- Industrial design
- Width 45mm
- Power factor monitoring in 1- and 3-phase mains
- Temperature monitoring of the motor winding (max. 6 PTC)
- Suitable for VFI (10 to 100Hz)
- Position of output relays presettable
- 2 change over contacts

Technical data

1. Functions

Power factor monitoring 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)
Red LED φ_2 and green LED flashing:	indication of thermistor fault
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:		
24V AC	terminals A1-A2	(D24SCT 24V)
110V AC	terminals A1-A2	(D24SCT 110V)
230V AC	terminals A1-A2	(D24SCT 230V)
Tolerance:		
24V AC	±10%	(D24SCT 24V)
110V AC	±10%	(D24SCT 110V)
230V AC	±10%	(D24SCT 230V)
Rated frequency:	48 to 63Hz	
Rated consumption:		
24V AC	3VA (2W)	(D24SCT 24V)
110V AC	3VA (2W)	(D24SCT 110V)
230V AC	3VA (2W)	(D24SCT 230V)
Duration of operation:	100%	
Reset time:	100ms	
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 10^6 operations
Electrical life:	2 x 10^5 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
	thermistor	terminals T1-T2 (resp. ⊥)
Voltage range:	1-phase mains	24 to 400V AC
	3-phase mains	3(N)~ 24 to 440V
Overload capacity:	400V AC	440V AC
	3(N)~ 440V	3(N)~ 500V
Current range:	1 to 16A	
Overload capacity:	18A (90A max.1s)	
Input resistance:	<10mΩ	
Switching threshold:	power factor	0.1 to 1.0
Hysteresis factor:	fixed, approx. 5%	
Insulation voltage:	500V AC (according to IEC 664-1)	
Surge voltage:	4kV, overvoltage category III (according to IEC 664-1)	
Initial resistance:		<1.5kΩ
Response value (relay in off-position):		≥3.6kΩ
Release value (relay in on-position):		≤1.8kΩ
Disconnection (short circuit thermistor):		no
Terminal voltage T1-T2:		max. 4.3V DC

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
Connections:	potential free terminals E1-E2 (resp. ⊥)
Loadable:	no
Line length:	max. 10m (screened or twisted pair)
Control pulse length:	-

Technical data

9. Control contact R1

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

10. Control contact T1

Function:	connection of max. 6 PTC-thermistors
Connections:	potential free, terminals T1-T2 (resp. ⊥)
Loadable:	no
Line length:	max. 10m (screened or twisted pair)
Control pulse length:	-

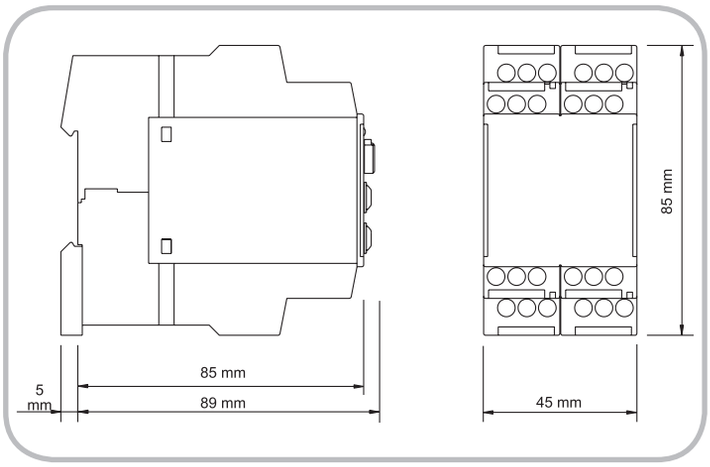
11. Accuracy

Base accuracy:	±3 (of maximum scale value)
Adjustment accuracy:	±5% (of maximum scale value)
Repetition accuracy:	<5%
Voltage influence:	≤0.5% / V
Temperature influence:	≤0.01% / °C

12. 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)

13. Dimensions



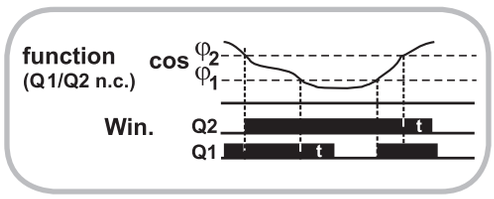
Functions

Load monitor for 1- or 3-phase mains and temperature monitoring of the motor winding

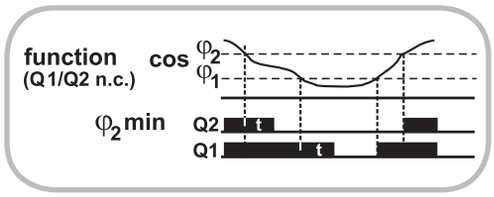
When the supply voltage U is applied, the set interval of the start-up suppression t_{START} begins (green LED flashing). Changes of the power factor during this period do not affect the state of the output relay. After the interval has expired the green LED is illuminated steadily.

In both functions (Win as well as φ2 min) the temperature monitoring is activated.
When the cumulative resistance of the PTC-circuit exceeds 3.6kΩ (at least one of the PTCs has reached the cut-off temperature) and if the DIP-switch 2 is in the n.c.-position, the output relay Q2 switches into off-position instantaneously (red LED φ2 and green LED are flashing). The output relay again switches into on-position (red LED not illuminated and green LED illuminated), if the cumulative resistance falls below 1.8kΩ by cooling down of the PTC.
When the DIP-switch 2 is in the n.o.-position, the mode of operation of the device remains unchanged, but the operation of the output relay Q2 is inverted.

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 cosφ1-regulator, the set interval of the tripping delay (t_{DELAY}) begins (red LED φ1 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 φ1 illuminated). When the measured value for the power factor again exceeds the set value, output relay Q1 switches into on-position (red LED φ1 not illuminated). When the power factor exceeds the value adjusted at the cosφ2-regulator, the set interval of the tripping delay (t_{DELAY}) begins (red LED φ2 flashes). After the interval has expired the output relay Q2 switches into off-position (red LED φ2 illuminated). The output relay again switches into on-position (red LED φ2 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 (DIP-switch 1 in position φ_2 min)
The set value for φ2 must be greater than that for φ1.
When the measured power factor falls below the value adjusted at cosφ2-regulator, the set interval of the tripping delay (t_{DELAY}) begins (red LED φ2 flashes). After the interval t_{DELAY} has expired and if the DIP-switch 2 is in the n.c.-position, the output relay Q2 switches into off-position (red LED φ2 illuminated). When the power factor falls below the value adjusted at the cosφ1-regulator, the set interval of the tripping delay (t_{DELAY}) begins again (red LED φ1 flashes). After the interval has expired the output relay Q1 switches into off-position (red LED φ1 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.



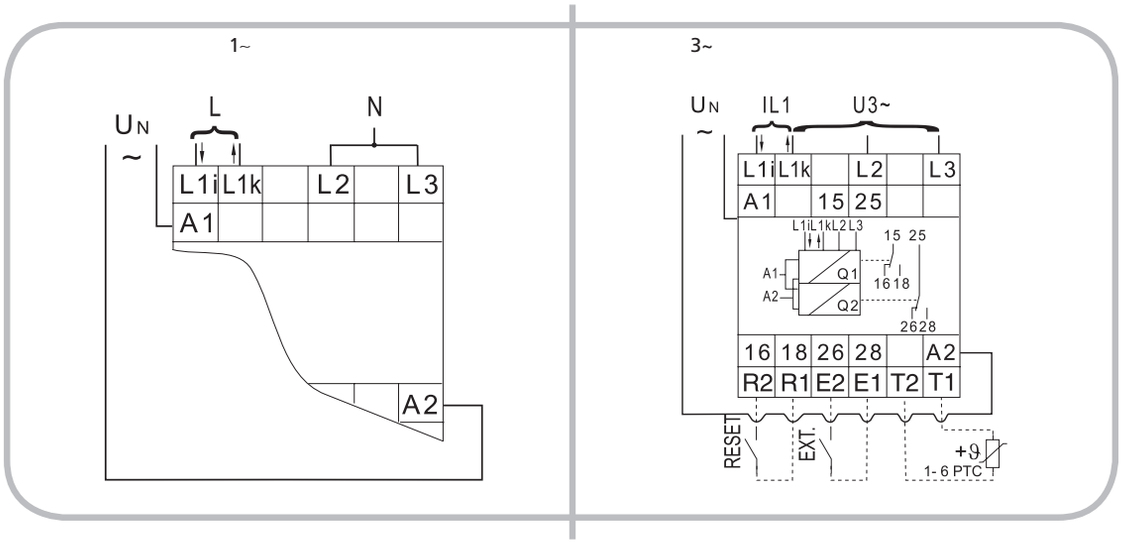
Disconnected consumer (DIP-switch 3 in position I=0)
When the current flow between L1i and L1k is interrupted and if the DIP-switch 2 is in the n.c.-position, both output relays switch into off-position and all three LEDs are flashing in a sequence. When the current flow is restored, the measuring cycle 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.

Latch (DIP-switch 4 resp. 5 in position M1 resp. M2)
For both functions (Win as well as φ2 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 cosφ1 resp. DIP-switch 5 in the position M2 for threshold cosφ2), 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. The errors during the temperature monitoring of the motor winding are stored, too, using the D24SCT, when the DIP-switch 5 is in the position M2.

No evaluation of the φ_2-threshold (DIP-switch 6 in position φ_2 off)
For both functions (Win as well as φ2 min) it is possible not to evaluate the threshold φ2. This can be done by bridging the terminals E1-E2 (resp. ⊥) using an external key or jumper-link. The temperature of the motor winding is monitored, even when the DIP-switch 6 is in the φ2 off position.

External alarm on terminals E1-E2 (resp. ⊥) (DIP-switch 6 in position delay=0)
For both functions (Win as well as φ2 min) the bridging of the terminals E1-E2 (resp. ⊥) 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 φ2 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



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