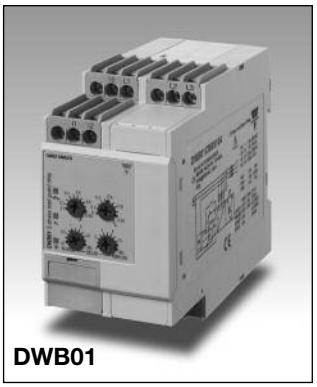
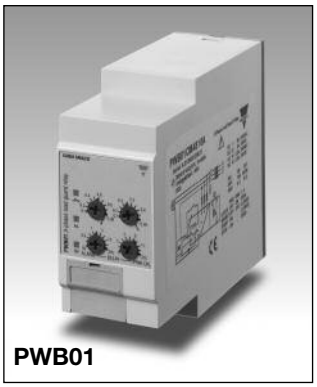
# Monitoring Relays
# 3-Phase Load Guard
# Types DWB01, PWB01


DWB01


PWB01

- **TRMS load guard relays for three phase balanced applications**
- **Measuring if the power factor is within set limits**
- **Measure voltage on own power supply**
- **Measuring ranges: 5A, 10A, MI current transformers**
- **Power ON delay 1 to 30 s knob adjustable**
- **Separately adjustable upper/lower level on absolute scale**
- **Programmable latching or inhibit at set level**
- **Automatic and manual start and stop of the system**
- **Output: 8 A SPDT relay N.D. or N.E. selectable**
- **For mounting on DIN-rail in accordance with DIN/EN 50 022 (DWB01) or plug-in module (PWB01)**
- **45 mm Euronorm housing (DWB01) or 36 mm plug-in module (PWB01)**
- **LED indication for relay, alarm and power supply ON**

## Product Description

DWB01 and PWB01 are precise TRMS power factor monitoring relays for 3-phase balanced systems. They can be used for monitoring the actual load of asynchronous motors and other symmetrical loads, where the power factor is almost proportional to the load.
The relay measures the power factor (cos φ), that is the ratio between the active and the apparent power of a motor.
Start/stop input allows to use a manual switch to start and stop the motor, without the need of an auxiliary device.
The advantage of using the latch function is that the relay can be kept energized even after the end of the alarm condition. Inhibit function can be used to avoid relay operation when not desired (maintenance, transients).
The LED's indicate the state of the alarm and the output relay.

## Ordering key

**DWB 01 C M48 10A**

- **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 | Supply: 600 to 690 VAC |
|---|---|---|---|---|---|
| DIN-rail | SPDT | **DWB 01 C M23 10A** | | **DWB 01 C M48 10A** | **DWB01 C M69 10A** |
| Plug-in | SPDT | **PWB 01 C M23 10A** | **PWB 01 C M48 10A** | | |

## Input Specifications

**Input**

| | | |
|---|---|---|
| Voltage (Own power supply): | | |
| 3 - phase | DWB01: | L1, L2, L3 |
| | PWB01: | 5, 6, 7 |
| | M23: | 208 to 240 VAC ± 15% |
| | DWB01CM48: | 380 to 480 VAC ± 15% |
| | PWB01C 8: | 380 to 415 VAC ± 15% |
| | DWB01CM69: | 600 to 690 VAC ± 15% |
| 1- phase | DWB01CM23: | L1, L2 (connect pins L2, L3) |
| | PWB01CM23: | 5, 6 (connect pins 6, 7) |
| | | 208 to 240 VAC ± 15% |
| Current: | DWB01: | 5A, 10A: I1, I2 |
| | | MI...: U1, U2 |
| | PWB01: | 5A, 10A: 11, 10 |
| | | MI...: 9, 8 |

| **Measuring ranges** | **Upper level** | **Lower level** |
|---|---|---|
| Power factor (cos φ) | 0.1 to 0.99 | 0.1 to 0.99 |
| | **AACrms** | **Max. curr. (30 s)** |
| Direct input: | 0.5 to 5A | 30A |
| | 1 to 10A | 50A |
| Standard CT (examples) | | |
| TADK2 50 A/5 A | 5 to 50 A | 60 A |
| TAD2 150 A/5 A | 15 to 150 A | 180 A |
| TAD6 400 A/5 A | 40 to 400 A | 480 A |
| TAD12 1000 A/5 A | 100 to 1000 A | 1200 A |
| TACO200 6000 A/5 A | 600 to 6000 A | 7200 A |
| MI CT ranges | | |
| MI 100 | 10 to 100 A | 325 AAC |
| MI 500 | 50 to 500 A | 1000 AAC |

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## Input Specifications (cont.)

| | |
|---|---|
| **Note:** The input voltage cannot raise over 300 VAC with respect to ground (PWB01 only) | |
| **Contact input** | |
| DWB01 | Terminals Z1, U1 |
| PWB01 | Terminals 2, 9 |
| Disabled | > 10 kΩ |
| Enabled | < 500 Ω |
| Pulse width | > 500 ms |
| **Hysteresis** | PF approx 0.1 |

## 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** | According to EN 60947-1 |
| Dielectric voltage | ≥ 2 kVAC (RMS) |
| Rated impulse withstand volt. | 4 kV (1.2/50 μs) |

## General Specifications

| | |
|---|---|
| **Power ON delay** | 1 to 30 s ± 0.5 s |
| **Reaction time** | (input signal variation from -20% to +20% or from +20% to -20% of set value) |
| Alarm ON delay | < 200 ms |
| Alarm OFF delay | < 200 ms |
| **Accuracy** | (15 min warm-up time) |
| Temperature drift | ± 1000 ppm/°C |
| Delay ON alarm | ± 10% on set value ± 50 ms |
| Repeatability | ± 0.5% on full-scale |
| **Indication for** | |
| Power supply ON | LED, green |
| Alarm ON | LED, red (flashing 2 Hz during delay time) |
| Output relay ON | LED, yellow |
| **Environment** | |
| Degree of protection | IP 20 |
| Pollution degree | 3 (DWB01), 2 (PWB01) |
| 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 DWB01 | 45 x 80 x 99.5 mm |
| PWB01 | 36 x 80 x 94 mm |
| **Weight** | Approx. 250 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 |
| Emissions | According to EN 61000-6-3 |

## Supply Specifications

| | |
|---|---|
| **Power supply** | Overvoltage cat. III |
| Rated operational voltage | (IEC 60664, IEC 60038) |
| Through terminals: | |
| DWB01: | L1, L2, L3 |
| PWB01: | 5, 6, 7 |
| M23 | 177 to 276 VAC 45 to 65 Hz |
| DWB01CM48 | 323 to 552 VAC45 to 65 Hz |
| PWB01CM48 | 323 to 477 VAC 45 to 65 Hz |
| DWB01CM69 | 510 to 793 VAC 45 to 65 Hz |
| Dielectric voltage | None |
| Dielectric voltage supply to output | 4 kV |
| **Rated operational power** | |
| M23: | 9 VA @ 230 VAC, 50 Hz |
| M48: | 13 VA @ 400 VAC, 50 Hz |
| M69: | 21 VA @ 600 VAC, 50 Hz |
| | Supplied by L1 and L2 |

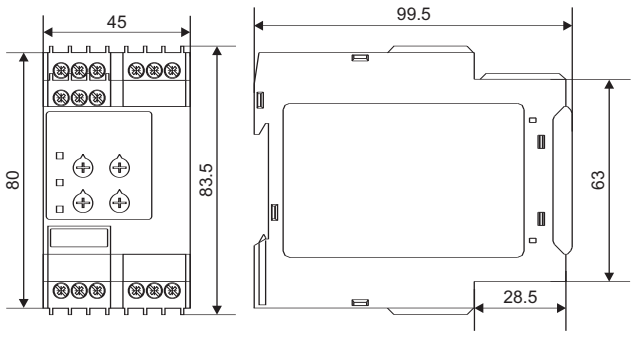
## Mode of Operation

DWB01 and PWB01 can be used for monitoring the actual load of asynchronous motors.
The relay measures the absolute value for the power factor of the system PF= Active Power/Apparent Power that is for balanced system with sinus waveforms the cosine of the angle between motor current and motor voltage (cos φ).
As cos φ varies with the load of the motor, underload and overload can be indirectly detected by DWB01 and PWB01.
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 upper level could be set above the cos φ marking on the motor, and the lower level under this value. It is anyway recommended to make the adjustment in connection with a practical test. The relay has an adjustable power ON delay in order to avoid overload detection during motor start.

**Example 1**
Latching mode, relay NE
In this application DWB01 or PWB01 are connected to an external current metering transformer, type MI..., (connected between U1 & U2) as

## Dimensions

**DIN-rail**




**Plug-in**