



World of Automation



Chapter 2: Monitoring relays



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HIGH QUALITY ELECTRONICS



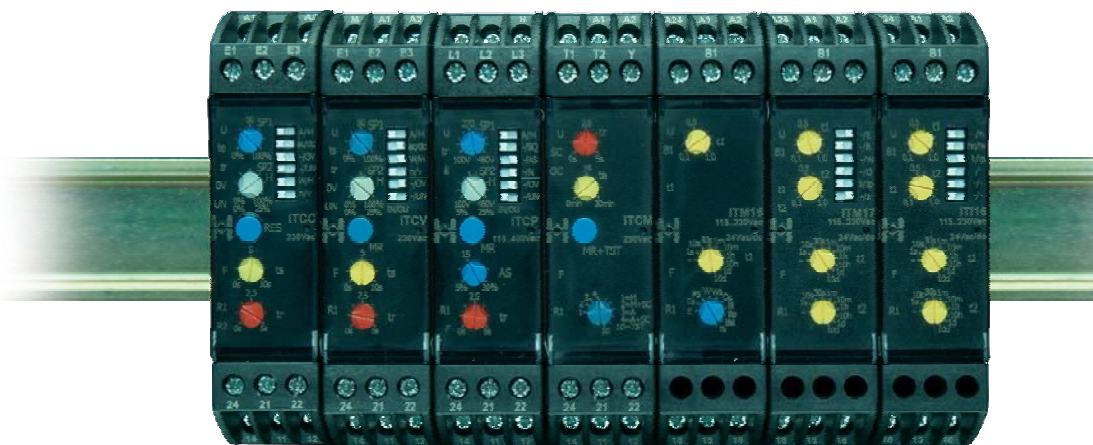
2 Chapter 2: Monitoring relays

- | | |
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| .04 TCC-W | .31 TCE |
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in-case Series

Monitoring and Timing Relays

in-case from HIQUEL: *in*-telligent, *in*-tegrated, *in*-dustrial



Customer demands placed on today's control systems mean ever more complex control requirements but at the same time often place limits on the amount of space available.

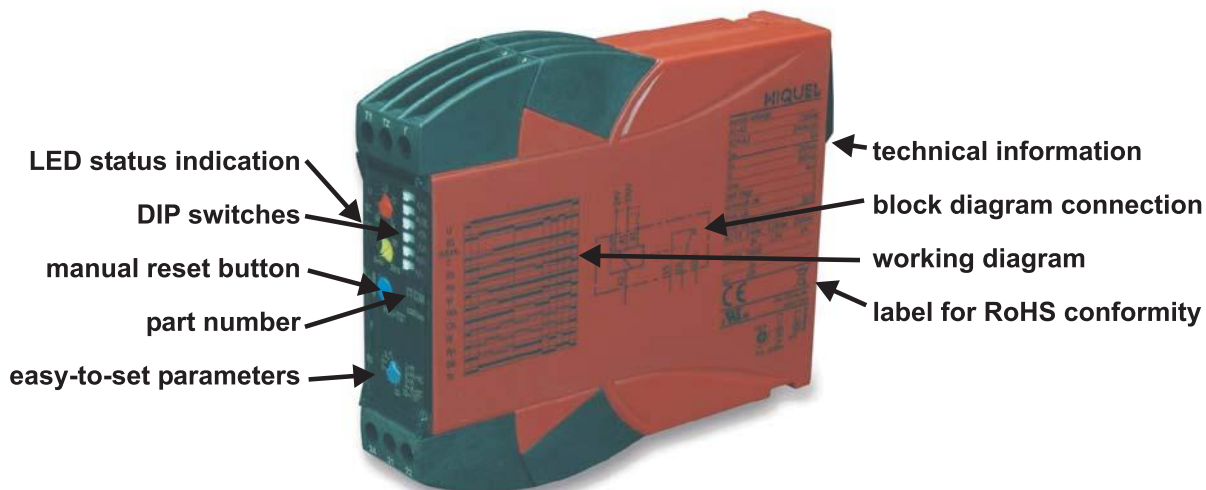
Hiquel's solution is the new *in-Case* series, an integrated range of Industrial Monitoring and Timing relays in a new, compact 22.5mm DIN rail case. Designed with the emphasis on flexibility and incorporating a new micro-controller, just four monitoring relays offer a complete range featuring single phase current and voltage, three phase voltage, and Thermistor monitoring, with all popular function variants, combinations and options selected by switches.

HIQUEL'S new custom IC means that just three Timing relays offer all standard timing functions and incorporate special features such as dual timing functions, and elapsed time indication.

As a result, customers will benefit from lower stock investment and faster deliveries.

Features at a glance:

Full installation details on the side:



LED status indication

DIP switches

manual reset button

part number

easy-to-set parameters

technical information

block diagram connection

working diagram

label for RoHS conformity

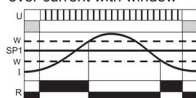


Function

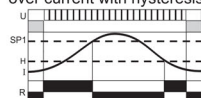
- Control relay active
- Control relay passive
- Contact closed
- Contact open

DIP-Switch: autom.-Reset / Relay normal

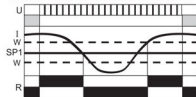
over current with window



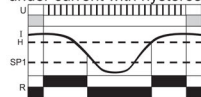
over current with hysteresis



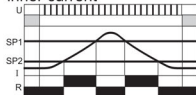
under current with window



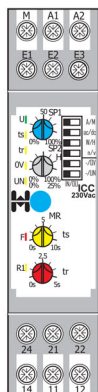
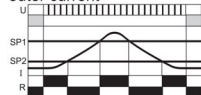
under current with hysteresis



inner current

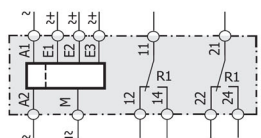


outer current



DIP-Switch

- auto-reset
- alternating current
- window
- relay normal
- A / M
- ac/dc
- W / H
- n / v
- /OV
- /UN
- manual-reset
- direct current
- hysteresis
- relay inverted
- 4 selectable base modes
- over
- under
- inner
- outer



input	range	resistance	I _{EMAX} (20°C)
E1-M	0mA - 100mA	500 mOhm	0,5 A
E2-M	0mA - 1A	50 mOhm	2 A
E3-M	0A - 10A	5 mOhm	15 A

part no	supply	output	sup. galv. iso*	C _{UL} US	housing types
ICC 400Vac	400V~ 2,5VA/1W	DPCO	yes	-	L
ICC 230Vac	230V~ 2,5VA/1W	DPCO	-	-	L
ICC 115Vac	115V~ 2,5VA/1W	DPCO	yes	-	L
ICC 24Vac	24V~ 2,5VA/1W	DPCO	yes	-	L

* The measurement input is galvanically isolated from the power supply

ICC

overview

- AC or DC current monitor
- 3 different current ranges
- 4 selectable base modes (over, under, between setpoints, outside setpoints)
- 2 selectable measuring functions
- automatic or manual reset selectable
- Alarm memory function
- output relay contact invertable
- DPCO output relay
- LED indicators for power supply, over and under current, failure and status of the output relay, start-up and reaction timer
- 22.5mm DIN rail mount housing

specification

supply voltage variation	nominal voltage -20%..+10%
frequency range	48 - 63 Hz
duty cycle	100%
repeat accuracy	<1%
output relay specification	max. 6A 230V~
Ue/Ie AC-15	24V/1,5A 115V/1,5A 230V/1,5A
Ue/Ie DC-13	24V/1A
expected life time	DPCO
mechanical	10 x 10 ⁶ operations
electrical	8 x 10 ⁴ operations
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20°C to 60 °C non condensing

* EN 60947-5-1 VDE 0435

ordering information

TCC-H

overview

- ◆ AC or DC over or under current monitor
- ◆ DPCO output max. 6A
- ◆ 3 measuring ranges 5mA - 10A RMS
- ◆ level and hysteresis adjustments
- ◆ programmable latch/no latch alarm
- ◆ LED indicators for power supply, contact and reaction timer
- ◆ 45mm DIN rail mount housing

specification

supply voltage variation	nominal voltage +10% / -15%
frequency range	48 - 63 Hz
duty cycle	100%
start surge delay	0 - 10s
reaction time	0 - 5s
reset time	< 100ms
output relay specification	max. 6A 230V~
Ue/Ie AC-15	120V/4A 240V/3A
Ue/Ie DC-13	24V/2A
expected life time	DPCO SPCO
mechanical	2 x 10 ⁶ resp. 1 x 10 ⁷ operations
electrical	1 x 10 ⁵ resp. 1 x 10 ⁵ operations
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20 to +60 °C non condensing

* EN 60947-5-1 VDE 0435

ordering information

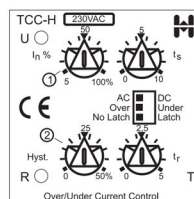
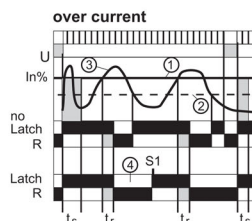
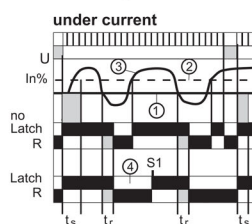
part no	supply	output	sup. galv. iso*	CE	housing types
TCC-H 230Vac	230V~ 2,5VA	DPCO	yes	yes	C
TCC-H 115Vac	115V~ 2,5VA	DPCO	yes	yes	C
TCC-H 24Vac	24V~ 2,5VA	DPCO	yes	yes	C
TCC-H 24Vdc	24V= 2W	DPCO	no	yes	C

* The measurement input is galvanically isolated from the power supply



Function

- Control relay active
- Control relay passive
- Contact closed
- Contact open



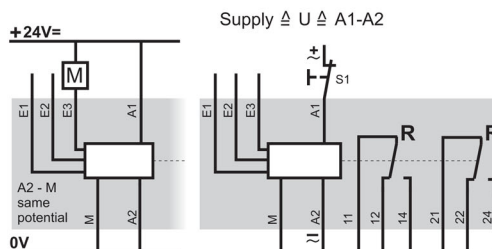
- Threshold "In"
- Hysteresis
- Monitored current
- Latch

ts... Start surge delay
tr... Reaction timer
T... LED indication reaction timer

Over/under current control relay
On application of the supply voltage the output relay pulls in and the timing period t_s starts.

Current control with no latch (auto reset) function
At the end of t_s , when the measured current exceeds the set threshold, timing period t_r starts. At the end of t_r the output relay changes over if the current measurement still exceeds the threshold.
The output relay resets immediately when the monitored current reaches the hysteresis set value.

Current control with latch (manual reset) function.
At the end of t_s , if the measured current exceeds the set threshold, timing period t_r starts. At the end of t_r the output relay changes over and remains in this condition, even if the monitored current reaches the hysteresis set value.
An external reset (S1) must be operated to reset the relay.



input	range	resistance	I _{EMAX} (20°C)
E1-M	5mA - 100mA	1,0 Ohm	1,5 A
E2-M	50mA - 1A	0,1 Ohm	3,5 A
E3-M	0,5A - 10A	0,01 Ohm	14 A





TCC-W

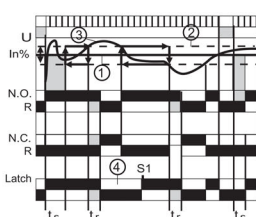
overview

- ◆ AC or DC over or under current monitor with window function
- ◆ DPCO output max. 6A
- ◆ 3 measuring ranges 5mA - 10A RMS
- ◆ level and hysteresis adjustments
- ◆ programmable latch/no latch alarm
- ◆ LED indicators for power supply, contact and reaction timer
- ◆ 45mm DIN rail mount housing

Function

Control relay active
Control relay passive
Contact closed
Contact open

- ① Threshold "In"
- ② Hysteresis
- ③ Monitored current
- ④ Latch

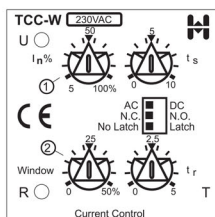


ts... Start surge delay
tr... Reaction timer
T... LED indication reaction timer
On application of the supply voltage with N.O. Mode selected, the output relay pulls in and the timing period t_r starts.

Current control with no latch (auto reset) function

At the end of t_s , if the measured current exceeds the window in either direction, timing period t_r starts. At the end of t_r , if the measurement still exceeds the setpoint the output relay changes over.

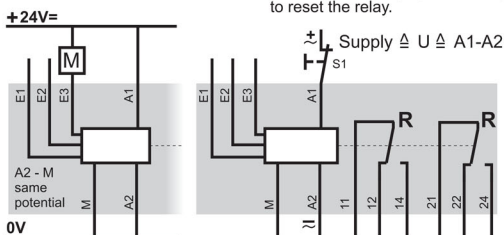
The output relay resets immediately, when the monitored current reaches the hysteresis set value.



Current control with latch (manual reset) function

At the end of t_s , when the measured current exceeds the window in either direction, timing period t_r starts. At the end of t_r , if the measurement still exceeds the setpoint the output relay changes over and remains in this condition, even when the measured current reaches the hysteresis set value.

An external reset (S1) must be operated to reset the relay.



input	range	resistance	I_{EMAX} (20°C)
E1-M	5mA - 100mA	1,0 Ohm	1,5 A
E2-M	50mA - 1A	0,1 Ohm	3,5 A
E3-M	0,5A - 10A	0,01 Ohm	14 A

part no	supply	output	sup. galv. iso*	CE	housing types
TCC-W 230Vac	230V~ 2,5VA	DPCO	yes	yes	C
TCC-W 115Vac	115V~ 2,5VA	DPCO	yes	yes	C
TCC-W 24Vac	24V~ 2,5VA	DPCO	yes	yes	C
TCC-W 24Vdc	24V= 2W	DPCO	no	yes	C

* The measurement input is galvanically isolated from the power supply

specification

supply voltage variation	nominal voltage +10% / -15%
frequency range	48 - 63 Hz
duty cycle	100%
start surge delay	0 - 10s
reaction time	0 - 5s
reset time	< 100ms
output relay specification	max. 6A 230V~ Ue / Ie AC-15 120V/4A 240V/3A Ue / Ie DC-13 24V/2A
expected life time	DPCO SPCO mechanical 2 x 10 ⁶ resp. 1 x 10 ⁷ operations electrical 1 x 10 ⁵ resp. 1 x 10 ⁵ operations
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20 to +60°C non condensing

* EN 60947-5-1 VDE 0435

ordering information

TCC-H2

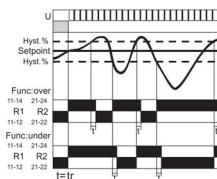
overview

- ◆ AC or DC over or under current monitor
- ◆ 2 x SPCO output relays max. 6A, each independently configured over/under current
- ◆ 2 measuring ranges 0.25-5A and 0.5-10A RMS
- ◆ 2 separate switch points independently adjustable
- ◆ programmable latch/no latch alarm
- ◆ LED indicators for power supply, relay 1 (R1) and relay 2 (R2)
- ◆ 45mm DIN rail mount housing



Function

- Control relay active
- Control relay passive
- Contact closed
- Contact open



Control relay for monitoring AC and DC voltage with two separately adjustable relay outputs.

Under or over current function can be set independently for R1 and R2 by DIP-Switch selection.

The trip point (Hyst) can be set independently for both R1 and R2 from 5-50% of the measured range.

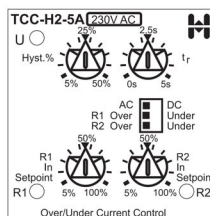
At the end of t_r , the output relay changes when the measured current exceeds the set value of one of the trip points (Hyst). The time t_r is valid for both relays.

When the measured current returns to within the permitted range, the corresponding relay resets immediately.

Switch "AC-DC" is used to select AC or DC input.

upper threshold: $[Y \cdot (100 + \text{Hyst}\%)] / 100$
lower threshold: $[Y \cdot (100 - \text{Hyst}\%)] / 100$

$Y = (Z \cdot \text{Setpoint}\%) / 100$
 $Z = 5A \text{ or } 10A$



specification

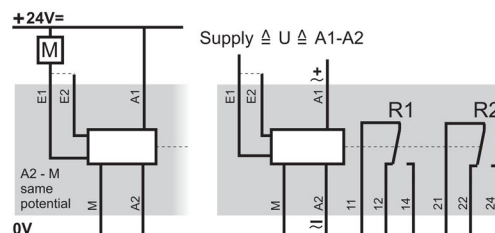
supply voltage variation	nominal voltage +10% / -15%
frequency range	48 - 63 Hz
duty cycle	100%
reaction time	0 - 5s
reset time	< 100ms
output relay specification	max. 6A 230V~
Ue/Ie AC-15	120V/4A 240V/3A
Ue/Ie DC-13	24V/2A
expected life time	SPCO
mechanical	5 x 10 ⁶ operations
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20 to +60°C non condensing

* EN 60947-5-1 VDE 0435

ordering information

part no	supply	output	sup. galv. iso*	housing types
TCC-H2 5A 230Vac	230V~ 2,5VA	2 x SPCO	yes	C
TCC-H2 5A 115Vac	115V~ 2,5VA	2 x SPCO	yes	C
TCC-H2 5A 24Vac	24V~ 2,5VA	2 x SPCO	yes	C
TCC-H2 5A 24Vdc	24V= 2W	2 x SPCO	no	C

* The measurement input is galvanically isolated from the power supply



input	range	resistance	I _{EMAX} (20°C)
E1-M	0,25A - 5A	0,01 Ohm	7 A
E1 + E2-M	0,5A - 10A	0,005 Ohm	14 A

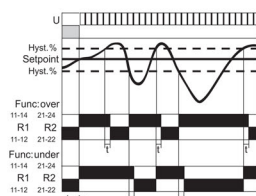


over/under current monitor with two switch points

- ◆ current/voltage dual trip for analogue signals
- ◆ 2 x SPCO output relays max. 6A, each independently configured over/under current/voltage
- ◆ 2 measuring ranges 0-10V and 0-20mA DC
- ◆ 2 separate independently adjustable set points
- ◆ LED indicators for power supply, contact and reaction timer
- ◆ 45mm DIN rail mount housing

Function

- Control relay active
- Control relay passive
- Contact closed
- Contact open



Control relay for monitoring DC current and DC voltage with two independently adjustable relay outputs.

Under or over current function can be set independently for R1 and R2 by DIP-Switch selection.

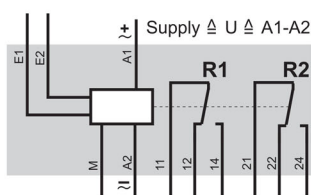
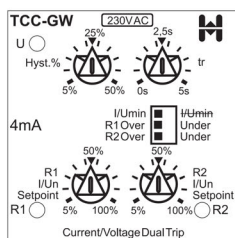
The setpoint (Hyst) can be independently adjusted for both R1 and R2 from 5-50%. At the end of t_r , the output relay changes as soon as the measured value exceeds one of the set points (Hyst). The time t_r is valid for both relays.

When the measured value returns to within the permitted range, the corresponding relay resets immediately.

Switch "I/Umin" can be used to enable or disable the minimum level control (<4mA or <2V). This could be particularly useful with 4-20mA signals in "Over" function.

upper threshold: $[Y \cdot (100 + \text{Hyst}\%)] / 100$
lower threshold: $[Y \cdot (100 - \text{Hyst}\%)] / 100$

$Y = (Z \cdot \text{Setpoint}\%) / 100$
 $Z = 10\text{V or } 20\text{mA}$



input	range	resistance	$I_{N, \text{MAX}}$ (20°C)
E1-M	0 - 10V	98 kOhm	20V
E2-M	0 - 20mA	50 Ohm	40mA

part no	supply	output	sup. galv. iso*	CALUS	housing types
TCC-GW 230Vac	230V~ 2,5VA	2 x SPCO	yes	yes	C
TCC-GW 115Vac	115V~ 2,5VA	2 x SPCO	yes	yes	C
TCC-GW 24Vac	24V~ 2,5VA	2 x SPCO	yes	yes	C
TCC-GW 24Vdc	24V= 2W	2 x SPCO	no	yes	C

* The measurement input is galvanically isolated from the power supply

specification

supply voltage variation	nominal voltage +10% / -15%
frequency range	48 - 63 Hz
duty cycle	100%
reaction time	0 - 5s
reset time	< 100ms
output relay specification	max. 6A 230V
Ue/Ie AC-15	240V/3A
Ue/Ie DC-13	24V/2A
expected life time	SPCO
mechanical	5 x 10 ⁶ operations
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20 to +60°C non condensing

* EN 60947-5-1 VDE 0435

ordering information

- ◆ AC or DC voltage monitor
- ◆ 3 different voltage ranges
- ◆ 4 selectable base modes (over, under, between setpoints, outside setpoints)
- ◆ 2 selectable measuring functions
- ◆ automatic and manual reset selectable
- ◆ Alarm memory function
- ◆ output relay contact invertable
- ◆ DPCOalarm relay
- ◆ LED indicators for power supply, over voltage and under voltage, failure and status of the output relay, start-up & reaction timer
- ◆ 22.5mm DIN rail mount housing

specification

supply voltage variation	nominal voltage -20%..+10%
frequency range	48 - 63 Hz
duty cycle	100%
repeat accuracy	<1%
output relay specification	max. 6A 230V~
Ue/Ie AC-15	24V/1,5A 115V/1,5A 230V/1,5A
Ue/Ie DC-13	24V/1A
expected life time	DPCO
mechanical	10 x 10 ⁶ operations
electrical	8 x 10 ⁴ operations
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20°C to 60 °C non condensing

* EN 60947-5-1 VDE 0435

ordering information

part no	supply	output	sup. galv. iso*	C _{RA} US	housing types
ICV 400Vac	400V~ 2,5VA/1W	DPCO	yes	-	L
ICV 230Vac	230V~ 2,5VA/1W	DPCO	yes	-	L
ICV 115Vac	115V~ 2,5VA/1W	DPCO	yes	-	L
ICV 24Vac	24V~ 2,5VA/1W	DPCO	yes	-	L

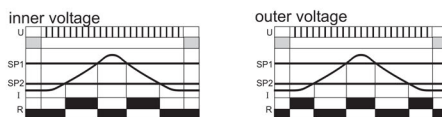
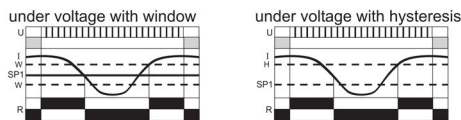
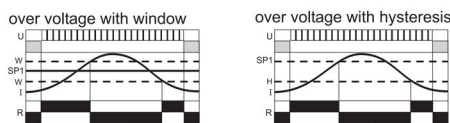
* The measurement input is galvanically isolated from the power supply



Function

- Control relay active
- Control relay passive
- Contact closed
- Contact open

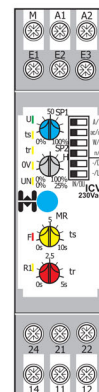
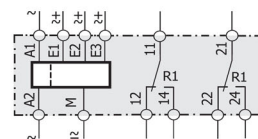
DIP-Switch: Autom.-Reset / Relay normal



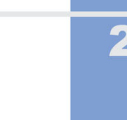
DIP-Switch

- autom.-reset A / M
- alternating current ac/dc
- window W / H
- relay normal n / v
- /OV
- /UN
- manual-reset
- direct current
- hysteresis
- relay inverted
- 4 selectable base modes

- over under
- inner outer



input	range	resistance	U _{EMAX} (20°C)
E1-M	0V - 10V	30 kOhm	13Vac
E2-M	0V - 45V	200 kOhm	75Vac
E3-M	0V - 450V	1,7 MOhm	550Vac





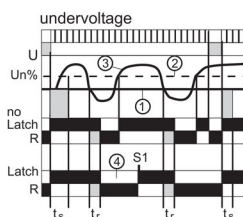
TCV-H

overview



Function

- Control relay active
- Control relay passive
- Contact closed
- Contact open



- ① Threshold "Un"
- ② Hysteresis
- ③ Monitored current
- ④ Latch

ts... Start surge delay
tr... Reaction timer
T... LED indication reaction timer

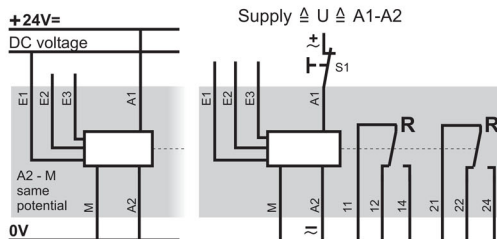
On the application of the supply voltage the output relay pulls in and the timing period ts starts.

Voltage monitor with no latch (auto reset) function

At the end of ts, when the measured voltage exceeds the set point (Hyst), the timing period tr starts. At the end of tr, if the measured value still exceeds the set point the output relay changes over. The output relay resets immediately when the measured voltage reaches the hysteresis set value.

Voltage monitor with latch (manual reset) function.

At the end of ts, when the measured voltage exceeds the set threshold, timing period tr starts. At the end of tr if the measured value still exceeds the set point the output relay changes over and remains in this condition, even when the measured voltage reaches the hysteresis set value. An external reset (S1) must be operated to reset the relay.



input	range	resistance	U _{EMAX} (20°C)
E1-M	0,5V - 10V	3,9 kOhm	30V
E2-M	3V - 60V	68 kOhm	130V
E3-M	30V - 600V	820 kOhm	660V

part no	supply	output	sup. galv. iso*	C _{UL} US	housing types
TCV-H 230Vac	230V~ 2,5VA	DPCO	yes	yes	C
TCV-H 115Vac	115V~ 2,5VA	DPCO	yes	yes	C
TCV-H 24Vac	24V~ 2,5VA	DPCO	yes	yes	C
TCV-H 24Vdc	24V= 2W	DPCO	no	yes	C

* The measurement input is galvanically isolated from the power supply

- ◆ AC or DC over or under voltage monitor
- ◆ DPCO output max. 6A
- ◆ 3 measuring ranges 0.5 - 600V RMS
- ◆ level and hysteresis adjustments
- ◆ programmable latch/no latch alarm
- ◆ LED indicators for power supply, contact and reaction timer
- ◆ 45mm DIN rail mount housing

specification

supply voltage variation	nominal voltage +10% / -15%
frequency range	48 - 63 Hz
duty cycle	100%
start surge delay	0 - 10s
reaction time	0 - 5s
reset time	< 100ms
output relay specification	max. 6A 230V~ Ue/Ie AC-15 120V/4A 240V/3A Ue/Ie DC-13 24V/2A
expected life time	DPCO SPCO mechanical 2 x 10 ⁶ resp. 1 x 10 ⁷ operations electrical 1 x 10 ⁵ resp. 1 x 10 ⁵ operations
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20 to +60°C non condensing

* EN 60947-5-1 VDE 0435

ordering information

TCV-W

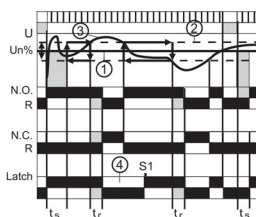
overview

- ◆ AC or DC over or under voltage monitor with window function
- ◆ DPCO output max. 6A
- ◆ 3 measuring ranges 0.5 - 600V RMS
- ◆ level and hysteresis adjustments
- ◆ programmable latch/no latch alarm
- ◆ LED indicators for power supply, contact and reaction timer
- ◆ 45mm DIN rail mount housing



Function

- Control relay active
- Control relay passive
- Contact closed
- Contact open



- Threshold "Un"
- Hysteresis
- Monitored current
- Latch

ts... Start surge delay
tr... Reaction timer
T... LED indication reaction timer

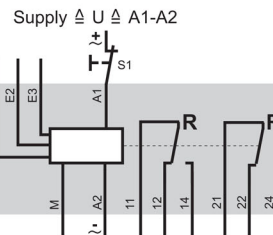
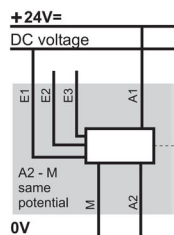
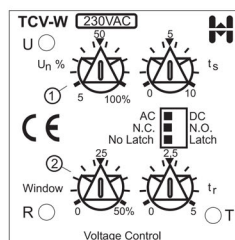
On application of the supply voltage with N.O. Mode selected, the output relay pulls in and the timing period t_s starts.

Voltage monitor with no latch (auto reset) function

At the end of t_s when the measured voltage exceeds the window in either direction timing period t_r starts. At the end of t_r if the measurement still exceeds the set point the output relay changes over. The output relay resets immediately when the monitored voltage reaches the hysteresis set value.

Voltage monitor with latch (manual reset) function

At the end of t_s when the measured voltage exceeds the window in either direction, timing period t_r starts. At the end of t_r if the measurement still exceeds the set point the output relay changes over and remains in this condition, even when the measured voltage reaches the hysteresis set value. An external reset (S1) must be operated to reset the relay.



input	range	resistance	U_{EMAX} (20°C)
E1-M	0.5 - 10V	3.9 kOhm	30V
E2-M	3 - 60V	68 kOhm	130V
E3-M	30 - 600V	820 kOhm	660V

specification

supply voltage variation	nominal voltage +10% / -15%
frequency range	48 - 63 Hz
duty cycle	100%
start surge delay	0 - 10s
reaction time	0 - 5s
reset time	< 100ms
output relay specification	max. 6A 230V~
Ue/Ie AC-15	120V/4A 240V/3A
Ue/Ie DC-13	24V/2A
expected life time	DPCO SPCO
mechanical	2 x 10 ⁶ resp. 1 x 10 ⁷ operations
electrical	1 x 10 ⁵ resp. 1 x 10 ⁵ operations
screws	pozidrive 1
screw tightening torque	0.6..0.8Nm
operating conditions	-20 to +60°C non condensing

* EN 60947-5-1 VDE 0435

ordering information

part no	supply	output	sup. galv. iso*	housing types
TCV-W 230Vac	230V~ 2.5VA	DPCO	yes	C
TCV-W 115Vac	115V~ 2.5VA	DPCO	yes	C
TCV-W 24Vac	24V~ 2.5VA	DPCO	yes	C
TCV-W 24Vdc	24V= 2W	DPCO	no	C

* The measurement input is galvanically isolated from the power supply

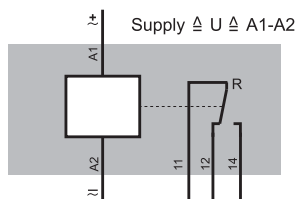
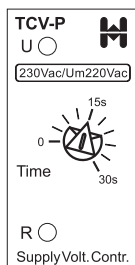
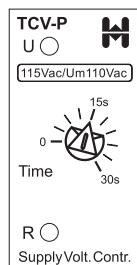
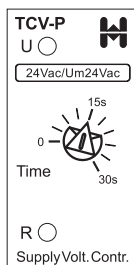
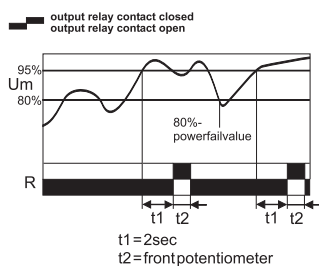




Function

With the introduction of modern multi-voltage electronic devices a common problem exists under supply voltage dip ('brown-out') conditions where electrical devices such as Contactors and Relays can drop out, but multi-voltage electronic devices remain energised, thus the control panel switch sequence is lost. The TCV-P monitors the supply voltage to detect a supply 'brown-out' ($< V_n \times 0.8$) or supply interruption.

When the supply is first established and the supply voltage value increases above 95% of the nominal value (U_n), time t_1 (fixed 2 seconds) starts to run to 'prove' the supply. When t_1 expires the output relay contact closes for time t_2 . Time t_2 can be selected with the potentiometer on the front plate (0-30sec). If the supply voltage decreases below 80% of the nominal value (U_n - 'brown-out' value) or there is a supply voltage interruption of 1 cycle or more the relay 'remembers' this event and when the supply returns above 95% for at least 2 seconds (t_1) the output relay pulses On for the duration of timer t_2 . This pulse is used to initiate a reset of the control panel.



TCV-P

overview

- ◆ supply voltage 'brown-out' monitor for 24V~, 115V~ and 230V~ supplies
- ◆ SPCO output for post brown-out control panel reset
- ◆ LED indicators for power supply and relay
- ◆ 22.5mm DIN rail mount housing

specification

supply voltage variation	nominal voltage +10% / -30%
frequency range	48 - 63 Hz
duty cycle	100%
repeat accuracy	< 1% of the selected range
output relay specification	max. 12A 250V~
Ue/Ie AC-15	120V/2,5A 240V/2,5A
Ue/Ie DC-13	24V/2A
expected life time	DPCO SPCO
mechanical	2×10^6 resp. 1×10^7 operations
electrical	1×10^5 resp. 1×10^5 operations
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20 to +60°C non condensing

* EN 60947-5-1 VDE 0435

ordering information

part no	supply	output	sup. galv. iso*	e _{FA} us	housing types
TCV-P 230Vac/Um220Vac	230V~ 6VA	DPCO	yes	-	A
TCV-P 115Vac/Um110Vac	115V~ 6VA	DPCO	yes	-	A
TCV-P 24Vac/Um 24Vac	24V~ 6VA	DPCO	yes	-	A

* The measurement input is galvanic isolated from the power supply

module overview

control relays	phase failure		monitors asymmetry		detects voltage break down		detects phase failure with regenerated voltage present		detects neutral connection		reaction time		neutral connection essential		housing type		zoom supply voltage		output - change over		UL-listing		thermistor protection	
	✓	✓	5..30% selectable, monitoring possible to activate	150..440V selectable, mode also selectable	✓	possible to activate	0,1 .. 5s	Reset-button	L	2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ICP	✓	✓	5..30% selectable, monitoring possible to activate	150..440V selectable, mode also selectable	✓	possible to activate	0,1 .. 5s	Reset-button	L	2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
TCP-S	✓	✓	>10%		✓		0,1 .. 10s		C	2					C	2								
PCP	✓	✓	>10%		✓		0,1 .. 10s		B	1					G	2								
TCP-L	✓	✓	>30%		✓		0,1 .. 10s		C	2					G	2								
PCP-L	✓	✓	>30%		✓		0,1 .. 10s		G	2					G	2								
TCP-SF	✓	✓	X				60ms		A	1					A	1								
TCP-SF2	✓	✓	X				60ms		B	2					B	2								
TCP-M	✓	✓	>10%		✓		0,1 .. 10s		C	2					C	2								
ICPV	✓	✓		80..260V selectable, mode also selectable			0,1 .. 5s	Reset-button	L	2	✓	✓			L	2								
TCP-V	✓	✓	X	$U_s = U_n \cdot 0,7$			0,1 .. 10s		C	2	✓	✓			C	2								
PCP-V	✓	✓	X	$U_s = U_n \cdot 0,7$			0,1 .. 10s		G	2	✓	✓			G	2								
TCP-VI	✓	✓	X	$U_s = U_n \cdot 0,85$			0,1 .. 10s		C	2	✓	✓			C	2								
TCP-3N	✓	✓	5..30% selectable, monitoring possible to activate	110..440V		possible to activate	1s, 5s		B	1					B	1								
TCP-3N2	✓	✓	5..30% selectable, monitoring possible to activate	110..440V		possible to activate	1s, 5s		C	2					C	2								
TCP-LC	✓	✓	X	$U_s = U_n \cdot 0,85$			30ms		C	2	✓	✓			C	2								
TCP-LC-S	✓	✓	X	$U_s = U_n \cdot 0,85$			30ms		B	2	✓	✓			B	2								
TCP-LS	✓	✓	X	$U_s = U_n \cdot 0,85$			30ms		C	2	✓	✓			C	2								
TCP-LS-S	✓	✓	X	$U_s = U_n \cdot 0,85$			30ms		B	2	✓	✓			B	2								



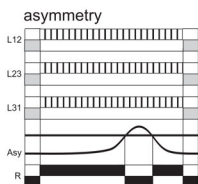
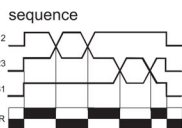
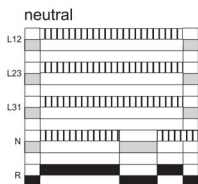
control relays



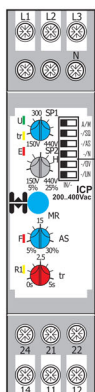
Function

- Control relay or voltage active
- Control relay or voltage passive
- Contact closed
- Contact open

DIP-Switch: autom.-Reset

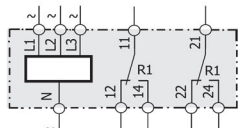


The device recognizes also the regenerated voltage of the consumer, starting from a load size of 0,5kW and an AS attitude of 10%.



DIP-Switch

- autom.-reset A / M manual-reset
- / SQ sequence on
- / AS asymmetry on
- / N neutral on
- / OV 3 selectable base modes
- / UN



ICP

overview

- 3 phase monitoring relay for 3x230/400V
- detects phase failure, phase sequence and phase asymmetry
- detects phase failure with regenerated voltage present
- for power supply with or without neutral connections
- 4 selectable base modes
- 3 selectable voltage measurement functions
- automatical and manual reset selectable
- selectable measuring range (150-440V)
- Alarm memory function
- DPCO alarm relay
- LED indicators for supply voltage, alarm, output relay status, reaction timer and setting error
- 22.5mm DIN rail mount housing

specification

supply voltage variation	nominal voltage -20%..+10%
frequency range	48 - 63 Hz
duty cycle	100%
max. measure voltage	480V~
repeat accuracy	<1%
output relay specification	max. 6A 230V~
Ue/Ie AC-15	24V/1,5A 115V/1,5A 230V/1,5A
Ue/Ie DC-13	24V/1A
expected life time	DPCO
mechanical	10 x 10 ⁶ operations
electrical	8 x 10 ⁴ operations
screws	pozidrive 1
screw tightening torque	0,6...0,8Nm
operating conditions	-20 °C .. +60 °C non condensing
* EN 60947-5-1 VDE 0435	

ordering information

part no	supply		output	sup. galv. iso*	 US	housing types
ICP 200...400Vac	115-440V~	30VA/1,5W	DPCO	no	-	L
ICP 300...500Vac	180-550V~	30VA/1,5W	DPCO	no	-	L

* The measurement input is galvanically isolated from the power supply

TCP

overview

- ◆ detects phase failure, phase sequence and phase asymmetry
- ◆ detects phase failure with regenerated voltage present
- ◆ SPCO or DPCO output max. 6A
- ◆ fixed asymmetry alarm
TCP / PCP >10%
TCP-L / PCP-L >30%
- ◆ no neutral connection required
- ◆ adjustable reaction timer 0.1 - 10s
- ◆ LED indicators for power supply, relay and reaction timer
- ◆ 22.5 or 45mm DIN rail mount housing or 11pin plug in housing

specification

supply voltage variation	nominal voltage +10% / -15%
frequency range	48 - 63 Hz
duty cycle	100%
reaction timer	0,1 - 10s
reset time	< 100ms
output relay specification	max. 6A 230V~ Ue/Ie AC-15 120V/4A 240V/3A Ue/Ie DC-13 24V/2A
expected life time	DPCO SPCO mechanical 2 x 10 ⁶ resp. 1 x 10 ⁷ operations electrical 1 x 10 ⁵ resp. 1 x 10 ⁵ operations
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20 to +60°C non condensing

* EN 60947-5-1 VDE 0435

ordering information

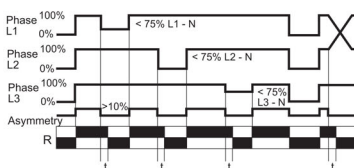
part no	supply	output	sup. galv. iso*	housing types
TCP 3x400Vac	3x 400V~ 2,5VA	DPCO	yes	C
TCP 3x230Vac	3x 230V~ 2,5VA	DPCO	yes	C
TCP-S 3x400Vac	3x 400V~ 2,5VA	SPCO	yes	B
TCP-S 3x230Vac	3x 230V~ 2,5VA	SPCO	yes	B
PCP 3x400Vac	3x 400V~ 2,5VA	DPCO	yes	G
PCP 3x230Vac	3x 230V~ 2,5VA	DPCO	yes	G
TCP-L 3x400Vac	3x 400V~ 2,5VA	DPCO	yes	C
TCP-L 3x230Vac	3x 230V~ 2,5VA	DPCO	yes	C
PCP-L 3x400Vac	3x 400V~ 2,5VA	DPCO	yes	G
PCP-L 3x230Vac	3x 230V~ 2,5VA	DPCO	yes	G

* The measurement input is galvanically isolated from the power supply



Function

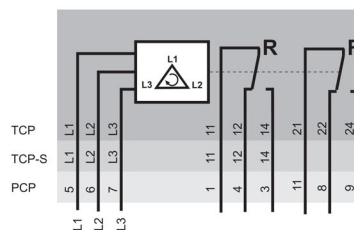
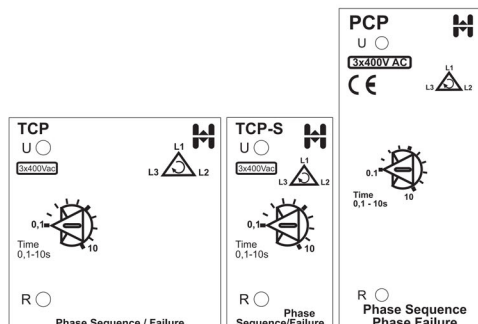
- Control relay active
- Control relay passive
- Contact closed
- Contact open



Control relay to monitor 3-wire, 3-phase systems for the failure of one or more phase, a phase asymmetry shift exceeding 10% and the correct phase rotation (L1, L2, L3)

The TCP detects that the phase sequence is correct and that no phase has failed, in which case the output relay **R** energises. At a loss of one phase (> 25% under nominal voltage) or at a detection of an asymmetry shift (> 10%), the reaction time **t** starts. At the end of time **t** the output relay **R** de-energises. Time **t** is adjustable between 0.1s and 10s and is used to time out short transients which would otherwise cause nuisance tripping. The relay energises again when phase L1, L2 and L3 return to within the permitted range.

The control relay will detect a phase failure even with a regenerated voltage present on the failed phase (no detection on request).





TCP-SF

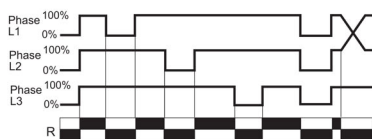
overview

- ◆ detects phase failure and phase sequence
- ◆ SPCO output max. 8A
- ◆ measuring voltage without neutral
- ◆ does not detect phase failure with regenerated voltage present
- ◆ LED indicators for power supply, relay and reaction timer
- ◆ 22.5mm DIN rail mount housing



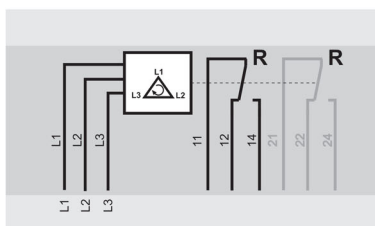
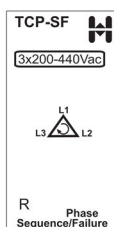
Function

- Control relay active
- Control relay passive
- Contact closed
- Contact open



Phase failure relay to monitor 3-wire, 3-phase systems for the failure of one or more phase and the correct phase rotation (L1, L2, L3). The TCP-SF detects if the phase sequence is correct and that no phase has failed. If this is the case, the output relay R energises and the yellow LED is illuminated.

At a loss of one phase the output relay R de-energises. The relay energises again, when the failed phase/phases resume. The control relay will not detect a phase failure with a regenerated voltage present on the failed phase. (Suitable for lift/elevator applications where the car must continue to the next stop and then not restart)



specification

supply voltage variation		nominal voltage +/-10%	
frequency range		48 - 63 Hz	
duty cycle		100%	
reset time		< 25ms	
relay type		1	2
output relay spec.	230V~	8A	8A
le AC-15	120V~	1,5A	1,5A
le AC-15	240V~	1,5A	1,5A
le DC-13	24V=	1A	1A
expected life time		DPCO	SPCO
mechanical		30 x 10 ⁶ resp. 30 x 10 ⁷ operations	
screws		pozidrive 1	
screw tightening torque		0,6..0,8Nm	
operating conditions		-20 to +60°C non condensing	
* EN 60947-5-1 VDE 0435			

ordering information

part no	supply	output	relay type	us	housing types
TCP-SF	3x 200-440V~	6VA	SPCO	1	A
TCP-SF2	3x 200-440V~	6VA	DPCO	2	B

TCP-M

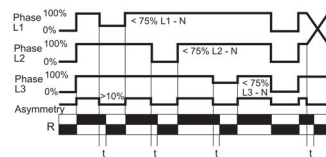
overview

- ◆ detects phase failure, phase sequence phase asymmetry and over-temperature using PTC sensors
- ◆ detects phase failure with regenerated voltage present
- ◆ up to 6 PTC sensors in series
- ◆ DPCO output max. 6A
- ◆ fixed asymmetry alarm >10%
- ◆ no neutral connection required
- ◆ adjustable reaction timer 0.1 - 10s
- ◆ LED indicators for power supply, relay and reaction timer
- ◆ 45mm DIN rail mount housing



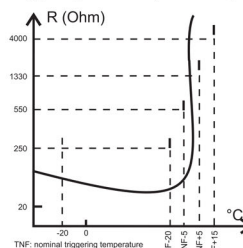
Function

- Control relay active
- Control relay passive
- Contact closed
- Contact open



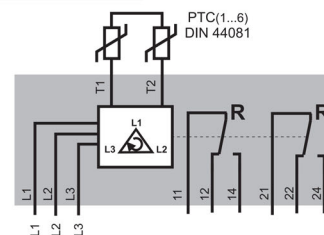
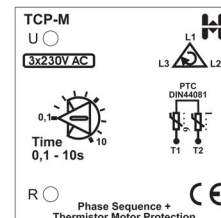
Control relay for phase failure and thermistor protection

The TCP-M monitors phase sequence, phase failure and phase asymmetry, and is used with PTC sensors to provide over temperature protection for motors and other equipment. When the phase sequence is correct, all phases are detected, and the resistance of the PTC sensors on the input T1 - T2 is within the correct range, the output relay R energises. At a loss of one phase (> Vn x 0.75), or the detection of an asymmetry imbalance >10%, or when the resistance of the PTC sensors exceeds the triggering threshold (3100 Ohm) the reaction time t starts.



At the end of time t the output relay R de-energises. Time t is adjustable between 0.1s and 10s and is used to time out short transients which would otherwise cause nuisance tripping. The relay energises again when phase L1, L2 and L3 return to the correct range and the resistance of the sensors falls below the reset threshold (1650 Ohms).

The control relay will detect a phase failure even with a regenerated voltage present on the failed phase (no detection on request).



specification

supply voltage variation	nominal voltage +10% / -15%
frequency range	48 - 63 Hz
duty cycle	100%
response/delay time	< 300ms
reset time	< 500ms
max. measuring voltage	< 2,5V
max. resistance	1500 Ohm (6 sensors)
triggering threshold	3100 Ohm
reset threshold	1650 Ohm
short circuit detection	0 - 20 Ohm
output relay specification	max. 6A 230V~
Ue/Ie AC-15	120V/4A 240V/3A
Ue/Ie DC-13	24V/2A
expected life time	DPCO SPCO
mechanical	2 x 10 ⁶ resp. 1 x 10 ⁷ operations
electrical	1 x 10 ⁵ resp. 1 x 10 ⁵ operations
operating conditions	-20 to 60°C non condensing
	* EN 60947-5-1 VDE 0435

ordering information

part no	supply	output	sup. galv. iso*	housing types
TCP-M 3x400Vac	3x 400V~ 2,5VA	DPCO	yes	C
TCP-M 3x230Vac	3x 230V~ 2,5VA	DPCO	yes	C
TCP-M 3x440Vac	3x 440V~ 2,5VA	DPCO	yes	C

* The measurement input is galvanically isolated from the power supply

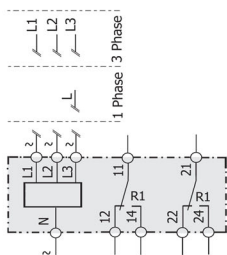
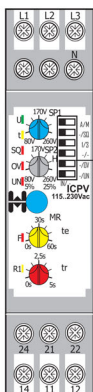
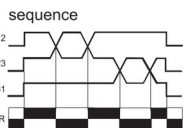
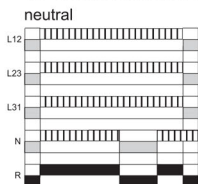




Function

- Control relay active
- Control relay or voltage passive
- Contact closed
- Contact open

DIP-Switch: autom.-Reset



ICPV

overview

- 3 phase monitoring relay
- detects phase failure, phase sequence
- 3 phase monitoring with single or 3 phase connection
- 4 selectable base modes
- 3 selectable voltage measurement functions
- automatical and manual reset selectable
- selectable measuring range (80-260V)
- Alarm memory function
- DPCO alarm relay
- LED indicators for power supply, failure, phase sequence, over and under voltage, output relay status and reaction timer
- 22.5mm DIN rail mount housing

specification

supply voltage variation	nominal voltage -20%..+10%
frequency range	48 - 63 Hz
duty cycle	100%
max. measure voltage	480V~
repeat accuracy	<1%
output relay specification	max. 6A 230V~
Ue/Ie AC-15	24V/1,5A 115V/1,5A 230V/1,5A
Ue/Ie DC-13	24V/1A
expected life time	DPCO
mechanical	10 x 10 ⁶ operations
electrical	8 x 10 ⁴ operations
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20 °C .. +60 °C non condensing

* EN 60947-5-1 VDE 0435

ordering information

part no	supply	output	sup. galv. iso*	housing types
ICPV 115..230Vac	115-230V ~ 25VA/1,5W	DPCO	no	L

* The measurement input is galvanically isolated from the power supply

TCP-V/PCP-V

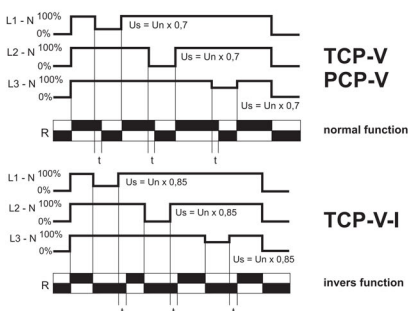
overview

- ◆ detects phase failure or reduction of phase voltage
- ◆ DPCO output max. 6A
- ◆ normal or inverted function available
- ◆ constant measuring
 - TCP-V $U_s = U_n \times 0.7$
 - PCP-V $U_s = U_n \times 0.7$
 - TCP-V-I $U_s = U_n \times 0.85$
- ◆ will not trip with regenerated voltage present
- ◆ requires neutral connection (3-phase 4-wire)
- ◆ adjustable reaction timer 0.1 - 10s
- ◆ LED indicators for power supply, relay and reaction timer
- ◆ 45mm DIN rail mount housing or 11pin plug in housing



Function

- Control relay active
- Control relay passive
- Contact closed
- Contact open

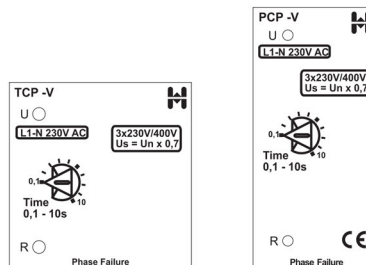


Phase failure relay 3-phase and neutral

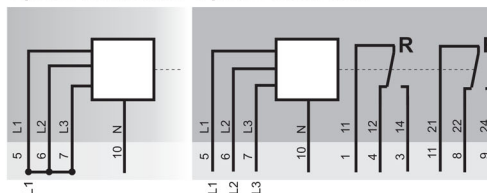
The TCP-V is a phase failure relay for monitoring 4-wire, 3-phase systems for phase failure or phase voltage reduction down to $V_n \times 0.7$ or less. When the control relay detects all 3 phases within the correct range, the output relay R energises.

At a loss of one phase (> 30% under nominal voltage) the reaction time t starts. At the end of time t the output relay R de-energises. Time t is adjustable between 0.1s and 10s, and is used to time out short transients which would otherwise cause nuisance tripping. The relay energises again, when phase L1, L2 and L3 return to the correct range.

The TCP-V may be used for monitoring a 1-phase system, in which case L1, L2 & L3 must be connected together (see below).



1-phase connection 3-phase connection



specification

supply voltage variation	nominal voltage +10% / -20%
frequency range	48 - 63 Hz
duty cycle	100%
reaction timer	0,1 - 10s
reset time	< 100ms
output relay specification	max. 6A 230V~
Ue/Ie AC-15	120V/4A 240V/3A
Ue/Ie DC-13	24V/2A
expected life time	DPCO SPCO
mechanical	2 x 10 ⁶ resp. 1 x 10 ⁷ operations
electrical	1 x 10 ⁵ resp. 1 x 10 ⁵ operations
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20 to +60°C non condensing

* EN 60947-5-1 VDE 0435

ordering information

part no	supply	output	sup. galv. iso*	housing types
TCP-V 3x440Vac	3x 250/440V~ 2,5VA	DPCO	yes	C
TCP-V 3x400Vac	3x 230/400V~ 2,5VA	DPCO	yes	C
PCP-V 3x400Vac	3x 230/400V~ 2,5VA	DPCO	yes	G
TCP-V 3x230Vac	3x 115/230V~ 2,5VA	DPCO	yes	C
TCP-V-I 3x440Vac	3x 250/440V~ 2,5VA	DPCO	yes	C
TCP-V-I 3x400Vac	3x 230/400V~ 2,5VA	DPCO	yes	C
TCP-V-I 3x230Vac	3x 115/230V~ 2,5VA	DPCO	yes	C

* The measurement input is galvanically isolated from the power supply



TCP-LC/TCP-LS

overview

- ◆ DPCO output max. 8A
- ◆ will not trip with regenerated voltage present
- ◆ requires neutral connection (3-phase 4-wire)
- ◆ LED indicators for power supply, contact and reaction timer
- ◆ 22.5 or 45mm DIN rail mount housing



Function

- Control relay active
- Control relay passive
- Contact closed
- Contact open



Phase failure relay 3-phase and neutral (TCP-LC / TCP-LS)

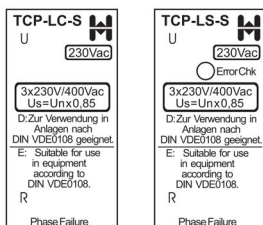
The TCP-LC is a phase failure relay for monitoring 4-wire, 3-phase systems for phase failure or phase voltage reduction down to $U_n \times 0.85$ or less. When the control relay detects all 3 phases within the correct range the output relay **R** energises.

At a loss of one phase ($> U_n \times 0.85$) the output relay **R** de-energises. The relay energises again, when phase L1, L2 and L3 return to the correct range ($> U_n \times 0.9$).

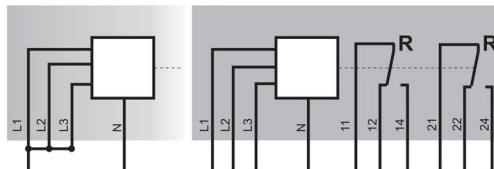
The TCP-LC may be used for monitoring a 1-phase system, in which case L1, L2 & L3 must be connected together (see below).

Push Button (only TCP-LS)

The push button at the front simulates a phase failure (the relay is switched off).



1-phase connection 3-phase connection



specification

supply voltage variation	nominal voltage +10% / -20%
frequency range	48 - 63 Hz
duty cycle	100%
output relay specification	8A 230V~
Ue/Ie AC-15	120V/1,6A 240V/1,6A
Ue/Ie DC-13	24V/1A
expected life	DPCO
mechanical	30 x 10 ⁶ operations
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20 to +60°C non condensing

* EN 60947-5-1 VDE 0435

ordering information

part no	supply	output	sup. galv. iso*	c _{us}	housing types
TCP-LC 3x230Vac/0,85	3x 230/400V~ 16VA	DPCO	yes	-	C
TCP-LC-S 3x230Vac/0,85	3x 230/400V~ 16VA	DPCO	yes	-	B
TCP-LS 3x230Vac/0,85	3x 230/400V~ 16VA	DPCO	yes	-	C
TCP-LS-S 3x230Vac/0,85	3x 230/400V~ 16VA	DPCO	yes	-	B

* The measurement input is galvanically isolated from the power supply

TCP-3N

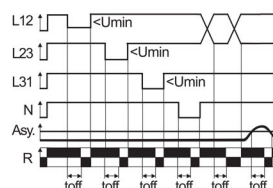
overview

- ◆ for 3-wire and 4-wire 3-phase supplies
- ◆ 3 phase monitoring relay for 3x230/400V
- ◆ monitors phase sequence
- ◆ detects phase failure with regenerated voltage present
- ◆ measures phase to phase voltage (adjustable from 110V to 440V)
- ◆ detects neutral connection (selectable by a DIP-switch)
- ◆ monitors asymmetry (adjustable from 5% to 30%, selectable by DIP-switch)
- ◆ 22.5 or 45mm DIN rail mount housing



Function

- Control relay active
- Control relay passive
- Contact closed
- Contact open



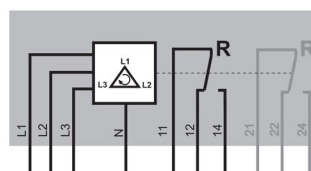
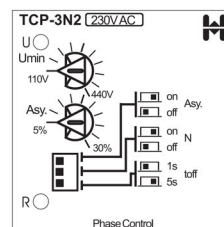
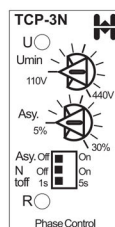
A load from 0,5kW detects the device with a AS-setting < 10% and the reverse voltage of consumers.

Control relay to monitor 3-wire and 4-wire 3-phase supplies for the failure of one or more phase, the correct phase rotation and the existence of a neutral connection.

The TCP-3N also measures the phase to phase voltages and calculates the asymmetry. Only if there is no failure the output relay energises.

With the "Umin" potentiometer the minimum phase to phase voltage is selected between 110V and 440V, with the "Asy." potentiometer the maximum asymmetry is chosen from 5% to 30%. The monitoring of the neutral connection and the asymmetry is selectable by two DIP-switches.

If the monitoring of the neutral connection is disabled, the neutral connection is not required. Two different off-delay times are selectable by DIP-switch (1s or 5s).



specification

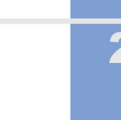
supply voltage variation	nominal voltage +/-10%	
frequency range	48 - 63 Hz	
duty cycle	100%	
relay type	1	2
output relay spec.	230V~	6A 6A
le AC-15	120V~	1A 1,5A
le AC-15	240V~	1A 1,5A
le DC-13	24V=	1A 1,0A
expected life time	DPCO	
mechanical	10 x 10 ⁶ operations	
screws	pozidrive 1	
screw tightening torque	0,6..0,8Nm	
operating conditions	-20 to +60°C non condensing	

* EN 60947-5-1 VDE 0435

ordering information

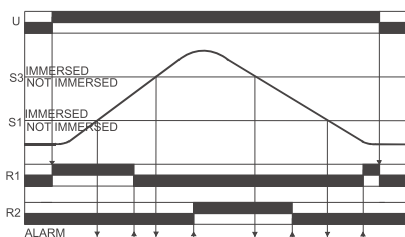
part no	supply		output	relay type	 us	housing types
TCP-3N	3x 110-440V~	30VA	SPCO	1	-	B
TCP-3N2	3x 110-440V~	30VA	DPCO	2	-	C

3 phase monitoring relay (phase to neutral measurement)

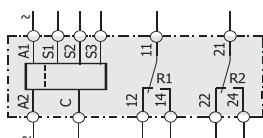
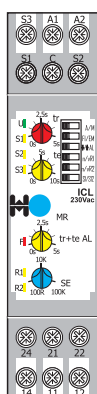
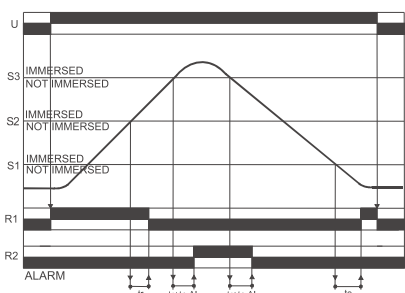




function: filling with two sensors and max. alarm



function: emptying with one sensor and min. alarm



ICL overview

- ◆ monitors one or two levels of conductive liquids
- ◆ programmable filling or emptying mode
- ◆ selectable mode for protection against dry running/overflow
- ◆ adjustable sensitivity 100 Ohm - 100 kOhm
- ◆ automatic or manual reset mode
- ◆ alarm memory function
- ◆ 2x SPCO output relay
- ◆ LED indicators for power supply, sensors, failure, and output relay
- ◆ 22.5mm DIN rail mount housing

specification

supply voltage variation	nominal voltage -20%..+10%
frequency range	48 - 63 Hz
duty cycle	100%
delay time	<1%
reset time	max. 6A 230V~
output relay specification	24V/1,5A 115V/1,5A 230V/1,5A 24V/1A
expected life time	SPCO
mechanical	10 x 10 ⁶ operations
electrical	8 x 10 ⁴ operations
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20 °C .. +60 °C
	non condensing

* EN 60947-5-1 VDE 0435

ordering information

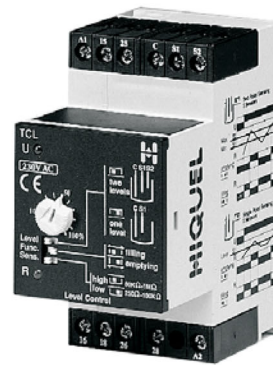
part no	supply	output	sup. galv. iso*	e _{AL} vs	housing types
ICL 400Vac	400V~ 2,5VA/1W	DPCO	yes	-	L
ICL 230Vac	230V~ 2,5VA/1W	DPCO	yes	-	L
ICL 115Vac	115V~ 2,5VA/1W	DPCO	yes	-	L
ICL 24Vac	24V~ 2,5VA/1W	DPCO	yes	-	L

* The measurement input is galvanically isolated from the power supply

TCL

overview

- ◆ monitors one or two levels of conductive liquids
- ◆ DPCO output max. 6A
- ◆ programmable filling or emptying mode
- ◆ programmable sensitivity 250 Ohm - 100 kOhm or 50 kOhm - 1 MOhm
- ◆ LED indicators for power supply, relay and reaction timer
- ◆ 45mm DIN rail mount housing or 11pin plug in housing



Function

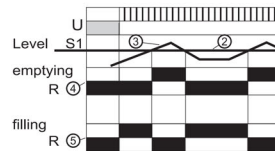
- Control relay active
- Control relay passive
- Contact closed
- Contact open

1 level
Single Point
Sensing
using 2 Sensors



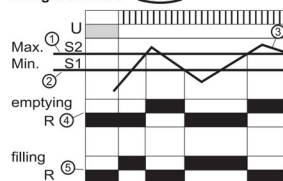
- max. level
- min. level
- monitored level
- Output relay, emptying function
- Output relay, filling function

Control relay to monitor the level of conductive liquids



The TCL controls the level of conductive liquids in a conductive or non-conductive container and works by passing a low voltage through the liquid from a suitable probe to an earth return which can either be the container or another probe.

2 level
Two Point
Sensing
using 3 Sensors

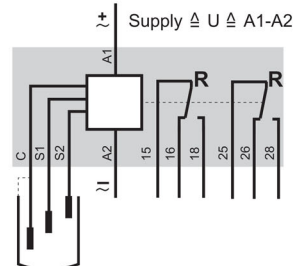
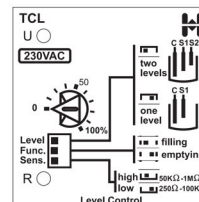


Single point sensing:
The relay changes over each time the liquid contacts C and S1.

Two point sensing:
The relay changes over each time the liquid contacts C, S1 and S2. The relay resets when the liquid level returns below S1.

The polarity of the sensor voltage is periodically reversed and is sufficiently low to avoid electrolytic action between the probes.

Note:
Do not make a connection between A2 and C when using TCL without galvanic isolation. (DC supplied versions)



specification

supply voltage variation	nominal voltage +10% / -20%
frequency range	48 - 63 Hz
duty cycle	100%
delay time	1s (fixed)
reset time	< 100ms
max measuring voltage	± 5,3V
max measuring current	~ 5mA
probes	cable length max. 100m
output relay specification	max. 6A 230V~
Ue/Ie AC-15	120V/4A 240V/3A
Ue/Ie DC-13	24V/2A
expected life time	DPCO SPCO
mechanical	2 x 10 ⁶ resp. 1 x 10 ⁷ operations
electrical	1 x 10 ⁵ resp. 1 x 10 ⁵ operations
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20 to +60°C non condensing

* EN 60947-5-1 VDE 0435

ordering information

part no	supply	output	sup. galv. iso*	C ^{UL} US	housing types
TCL 230Vac	230V~ 2,5VA	DPCO	yes	-	C
TCL 115Vac	115V~ 2,5VA	DPCO	yes	-	C
TCL 24Vac	24V~ 2,5VA	DPCO	yes	-	C
TCL 24Vdc	24V= 2W	DPCO	no	-	C
PCL 230Vac	230V~ 2,5VA	DPCO	yes	-	G
PCL 115Vac	115V~ 2,5VA	DPCO	yes	-	G
PCL 24Vac	24V~ 2,5VA	DPCO	yes	-	G
PCL 24Vdc	24V= 2W	DPCO	no	-	G

* The measurement input is galvanically isolated from the power supply.

TCL-LC

overview

- ♦ monitoring one or two levels of conductive liquids
- ♦ LED indicators for power supply and output relay
- ♦ fixed switching levels with 20 kOhm and 60 kOhm
- ♦ 22.5mm DIN rail mount housing

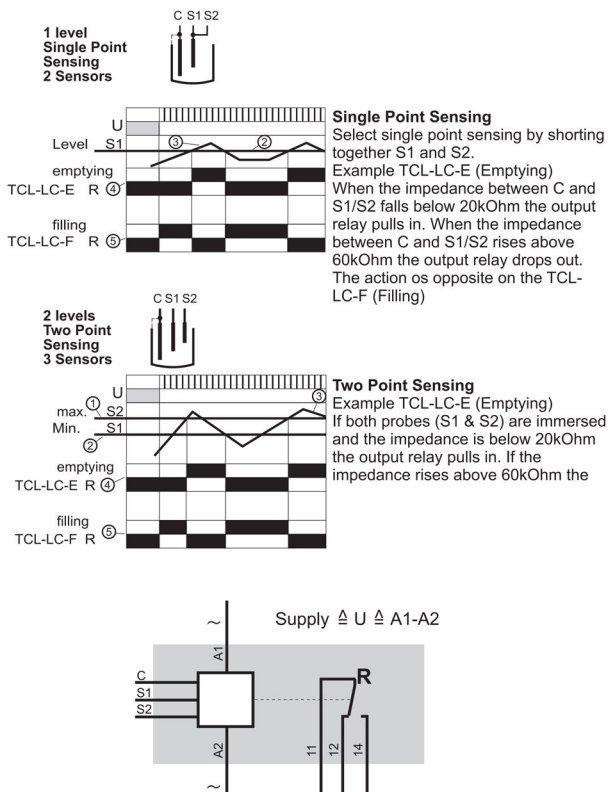
Function

Control relay active
Control relay passive
Contact closed
Contact open

- 1 Max. level
- 2 Min. level
- 3 Monitored level
- 4 Output relay, emptying function
- 5 Output relay, filling function

Control relay to monitor the level of conductive liquids

The TCL-LC works by comparing the impedance between the probes in a conductive media and depending on the function and the current state at the probes changes over the output relay.



specification

supply voltage variation	nominal voltage +10% / -10%
frequency range	48 - 63 Hz
duty cycle	100%
delay time	< 300ms
reset time	< 300ms
max. measuring voltage	< 7V~
max. measuring current	< 1mA
probes	cable length max. 100m
output relay specification	max. 12A 230V~
Ue/Ie AC-15	120V/2A 240V/2A
Ue/Ie DC-13	24V/1,5A
expected life time	
mechanical	1 x 10 ⁷ operations
electrical	1 x 10 ⁵ operations
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20 to +60°C non condensing

* EN 60947-5-1 VDE 0435

ordering information

part no.	supply	output	supp. galv. iso..*	UL US	Gehäusetype
TCL-LC-E 230Vac	230V~ 2,5VA	SPCO	yes	-	B
TCL-LC-E 115Vac	115V~ 2,5VA	SPCO	yes	-	B
TCL-LC-E 24Vac	24V~ 2,5VA	SPCO	yes	-	B
TCL-LC-F 230Vac	230V~ 2,5VA	SPCO	yes	-	B
TCL-LC-F 115Vac	115V~ 2,5VA	SPCO	yes	-	B
TCL-LC-F 24Vac	24V~ 2,5VA	SPCO	yes	-	B

TCL-LC with DPCO on request

* The measurement input is galvanically isolated from the power supply.

TCL-3

overview

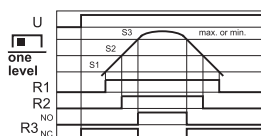
- ◆ monitors two or three levels of conductive liquids
- ◆ 3 x N.O. output max. 6A
- ◆ programmable filling or emptying mode
- ◆ programmable sensitivity 250 Ohm - 100 kOhm or 50 kOhm - 1 MOhm
- ◆ LED indicators for power-supply and all three relays
- ◆ 45mm DIN rail mount housing



Function

Control relay to monitor the level of conductive liquids

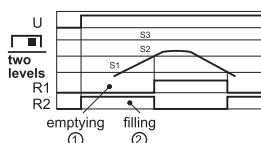
The TCL controls the level of conductive liquids in a conductive or non-conductive container and works by passing a low voltage through the liquid from suitable probes to an earth return which can either be the container or another probe.



Single point sensing:

The relays R1, R2 and R3 change over each time the liquid contacts C and S1, C and S2 or C and S3. DIP-switch Function R3 inverts relay 3.

- ① Output relay, function emptying
- ② Output relay, function filling



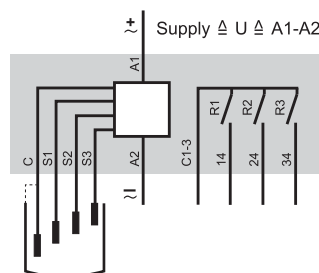
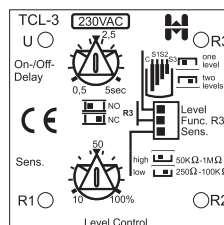
Two point sensing:

The relay changes over each time the liquid contacts C, S1 and S2. The relay resets when the liquid level returns below S1.

R1... emptying
R2... filling

S3 can be used to monitor limits.

Note: Do not make a connection between A2 and C when using TCL without galvanic isolation. (DC supply versions)
DC-DC isolation on request



specification

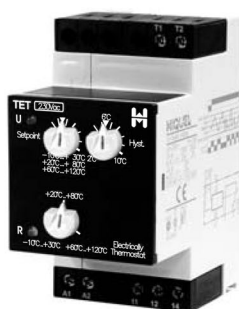
supply voltage variation	nominal voltage +10% / -20%
frequency range	48 - 63 Hz
duty cycle	100%
delay time	0,5 - 5s
reset time	0,5 - 5s
max. measuring voltage	± 5,3V
max. measuring current	~ 5mA
probes	cable length max. 100m
output relay specification	max. 6A 230V~
Ue/Ie AC-15	120V/4A 240V/3A
Ue/Ie DC-13	24V/2A
expected life time	SPNO
mechanical	2 x 10 ⁷ operations
electrical	1 x 10 ⁵ operations
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20 to +60°C non condensing

* EN 60947-5-1 VDE 0435

ordering information

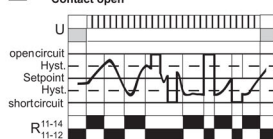
part no	supply	output	sup. galv. iso*	CE US	housing types
TCL3 230Vac	230V~ 2,5VA	3 x NO	yes	-	C
TCL3 115Vac	115V~ 2,5VA	3 x NO	yes	-	C
TCL3 24Vac	24V~ 2,5VA	3 x NO	yes	-	C
TCL3 24Vdc	24V= 2W	3 x NO	yes	-	C

* The measurement input is galvanically isolated from the power supply



Function

Control relay active
Control relay passive
Contact closed
Contact open



Description

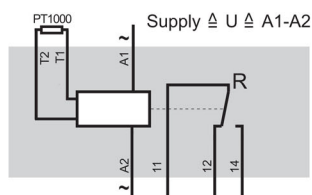
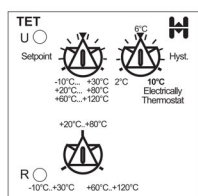
The measuring range is selected with the lower potentiometer three ranges are available:
-10°C...+30°C; +20°C...+80°C; +60°C...+120°C.

With the "Setpoint" potentiometer the required temperature value is selected, the "Hyst." potentiometer determines the trip point. The relay de-energises if the temperature is greater than "Setpoint+Hyst.", and re-energises when the temperature falls below "Setpoint-Hyst.".

The relay also de-energises if there is a short circuit, open circuit or supply failure.

The use of shielded twisted pair cable is recommended for connection of the PT1000. It is not recommended to connect the PT1000 together with the power supply.

If using shielded twisted pair use the "T2" terminal.



TET

overview

- ◆ standard PT1000 detection
- ◆ 3 measuring ranges
- ◆ setpoint and hysteresis independently adjustable
- ◆ LED indicators for power supply and output relay
- ◆ 45mm DIN rail mount housing

specification

supply voltage variation	nominal voltage +10% / -15%
frequency range	48 - 63 Hz
duty cycle	100%
output relay specification	
Ue/Ie AC-15	120V/3,5A 240V/3A
Ue/Ie DC-13	24V/2,5A
expected life time	1 SPCO
mechanical	5 x 10 ⁶ operations
electrical	1 x 10 ⁵ operations
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20 to +60°C non condensing

* EN 60947-5-1 VDE 0435

ordering information

part no	supply	output	sup. galv. iso*	UL US	housing types
TET 230Vac	230V~ 2,5VA	SPCO	yes	-	C
TET 115Vac	115V~ 2,5VA	SPCO	yes	-	C
TET 24Vac	24V~ 2,5VA	SPCO	yes	-	C
TET 24Vdc	24V= 2W	SPCO	no	-	C

* The measurement input is galvanically isolated from the power supply.

TCV-SK

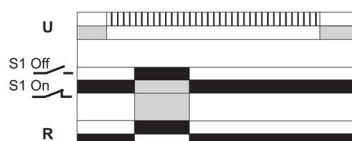
overview

- ◆ safety edge monitor for use on industrial roller doors
- ◆ embedded diode or resistor detection
- ◆ output relay max. 6A
- ◆ LED indicators for power supply, contact and function
- ◆ TÜV-Nr. E/HG-99/101 approval for TCV-SK-S
- ◆ safety edge monitor, category 2 according to EN 954-1 for TCV-SK-S
- ◆ 22.5 or 45mm DIN rail mount housing



Function

- Control relay active
- Control relay passive
- Contact closed
- Contact open



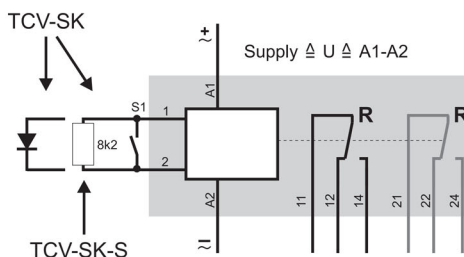
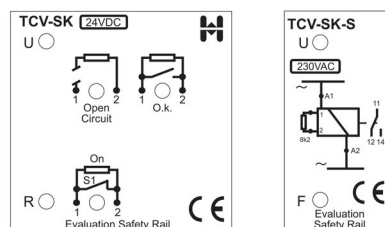
Control relay to monitor permanent safety rails on roller shutter doors

On the application of the supply voltage and after detection of a diode (only TCV-SK) or a 8k2 resistor (TCV-SK and TCV-SK-S) connected to the input, the output relay energizes and the green LED (safety rail o.k.) is illuminated.

When the control relay detects an open circuit, the output relay drops out immediately and the yellow LED (open circuit) is illuminated.

When the control relay detects a short circuit, the relay drops out immediately and the red LED (failure) is illuminated.

When the output relay drops out a red LED flashes to indicate a circuit fault.



specification

supply voltage variation	nominal voltage +10% / -15%
frequency range	48 - 63 Hz
duty cycle	100%
LED indicators	yellow open circuit green safety rail o.k. red failure
output relay specification	max. 6A 230V~ Ue/Ie AC-15 120V/4A 240V/3A Ue/Ie DC-13 24V/2A
expected life time	DPCO SPCO mechanical 2 x 10 ⁶ resp. 1 x 10 ⁷ operations electrical 1 x 10 ⁵ resp. 1 x 10 ⁵ operations
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20 to +60°C non condensing

* EN 60947-5-1 VDE 0435

ordering information

part no	supply	output	sup. galv. iso*	housing types
TCV-SK 230Vac	230V~ 2,5VA	DPCO	yes	C
TCV-SK 115Vac	115V~ 2,5VA	DPCO	yes	C
TCV-SK 24Vac	24V~ 2,5VA	DPCO	yes	C
TCV-SK 24Vdc	24V= 2W	DPCO	no	C
TCV-SK-S 230Vac	230V~ 2,5VA	SPCO	yes	B
TCV-SK-S 115Vac	115V~ 2,5VA	SPCO	yes	B
TCV-SK-S 24Vac	24V~ 2,5VA	SPCO	yes	B
TCV-SK-S 24Vdc	24V= 2W	SPCO	no	B

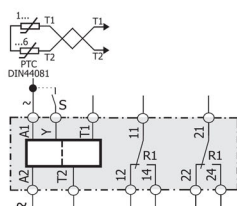
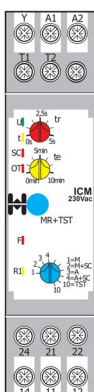
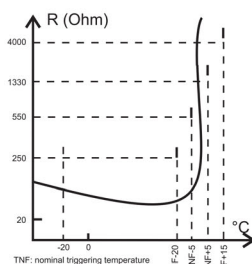
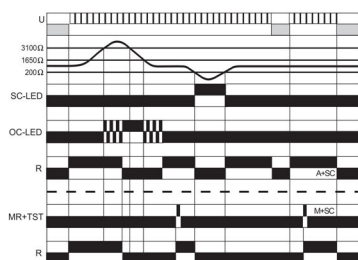
* The measurement input is galvanically isolated from the power supply





Function

- Control relay active
- Control relay passive
- Contact closed
- Contact open



ICM

overview

- thermistor motor protection relay
- 5 selectable functions
- up to 6 PTC-sensors in series
- switchable test function (without sensor connected)
- probe short and/or open circuit detection
- automatical, manual or external reset selectable
- Alarm memory function
- DPCO output relay
- LED indicators for power supply, over temperature, short circuit, alarm, output relay status, start and reaction timer
- 22.5mm DIN rail mount housing

specification

supply voltage variation	nominal voltage -20%..+10%
frequency range	48 - 63 Hz
duty cycle	100%
repeat accuracy	<1%
output relay specification	max. 6A 230V~
Ue/Ie AC-15	24V/1,5A 115V/1,5A 230V/1,5A
Ue/Ie DC-13	24V/1A
expected life time	DPCO
mechanical	10 x 10 ⁶ operations
electrical	8 x 10 ⁴ operations
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20 °C .. +60 °C non condensing

* EN 60947-5-1 VDE 0435

ordering information

part no	supply	output	sup. galv. iso*	UL US	housing types
ICM 400Vac	400V~ 2,5VA/1W	DPCO	yes	-	L
ICM 230Vac	230V~ 2,5VA/1W	DPCO	yes	-	L
ICM 115Vac	115V~ 2,5VA/1W	DPCO	yes	-	L
ICM 24Vac	24V~ 2,5VA/1W	DPCO	yes	-	L

* The measurement input is galvanically isolated from the power supply

- ◆ thermistor motor protection using DIN 44081 PTC-sensors
- ◆ up to 6 PTC sensors in series
- ◆ DPCO output max. 6A
- ◆ fault latching function
- ◆ switchable test function (TCM)
- ◆ probe short and/or open circuit detection
- ◆ LED indicators for power supply and output relay
- ◆ 22.5 or 45mm DIN rail mount housing

specification

supply voltage variation	nominal voltage +10% / -15%
frequency range	48 - 63 Hz
duty cycle	100%
response/delay time	< 300ms
reset time	< 500ms
max. measuring voltage	< 2,5V
max. resistance	1500 Ohm (6 sensors)
triggering threshold	3100 Ohm
reset threshold	1650 Ohm
short circuit detection	0 - 20 Ohm
output relay specification	max. 6A 230V~
Ue/Ie AC-15	120V/4A 240V/3A
Ue/Ie DC-13	24V/2A
expected life time	DPCO SPCO
mechanical	2 x 10 ⁶ resp. 1 x 10 ⁷ operations
electrical	1 x 10 ⁵ resp. 1 x 10 ⁵ operations
operating conditions	-20 to +60°C non condensing

* EN 60947-5-1 VDE 0435

ordering information

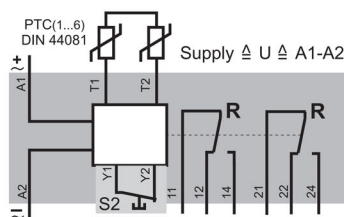
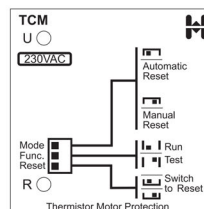
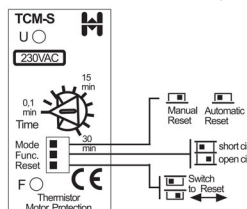
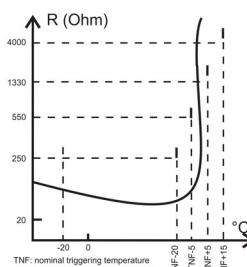
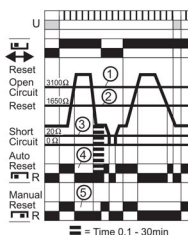
part no	supply	output	sup. galv. iso*	US	housing types
TCM 230Vac	230V~ 2,5VA	DPCO	yes	-	C
TCM 115Vac	115V~ 2,5VA	DPCO	yes	-	C
TCM 24Vac/dc	24V~ 2W	DPCO	no	-	C
TCM-S 230Vac	230V~ 2,5VA	DPCO	yes	-	B
TCM-S 115Vac	115V~ 2,5VA	DPCO	yes	-	B
TCM-S 24Vac	24V~ 2,5VA	DPCO	yes	-	B
TCM-S 24Vdc	24V= 2W	DPCO	no	-	B
TCM-SR 230Vac	230V~ 2,5VA	DPCO	yes	-	B
TCM-SR 24Vac	24V~ 2,5VA	DPCO	yes	-	B
TCM-SR 24Vdc	24V= 2W	DPCO	no	-	B

* The measurement input is galvanically isolated from the power supply



Function

- Control relay active
- Control relay passive
- Contact closed
- Contact open
- ① Triggering threshold
- ② Reset threshold
- ③ Short circuit detection threshold
- ④ Output relay, function
- ⑤ Output relay, function
- Auto reset mode
- Manual reset mode



To perform a manual reset of TCM-SR a momentary break contact is connected to terminals Y1 and Y2).

The TCM is used with PTC sensors (DIN 44081) to provide permanent over temperature protection for motors and other equipment

Up to 6 PTC's connected in series can be used with one TCM relay. On the application of the supply voltage the output relay pulls in. When the PTC sensors reach their nominal temperature the TCM converts the sudden increase of resistance into a signal which causes the output relay R to change over. The red LED F starts blinking.

Care must be taken to ensure that long cables connecting PTC's to T1 and T2 are shielded otherwise external electro-magnetic influences can interfere with the correct function of the sensor.

Front plate located DIP-Switches are used to select either.

Auto reset mode

When the resistance returns under the reset threshold, time t starts (TCM-S). At the end of time t, the output relay resets and the red LED F goes out.

Manual reset mode

Either an external reset (S1) must be operated to reset the relay, or the third dip switch can be used to perform a manual reset. With the external switch S2 (only TCM-SR) galvanically disconnected, the reset can also be performed. This function is available if the Reset DIP-Switch is switched to the left.





TCM-LC

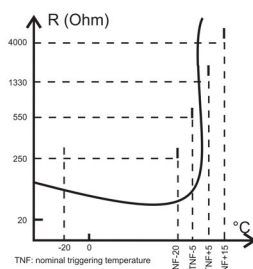
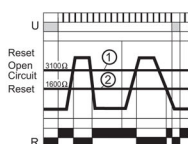
overview

- thermistor motor protection relay using DIN 44081 PTC-sensors
- up to 6 PTC sensors in serie
- open circuit detection
- DPCO output max. 6A
- fault latching function (TCM)
- LED indicators for power supply and output relay
- 22.5mm or DIN rail mount housing

Function

- Control relays active
- Control relays passive
- Contact closed
- Contact open

- ① triggering threshold
- ② reset threshold

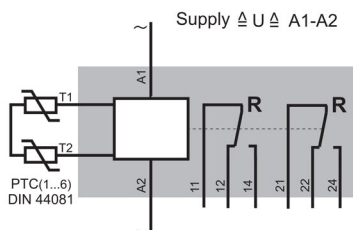


TNF: nominal triggering temperature

The TCM-LC is used with PTC sensors (DIN 44081) to provide permanent over temperature protection for motors and other equipment.

Up to 6 PTC's connected in series can be used with one TCM relay. On the application of the supply voltage the output relay pulls in. When the PTC sensors reach their nominal temperature the TCM converts the sudden increase of resistance in a signal which causes the output relay R to change over. The red LED F starts blinking.

Care must be taken to ensure that long cables connecting PTC's to T1 and T2 are shielded otherwise external electro-magnetic influences can interfere with the correct function of the sensor.



specification

supply voltage variation		nominal voltage +10% / -20%	
frequency range		48 - 63 Hz	
duty cycle		100%	
response/delay time		< 300ms	
reset time		< 300ms	
max. measuring voltage		< 2,5V	
max. resistance		1500 Ohm (6 sensors)	
triggering threshold		3100 Ohm	
reset threshold		1600 Ohm	
relaytype		1	2
output relay spec.	230V~	12,0A	8,0A
	Ie AC-15*	120V~	2,0A
	Ie AC-15*	240V~	2,0A
	Ie DC-13*	24V=	1,5A
expected life time		SPCO 2DPCO	
mechanical		1 x 10 ⁶ resp. 1x 10 ⁷ operations	
electrical		1 x 10 ⁵ resp. 1 x 10 ⁵ operations	
operating conditions		-20 to +60°C non condensing	
		* EN 60947-5-1 VDE 0435	

ordering information

part no	supply	output	sup. galv. iso*	relaytype	housing types
TCM-LC 230Vac	230V~ 2,5VA	SPCO	yes	1	B
TCM-LC 115Vac	115V~ 2,5VA	SPCO	yes	1	B
TCM-LC 24Vac	24V~ 2,5VA	DPCO	yes	1	B
TCM-LC2 230Vac	230V~ 2,5VA	DPCO	yes	2	B
TCM-LC2 115Vac	115V~ 2,5VA	DPCO	yes	2	B
TCM-LC2 24Vac	24V~ 2,5VA	DPCO	yes	2	B

* The measurement input is galvanically isolated from the power supply

TCS

overview

- under speed control with fault latching function
- SPCO output max. 6A
- input PNP 24Vdc, volt free contact and 15-40Vdc
- start surge delay 0.2-20s
- 4 selectable speed ranges
- LED indicators for power supply, relay and reaction timer
- 45mm DIN rail mount housing

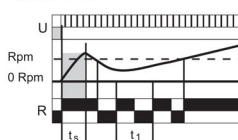


Function

Control relay active
Control relay passive
Contact closed
Contact open

- ① Underspeed threshold
- ② Monitored speed
- ts... Start surge delay

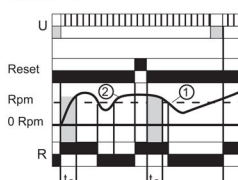
Auto Reset



Control relay to monitor under speed

On application of the supply voltage the output relay energises and the timing period t_s starts. The TCS monitors the time between the leading edge of successive input pulses. When the timing period between the pulses exceeds the set value, the output relay drops out.

Manual Reset

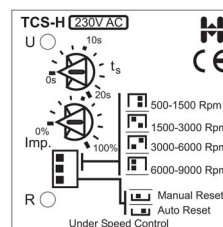
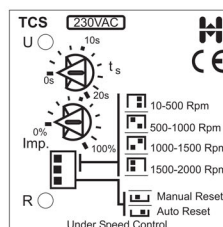


Auto Reset

When the timing period between the pulses returns to the acceptable range for three successive pulses the output relay resets.

Manual Reset

The output relay resets when terminals +24 and E2 are connected. After breaking the connection time t_s starts.



specification

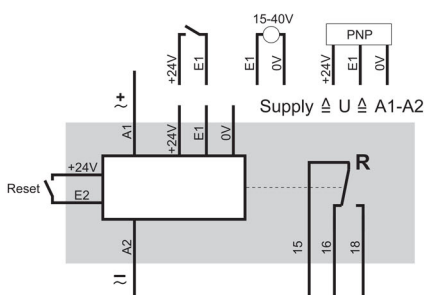
supply voltage variation	nominal voltage +10% / -20%
frequency range	48 - 63 Hz
duty cycle	100%
range	TCS 10-2000 Rpm
	TCS-H 500-9000 Rpm
start surge delay	0 - 20 s
output relay specification	max. 6A 230V~
	Ue/Ie AC-15 120V/5A 240V/4A
	Ue/Ie DC-13 24V/3A
expected life time	DPCO SPCO
	mechanical 2 x 10 ⁶ resp. 1 x 10 ⁷ operations
	electrical 1 x 10 ⁵ resp. 1 x 10 ⁵ operations
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20 to +60°C non condensing

* EN 60947-5-1 VDE 0435

ordering information

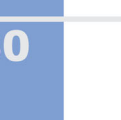
part no	supply	output	sup. galv. iso*	UL US	housing types
TCS 230Vac	230V~ 2,5VA	SPCO	yes	-	C
TCS 115Vac	115V~ 2,5VA	SPCO	yes	-	C
TCS 24Vdc	24V= 2W	SPCO	no	-	C
TCS-H 230Vac	230V~ 2,5VA	SPCO	yes	-	C
TCS-H 115Vac	115V~ 2,5VA	SPCO	yes	-	C
TCS-H 24Vdc	24V= 2W	SPCO	no	-	C

* The measurement input is galvanically isolated from the power supply



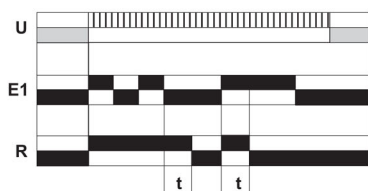
under speed control





Function

Control relay active
Control relay passive
Contact closed
Contact open

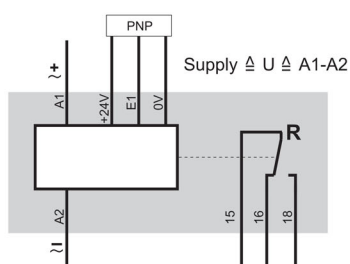


A Control relay to monitor changing impulses on a sensor
After applying the supply voltage the relay waits to see the leading edge of an input pulse.
When the pulse is detected the output relay energises. When there are no more pulses measured during time t , the output relay drops out.

Time ranges

0,1s-1,0s 1,0s-10s 0,1min-1,0min 1,0min-10min 0,1h-1,0h 1,0h-10h

The required delay time within the range selected is set using the potentiometer on the front plate



DGR

overview

- ◆ speed control/PLC watchdog relay
- ◆ SPCO output max. 6A
- ◆ 6 selectable time ranges
- ◆ LED indicators for power supply and output relay
- ◆ 22.5 or 45mm DIN rail mount housing

specification

supply voltage variation	nominal voltage +10% / -15%
frequency range	48 - 63 Hz
max delay time	100% of the selected time range
max input frequency	10Hz or 600 Rpm
output relay specification	max. 6A 230V~
Ue/Ie AC-15	120V/5A 240V/4A
Ue/Ie DC-13	24V/4A
expected life time	DPCO SPCO
mechanical	2 x 10 ⁵ resp. 1 x 10 ⁷ operations
electrical	1 x 10 ⁵ resp. 1 x 10 ⁵ operations
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20 to +60°C non condensing

* EN 60947-5-1 VDE 0435

ordering information

part no	supply	output	sup. galv. iso*	c _{us}	housing types
DGR 230Vac	230V~ 2VA	SPCO	yes	-	C
DGR 24Vdc	24V= 1W	SPCO	no	-	B

* The measurement input is galvanically isolated from the power supply

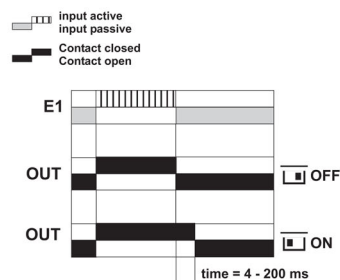
TCE

overview

- ◆ sensor pulse extension relay
- ◆ semiconductor output max. 300mA
- ◆ input PNP/NPN selectable by dip switch
- ◆ suppression of pulses less than 0.5ms
- ◆ selectable output polarity, NO or NC
- ◆ LED indicators for power supply and output
- ◆ 22.5mm DIN rail mount housing



Function

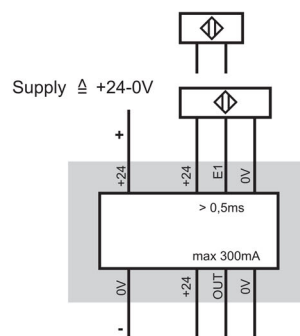
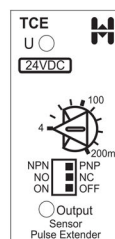


Control relay to extend sensor pulses

The TCE will operate with both NPN and PNP sensors.

Pulses <0.5ms will be suppressed, pulses >0.5ms will be extended to the time set by potentiometer.

With the dip switch setting OFF, all pulses will be re-transmitted in their original length.



specification

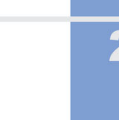
supply voltage	15 - 32V=
duty cycle	100%
output specification	max. 300mA
pulse extension	TCE
	4 - 200ms
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20 to +60°C non condensing

* EN 60947-5-1 VDE 0435

ordering information

part no	supply	output	sup. galv. iso*	CE	US	housing types
TCE 24Vdc	24V= 1W	thyristor	no	-	-	B

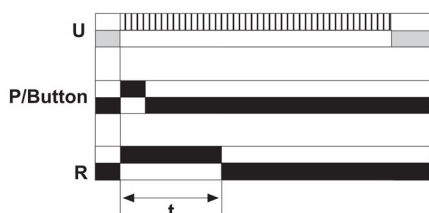
* The measurement input is galvanically isolated from the power supply





Function

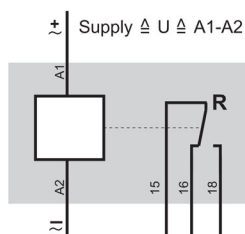
Control relay active
 Control relay passive
 Contact closed
 Contact open



A Control Relay to monitor emergency lights

When pressing the "Test" button on the front plate, the output relay energises and time t starts. During this time the emergency lights remain disconnected from the supply voltage for either 30 min or 3 hours. This is to enable a test of the emergency light system. At the end of time t the relay drops out and the emergency lights are re-connected to the supply voltage.

Two timing periods can be selected by using the knob on the front plate.



DELR

overview

- ◆ emergency light test with on-pulse function
- ◆ SPCO output max. 8A
- ◆ 2 selectable time ranges 30min/3hrs
- ◆ built in test function
- ◆ LED indicators for power supply and output relay
- ◆ 22.5 DIN rail mount housing

specification

supply voltage variation	nominal voltage +10% / -15%
frequency range	48 - 63 Hz
max. delay time	100% of the selected time range
repeat accuracy	< 1% under constant conditions
output relay specification	max. 8A 230V~
Ue/Ie AC-15	120V/3A 240V/3A
Ue/Ie DC-13	24V/1,5A
expected life time	DPCO SPCO
mechanical	2 x 10 ⁶ resp. 1 x 10 ⁷ operations
electrical	1 x 10 ⁵ resp. 1 x 10 ⁵ operations
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20 to +60°C non condensing
	* EN 60947-5-1 VDE 0435

ordering information

part no	supply	output	housing types
DELR 230Vac	230V~ 6VA	SPCO	A

TPS/UPS

overview

- ◆ output 24V=
- ◆ input 230V~ or 115V~
- ◆ TPS1 and TPS2 with SPCO relay max. 6A for NPN- or PNP-sensor connection
- ◆ UPS24 uninterruptible power supply with battery-pack
- ◆ LED indicators for power supply and relay
- ◆ 22.5mm, 45mm or 67.5mm DIN rail mount housing

specification

output voltage	24V=
TPS1 + TPS2	100mA cont. 150mA < 10s
TPS3 + TPS4	300mA cont. 400mA < 5min
supply voltage	nominal voltage +6% / -10%
frequency range	48 - 63 Hz
duty cycle	100%
relay specification	max. 6A 230V~
Ue/Ie AC-15	120V/4A 240V/3A
Ue/Ie DC-13	24V/2A
expected life time	SPCO
mechanical	2 x 10 ⁷ operations
electrical	1 x 10 ⁵ operations
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20 to +60°C non condensing

* EN 60947-5-1 VDE 0435

ordering information

part no	supply	output	relay	housing types
TPS1	230V~ 3,2VA	24V= 100mA	SPCO/NPN	C
TPS2	230V~ 3,2VA	24V= 100mA	SPCO/PNP	C
TPS3	230V~ 10VA	24V= 300mA	-	E
TPS4	115V~ 10VA	24V= 300mA	-	E
UPS24	24V= 2W	0,2A	thyristor	B
Akku-Pack	NiCd, 24V, 110mAh			

