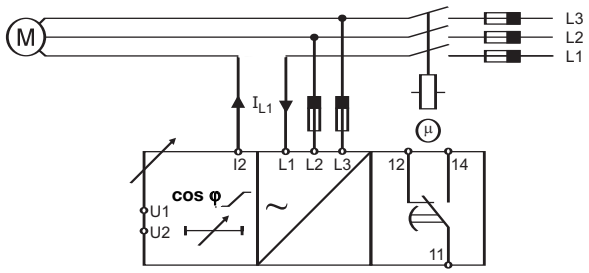
Example 1:
Overload monitoring.
The relay operates and the yellow LED is ON as long as cos φ is below the set limit.
The relay releases when it exceeds the set level.

Example 2:
Underload monitoring.
The relay operates and the yellow LED is ON as long as cos φ is above the set limit.
The relay releases when it drops below the set level.

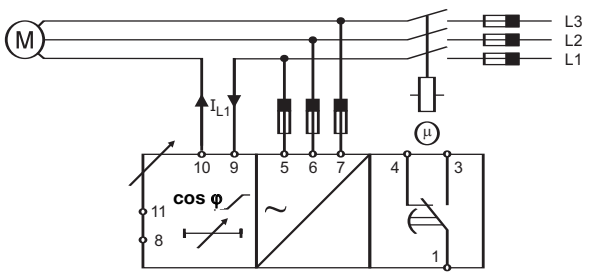
Example 3:
DWA01CM235A and PWA01CM235A can be used for monitoring the cos φ of a 1-Phase load with 208 to 240 V AC mains voltgage. In this case the power supply has to be connected between L1, L3 (or 5, 7) and L2 and L3 (or 6 and 7) have to be connected.

Wiring Diagrams

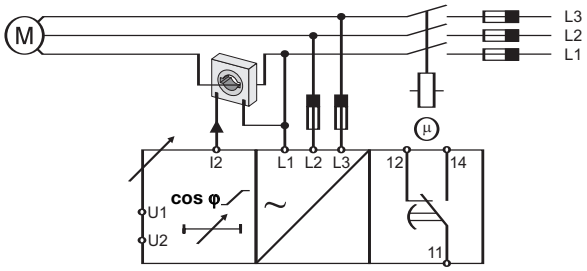
DWA01 - Direct connection



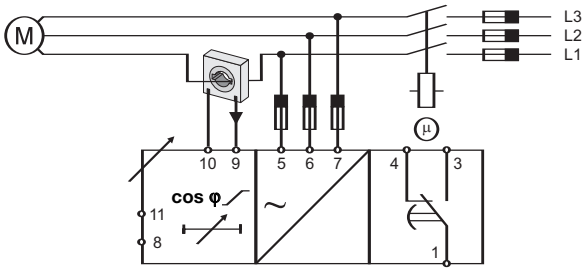
PWA01 - Direct connection



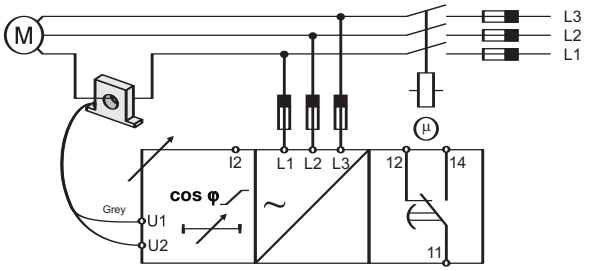
DWA01 - Standard CT



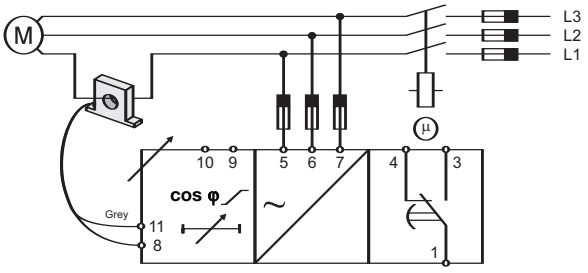
PWA01 - Standard CT



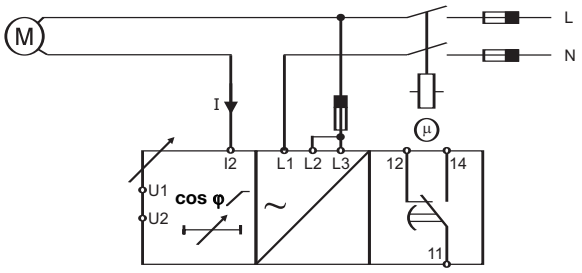
DWA01 - MI CT



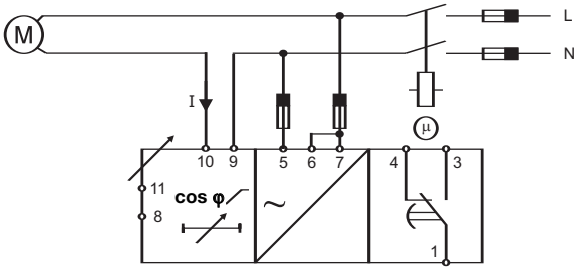
PWA01 - MI CT



DWA01CM235A - Direct connection - 1-Phase Load

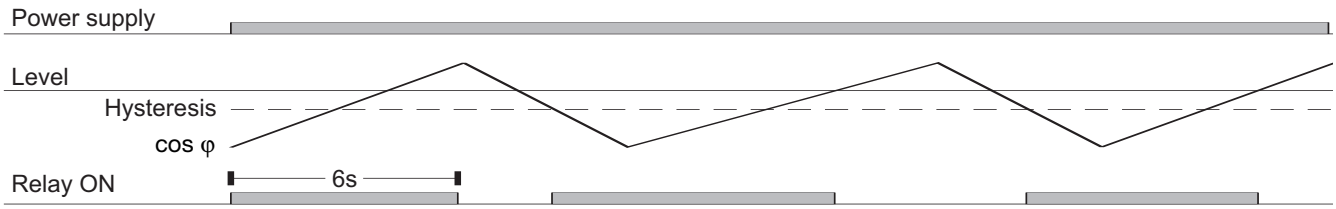


PWA01CM235A - Direct connection - 1-Phase Load

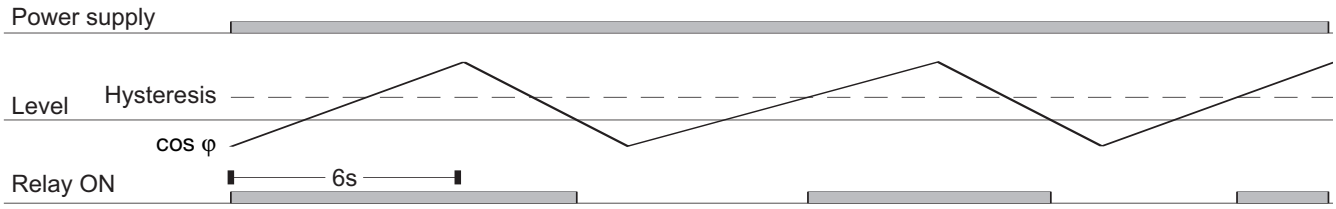


Operation Diagrams

Overload monitoring

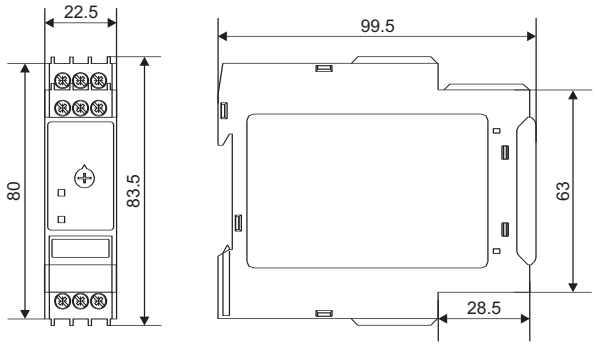


Underload monitoring



Dimensions

DIN-rail



Plug-in