

- Industrial design
- Width 45mm
- Power factor monitoring in 1- and 3-phase mains
- Suitable for VFI (10 to 100Hz)
- Position of output relays presettable
- 2 change over contacts



Technical data

1. Functions

Power factor monitor of minimum threshold φ_1 (terminals 15-16-18) and the following additional functions (selectable by means of DIP-switches)

- DIP-Switch 1 additional maximum monitoring of threshold φ_2 (terminals 25-26-28) (Win) or additional minimum monitoring of threshold φ_2 , if $\varphi_2 > \varphi_1$ (φ_2 min)
- DIP-Switch 2 position of both output contacts either in on-position if fault occurs (n.o.) or in off-position if fault occurs (n.c.)
- DIP-Switch 3 alarm for disconnected consumer ($I = 0$)
- DIP-Switch 4 fault latch of threshold φ_1
- DIP-Switch 5 fault latch of threshold φ_2
- DIP-Switch 6 if E1 is closed there will be either no evaluation of threshold φ_2 (φ_2 off) or E1 switches contact 2 without delay (delay = 0)

2. Time ranges

	Adjustment range	
Start-up suppression time:	3s	3min
Tripping delay:	1s	40s

3. Indicators

- Green LED ON: indication of supply voltage
- Green LED flashes: indication of start-up suppression time
- Red LED ON: indication of fault of the corresponding threshold
- Red LED flashes: indication of tripping delay of the corresponding threshold
- Red LED φ_2 flashes (2:1) external alarm on control contact E1 (if delay = 0)
- All LED flashing indication of disconnected consumer (if $I = 0$)
- All LED flashing (sequence): wrong connection of L1i and L1k) or frequency out of range

4. Mechanical design

Self-extinguishing plastic housing, IP rating IP40
 Mounted on DIN-Rail TS 35 according to EN 50022
 Mounting position: any
 Shockproof terminal connection according to VBG 4 (PZ1 required), IP rating IP20
 Initial torque: max. 1Nm

Terminal capacity:
 1 x 0.5 to 2.5mm² with/without multicore cable end
 1 x 4mm² without multicore cable end
 2 x 0.5 to 1.5mm² with/without multicore cable end
 2 x 2.5mm² flexible without multicore cable end

5. Input circuit

Supply voltage:	terminals A1-A2	(D24SC 24V)
24V AC	terminals A1-A2	(D24SC 110V)
110V AC	terminals A1-A2	(D24SC 230V)
230V AC		
Tolerance:		
24V AC	±10%	(D24SC 24V)
110V AC	±10%	(D24SC 110V)
230V AC	±10%	(D24SC 230V)

Rated frequency:	48 to 63Hz	
Rated consumption:	24V AC	3VA (2W) (D24SC 24V)
	110V AC	3VA (2W) (D24SC 110V)
	230V AC	3VA (2W) (D24SC 230V)
Duration of operation:	100%	
Reset time:	500ms	
Residual ripple for DC:	-	
Drop-out voltage:	>30% of the supply voltage	
Insulation voltage:	415V AC (according to IEC 664-1)	
Surge voltage:	4kV, overvoltage category III (according to IEC 664-1)	

6. Output circuit

- 2 potential free change over contacts
- Switching capacity (distance < 5mm): 1250VA (5A / 250V AC)
- Switching capacity (distance > 5mm): 2000VA (8A / 250V AC)
- Fusing: 8A fast acting
- Mechanical life: 20 x 10⁶ operations
- Electrical life: 2 x 10⁵ operations at 1000VA resistive load
- Switching frequency: max. 60/min at 100VA resistive load
 max. 6/min at 1000VA resistive load (according to IEC 947-5-1)
- Insulation voltage: 250V AC (according to IEC 664-1)
- Surge voltage: 4kV, overvoltage category III (according to IEC 664-1)

7. Measuring circuit

- Input: voltage terminals L1i-L1k-L2-L3
- Voltage range: 1-phase mains 24 to 400V AC
 3-phase mains 3(N)~ 24 to 440V
- Overload capacity: 1~ 400V AC 440V AC
 3(N)~ 440V 3(N)~ 500V
- Current range: 1 to 16A
- Overload capacity: 18A (90A max. 1s)
- Input resistance: <10m Ω
- Switching threshold: power factor 0.1 to 1.0
- Hysteresis: fixed, approx. 5%
- Insulation voltage: 500V AC (according to IEC 664-1)
- Surge voltage: 4kV, overvoltage category III (according to IEC 664-1)

8. Control contact E1

- Function: if E1 is closed there will be either no evaluation of threshold φ_2 or E1 switches contact Q2 without delay potential free, terminals E1-E2 (resp. \perp)
- Connections: no
- Loadable: no
- Line length: max. 10m (screened or twisted pair)
- Control pulse length: -

9. Control contact R1

- Function: external reset-key
- Connections: potential free, terminals R1-R2 (resp. \perp)
- Loadable: no
- Line length: max. 10m (screened or twisted pair)
- Control pulse length: -

Technical data

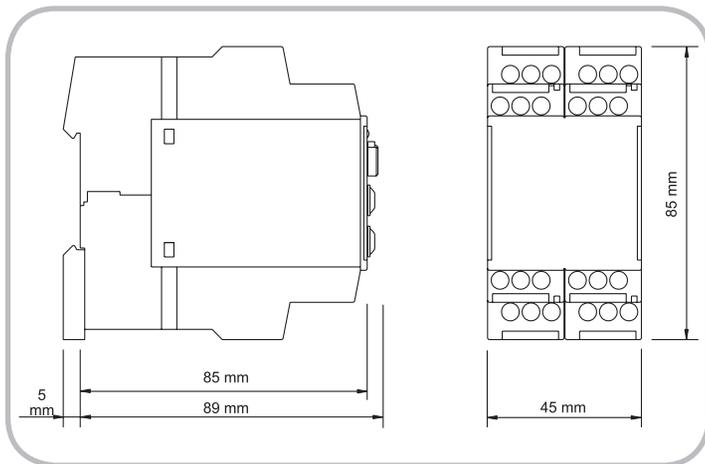
10. Accuracy

Base accuracy:	$\pm 3\%$ (of maximum scale value)
Adjustment accuracy:	$\pm 5\%$ (of maximum scale value)
Repetition accuracy:	$< 5\%$
Voltage influence:	$\leq 0.5\% / V$
Temperature influence:	$\leq 0.01\% / ^\circ C$

11. Ambient conditions

Ambient temperature:	-25 to +55°C (according to IEC 68-1) -25 to +40°C (according to UL 508)
Storage temperature:	-25 to +70°C
Transport temperature:	-25 to +70°C
Relative humidity:	15% to 85% (according to IEC 721-3-3 class 3K3)
Pollution degree:	3 (according to IEC 664-1)

12. Dimensions



Functions

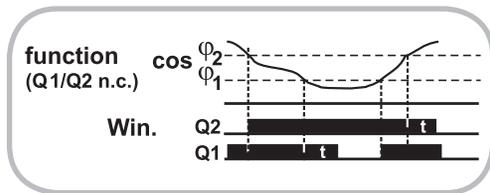
Load monitor for 1- or 3-phase mains

When the supply voltage U is applied, the set interval of the start-up suppression t_{START} begins (green LED flashes). Changes of the power factor during this period do not affect the state of the output relay. After the interval has expired the green LED is illuminated steadily.

Maximum monitoring of the threshold φ_2 (DIP-switch 1 in position Win)

When the measured power factor falls below the value adjusted at the $\cos\varphi_1$ -regulator, the set interval of the tripping delay (t_{DELAY}) begins (red LED φ_1 flashes). After the interval has expired and if the DIP-switch 2 is in the n.c.-position, the output relay Q1 switches into off-position (red LED φ_1 illuminated). When the measured value for the power factor again exceeds the set value, output relay Q1 switches into on-position (red LED φ_1 not illuminated). When the power factor exceeds the value adjusted at the $\cos\varphi_2$ -regulator, the set interval of the tripping delay (t_{DELAY}) begins (red LED φ_2 flashes). After the interval has expired the output relay Q2 switches into off-position (red LED φ_2 illuminated). The output relay again switches into on-position (red LED φ_2 not illuminated), when the measured value for the power factor falls below the set value.

When the DIP-switch 2 is in the n.o.-position, the mode of operation of the device remains unchanged, but the operation of both output relays is inverted.



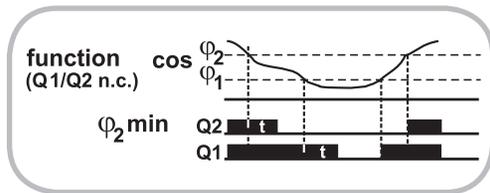
Additional minimum monitoring of the φ_2 -threshold $\perp\varphi$ (DIP-switch 1 in position φ_2 min)

The set value for φ_2 must be greater than that for φ_1 .

When the measured power factor falls below the value adjusted at $\cos\varphi_2$ -regulator, the set interval of the tripping delay (t_{DELAY}) begins (red LED φ_2 flashes). After the interval has expired and if the DIP-switch 2 is in the n.c.-position, the output relay Q2 switches into off-position (red LED φ_2 illuminated). When the power factor falls below the value adjusted at the $\cos\varphi_1$ -regulator, the set interval of the tripping delay (t_{DELAY}) begins again (red LED φ_1 flashes). After the interval has expired the output relay Q1 switches into off-position (red LED φ_1 illuminated).

Both output relays switch into on-position again (red LED for the corresponding threshold not illuminated), when the measured value for the power factor exceeds the value set at the according regulator.

When the DIP-switch 2 is in the n.o.-position, the mode of operation of the device remains unchanged, but the operation of both output relays is inverted.



Disconnected consumer (DIP-switch 3 in position I=0)

When the current flow between L1i and L1k is interrupted and if the DIP-switch 2 is in the n.c.-position, both output relays switch into off-position and all three LEDs are flashing in a sequence. When the current flow is restored, the measuring cycle is restarted with the set interval of the start-up suppression. When the DIP-switch 2 is in the n.o.-position, the mode of operation of the device remains unchanged, but the operation of both output relays is inverted.

Fault latch (DIP-switch 4 resp. 5 in position M1 resp. M2)

For both functions (Win as well as φ_2 min) it is possible to activate a fault latch.

If the function is selected for one of the two switching thresholds, (DIP-switch 4 in the position M1 for threshold $\cos\varphi_1$ resp. DIP-switch 5 in the position M2 for threshold $\cos\varphi_2$), a short term error will be stored after the expiration of the tripping delay. The measuring cycle is restarted with the set interval of the start-up suppression after activating the internal or external reset key.

No evaluation of the φ_2 -threshold (DIP-switch 6 in position φ_2 off)

For both functions (Win as well as φ_2 min) it is possible not to evaluate the threshold φ_2 . This can be done by bridging the terminals E1-E2 (resp. \perp) using an external key or jumper-link.

External alarm on terminals E1-E2 (resp. \perp)

(DIP-switch 6 in position delay=0)

For both functions (Win as well as φ_2 min) the bridging of the terminals E1-E2 (resp. \perp) using an external key is interpreted as an external alarm. When the DIP-switch 2 is in the n.c.-position, the output relay Q2 switches into off-position instantaneously and the red LED φ_2 flashes in a ratio of 2:1. The output relay Q2 switches into on-position again as soon as the external key is opened. When the DIP-switch 2 is in the n.o.-position, the mode of operation of the device remains unchanged, but the operation of both output relays is inverted.

► Connections

