



World of Automation



Chapter 1: General information

HIQUEL®
HIGH QUALITY ELECTRONICS

www.hiquel.com



HIQUEL

HIGH QUALITY ELECTRONICS

new dimension in time ...



















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We reserve the right to alter specifications in the interests of technical progress.

CATALOGUE GUIDE

-  ◆ number of closing contacts
-  ◆ number of changing contacts
-  ◆ DIN-Rail mounting
-  ◆ 11 pin plug in
-  ◆ timer functionality
-  ◆ real time clock
-  ◆ protection class
-  ◆ temperature measurement function
-  ◆ PTC (Thermistor) measurement function
-  ◆ 3 phase measurement function
-  ◆ diode array
-  ◆ thyristor output
-  ◆ voltage measurement function
-  ◆ current measurement function
-  ◆ liquid level control
-  ◆ speed control
-  ◆ UL certification
-  ◆ CE conformity

monitoring & control relays

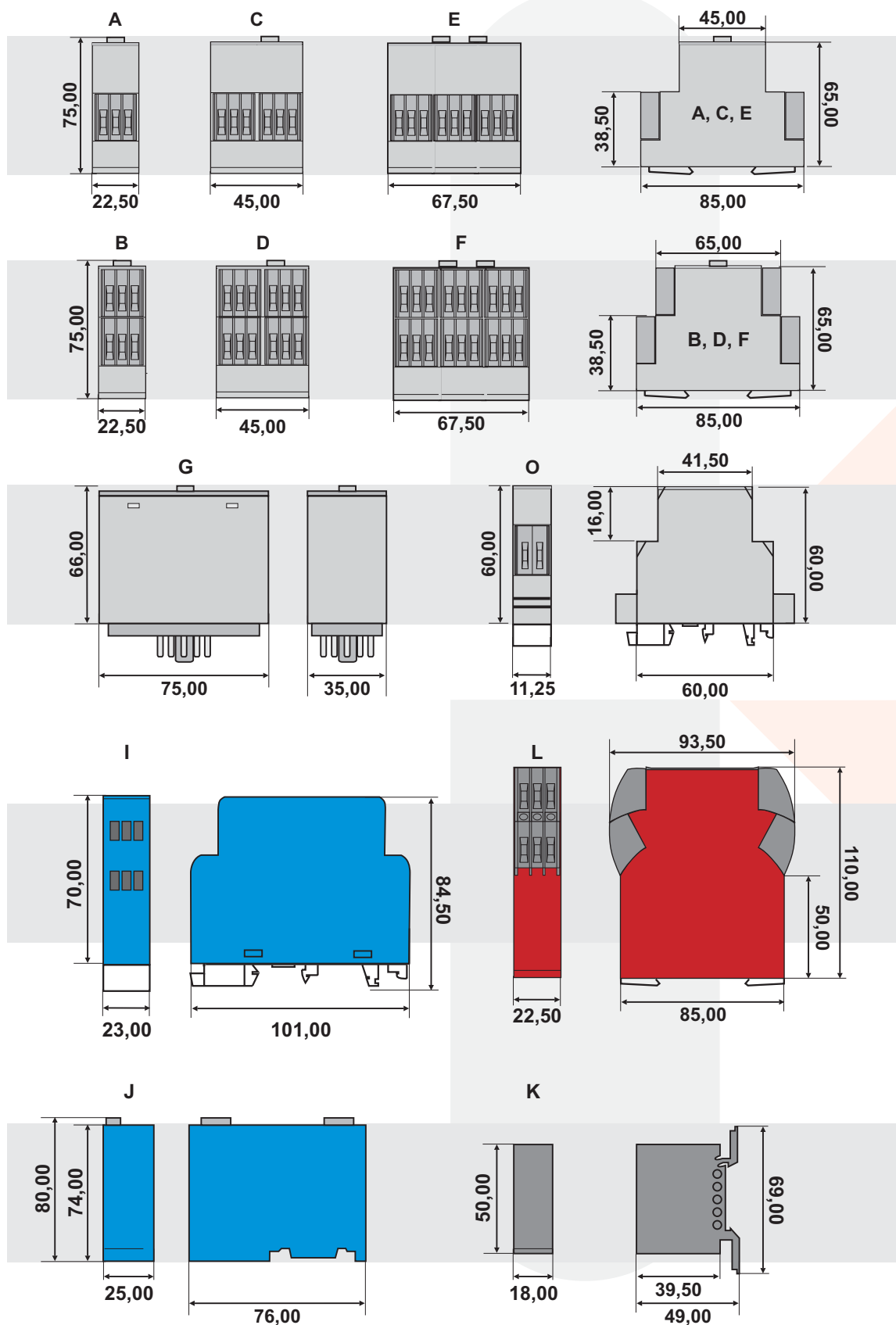
timing relays

signal converting relays

special purpose



housing types



DIN-rail
terminals: IP20
housing: IP50

all dimensions in mm



World of Automation



Chapter 2: Monitoring relays

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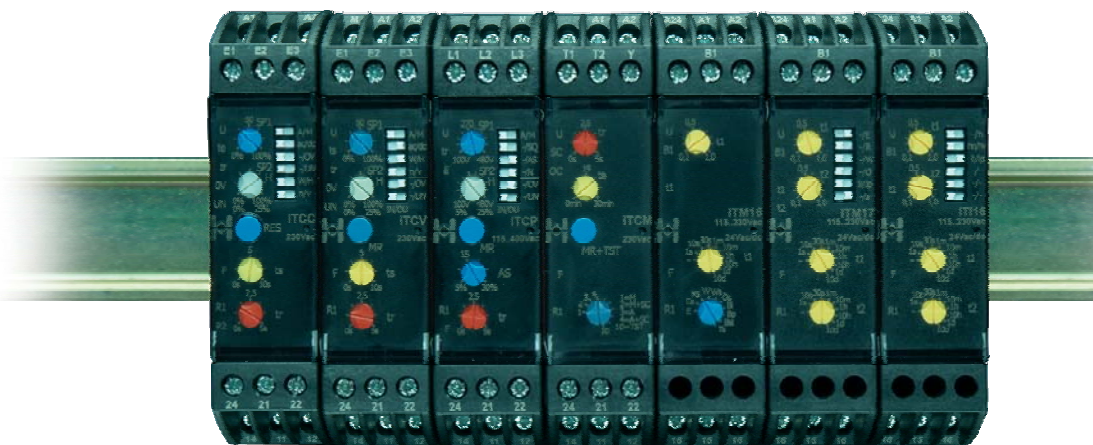
2 Chapter 2: Monitoring relays

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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.

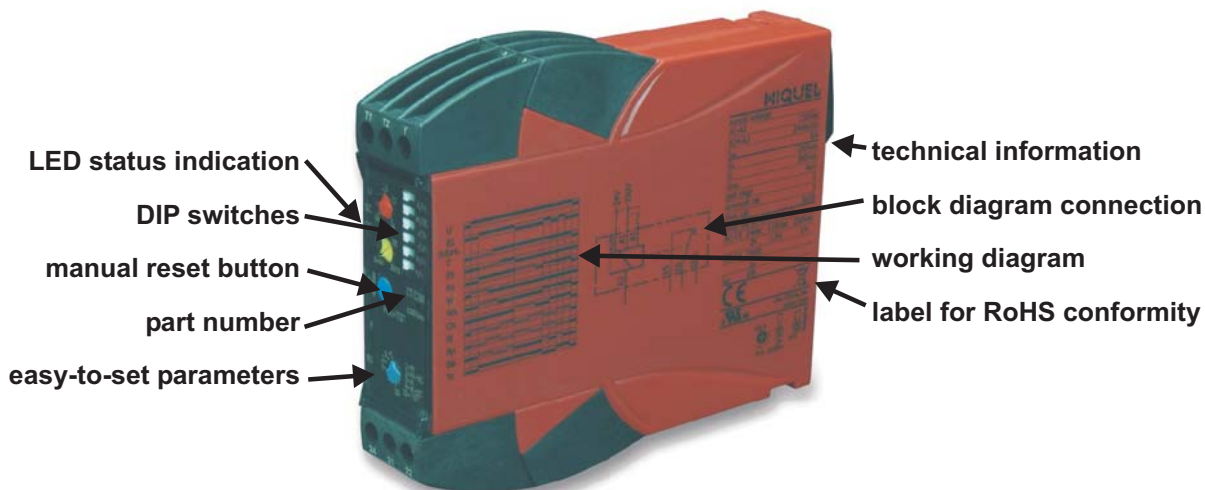
Hiquel's solution is the new *in-Case* series, an integrated range of Industrial Monitoring and Timing relays in a new, compact 22.5mm DIN rail case. Designed with the emphasis on flexibility and incorporating a new micro-controller, just four monitoring relays offer a complete range featuring single 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:





Function

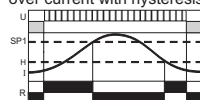
- Control relay active
- Control relay passive
- Contact closed
- Contact open

DIP-Switch: autom.-Reset / Relay normal

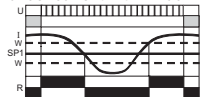
over current with window



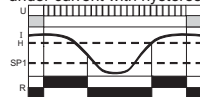
over current with hysteresis



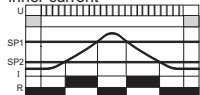
under current with window



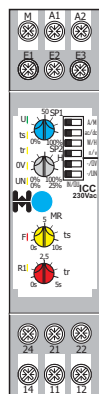
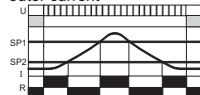
under current with hysteresis



inner current

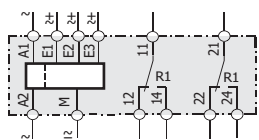


outer current



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*	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

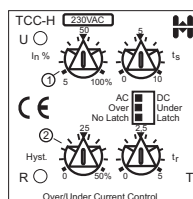
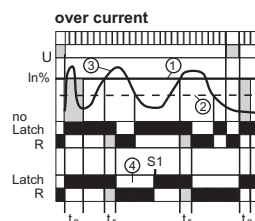
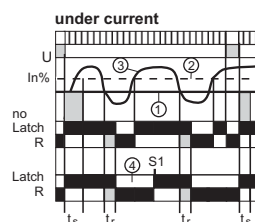
part no	supply	output	sup. galv. iso*	HIQUEL [®]	housing types
TCC-H 230Vac	230V~ 2,5VA	DPCO	yes	yes	C
TCC-H 115Vac	115V~ 2,5VA	DPCO	yes	yes	C
TCC-H 24Vac	24V~ 2,5VA	DPCO	yes	yes	C
TCC-H 24Vdc	24V= 2W	DPCO	no	yes	C

* The measurement input is galvanically isolated from the power supply



Function

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



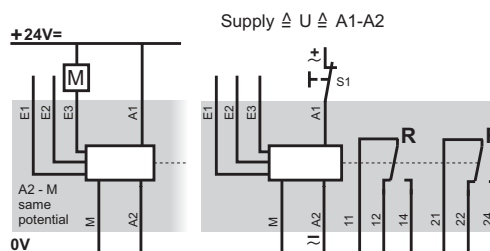
- ① Threshold "In"
- ② Hysteresis
- ③ Monitored current
- ④ Latch

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



over/under current control



TCC-W

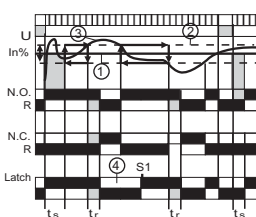
overview

- ◆ 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
Ts... LED indication reaction timer
On application of the supply voltage with N.O. Mode selected, the output relay pulls in and the timing period ts starts.

Current control with no latch (auto reset) function

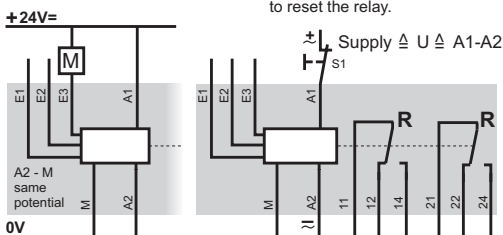
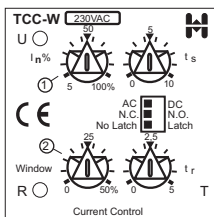
At the end of ts, if the measured current exceeds the window in either direction, timing period tr starts. At the end of tr, if the measurement still exceeds the setpoint the output relay changes over.

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 ts, when the measured current exceeds the window in either direction, timing period tr starts. At the end of tr, 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*	housing types
TCC-W 230Vac	230V~ 2,5VA	DPCO	yes	C
TCC-W 115Vac	115V~ 2,5VA	DPCO	yes	C
TCC-W 24Vac	24V~ 2,5VA	DPCO	yes	C
TCC-W 24Vdc	24V= 2W	DPCO	no	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

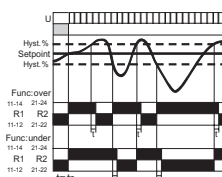
overview

- ◆ 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.

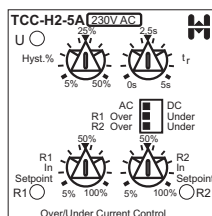
When the measured current returns to within the permitted range, the corresponding relay resets immediately.

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 or 10A



specification

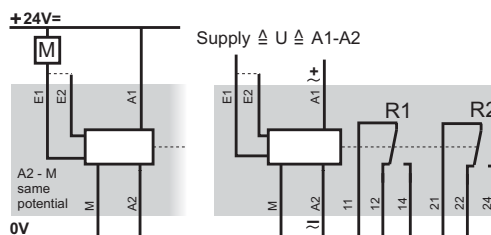
supply voltage variation	nominal voltage +10% / -15%
frequency range	48 - 63 Hz
duty cycle	100%
reaction time	0 - 5s
reset time	< 100ms
output relay specification	max. 6A 230V~
Ue/Ie AC-15	120V/4A 240V/3A
Ue/Ie DC-13	24V/2A
expected life time	SPCO
mechanical	5 x 10 ⁶ operations
screws	pozidrive 1
screw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

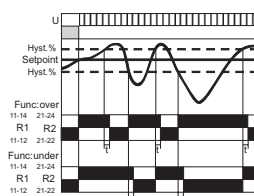


over/under current monitor with two switch points

- ◆ 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

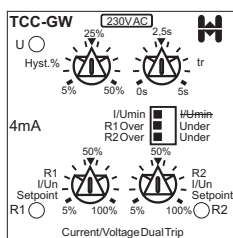


Control relay for monitoring DC current and DC voltage with two independently adjustable relay outputs.

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.

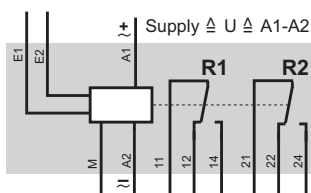
When the measured value returns to within the permitted range, the corresponding relay resets immediately.



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*	housing types
TCC-GW 230Vac	230V~ 2,5VA	2 x SPCO	yes	C
TCC-GW 115Vac	115V~ 2,5VA	2 x SPCO	yes	C
TCC-GW 24Vac	24V~ 2,5VA	2 x SPCO	yes	C
TCC-GW 24Vdc	24V= 2W	2 x SPCO	no	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

ICV

overview

- ◆ 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

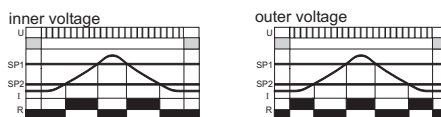
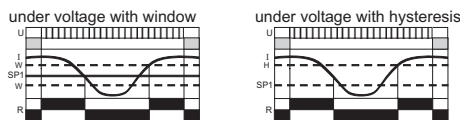
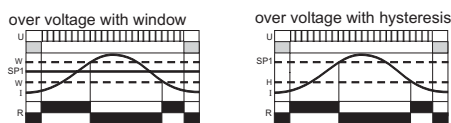
* The measurement input is galvanically isolated from the power supply



Function

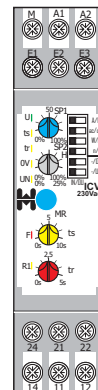
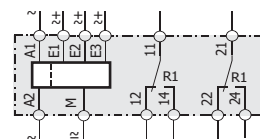
- Control relay active
- Control relay passive
- Contact closed
- Contact open

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



single phase voltage control





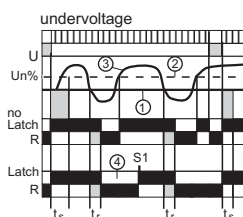
TCV-H

overview

- ◆ 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

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

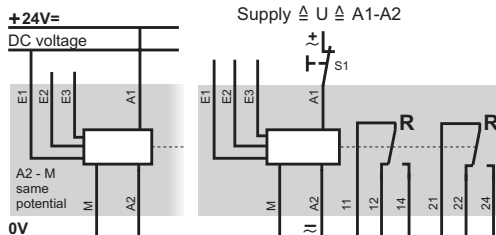
On the application of the supply voltage the output relay pulls in and the timing period t_s starts.

Voltage monitor with no latch (auto reset) function

At the end of t_s , when the measured voltage exceeds the set point (Hyst), the timing period t_r starts. At the end of t_r , 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 t_s , when the measured voltage exceeds the set threshold, timing period t_r starts. At the end of t_r 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*	housing types
TCV-H 230Vac	230V~ 2,5VA	DPCO	yes	C
TCV-H 115Vac	115V~ 2,5VA	DPCO	yes	C
TCV-H 24Vac	24V~ 2,5VA	DPCO	yes	C
TCV-H 24Vdc	24V= 2W	DPCO	no	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

TCV-W

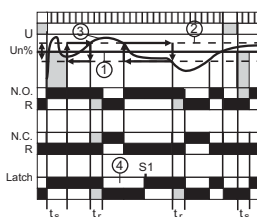
overview

- ◆ 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

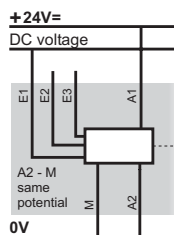
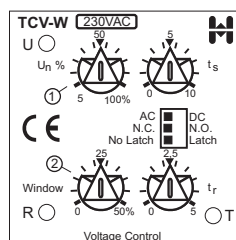
On application of the supply voltage with N.O. Mode selected, the output relay pulls in and the timing period ts starts.

Voltage monitor with no latch (auto reset) function

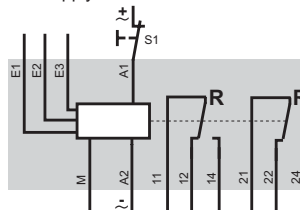
At the end of ts when the measured voltage exceeds the window in either direction timing period tr starts. At the end of tr if the measurement still exceeds the set point the output relay changes over. The output relay resets immediately when the monitored voltage reaches the hysteresis set value.

Voltage monitor with latch (manual reset) function

At the end of ts when the measured voltage exceeds the window in either direction, timing period tr starts. At the end of tr 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.



Supply Δ U Δ A1-A2



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

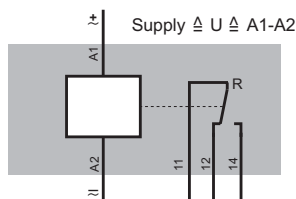
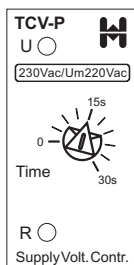
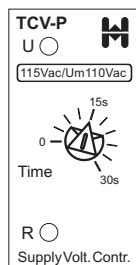
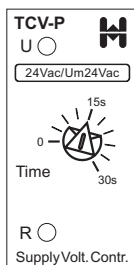
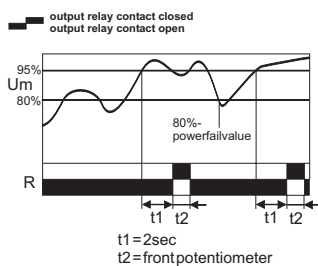




Function

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 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}	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		Reset-button	C	2				C	2								
ICPV	✓	✓	✓		80..260V selectable, mode also selectable			0,1 .. 5s	✓		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								



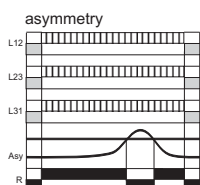
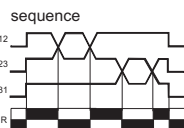
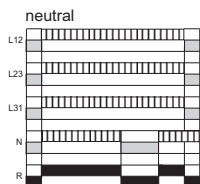
control relays



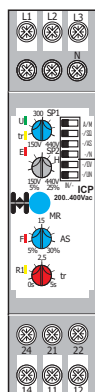
Function

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

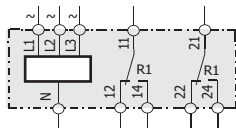
DIP-Switch: autom.-Reset



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
- over under inner



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*		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

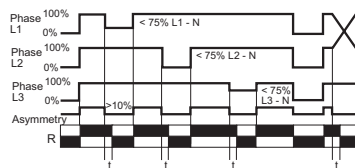
part no	supply	output	sup. galv. iso*	HIQUEL	housing types
TCP 3x400Vac	3x 400V~ 2,5VA	DPCO	yes	yes	C
TCP 3x230Vac	3x 230V~ 2,5VA	DPCO	yes	yes	C
TCP-S 3x400Vac	3x 400V~ 2,5VA	SPCO	yes	yes	B
TCP-S 3x230Vac	3x 230V~ 2,5VA	SPCO	yes	yes	B
PCP 3x400Vac	3x 400V~ 2,5VA	DPCO	yes	no	G
PCP 3x230Vac	3x 230V~ 2,5VA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

* The measurement input is galvanically isolated from the power supply



Function

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



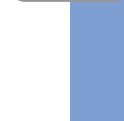
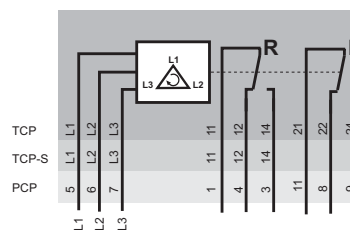
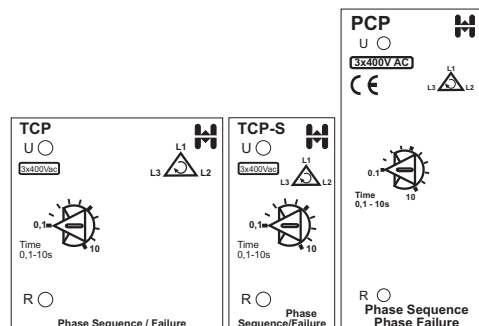
Control relay to monitor 3-wire, 3-phase systems for the failure of one or more phase, a phase asymmetry shift exceeding 10% and the correct phase rotation (L1, L2, L3)

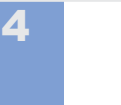
The TCP detects that the phase sequence is correct and that no phase has failed, in which case the output relay **R** energises.

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

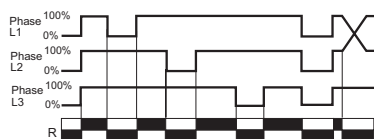
overview



- ◆ 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

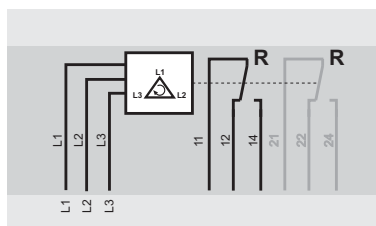
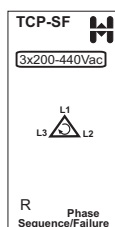
Function

- 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	certification	housing types
TCP-SF	3x 200-440V~ 6VA	SPCO	1	-	A
TCP-SF2	3x 200-440V~ 6VA	DPCO	2	-	B

TCP-M

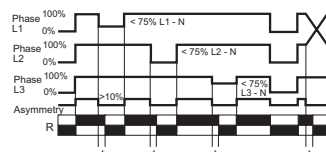
overview

- ◆ 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



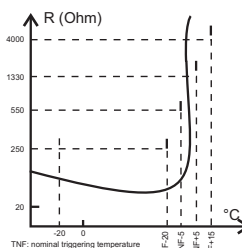
Function

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



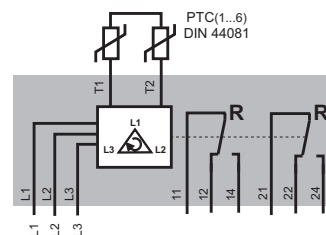
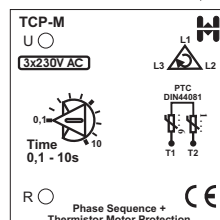
Control relay for phase failure and thermistor protection

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 ($> V_n \times 0.75$), 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

3 phase failure and thermistor motor protection

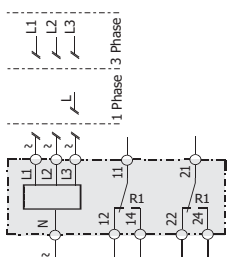
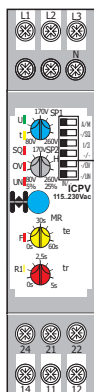
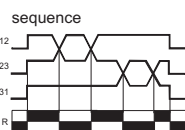
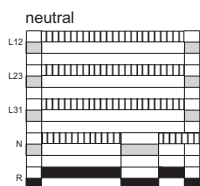




Function

- 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
- ◆ automatic 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

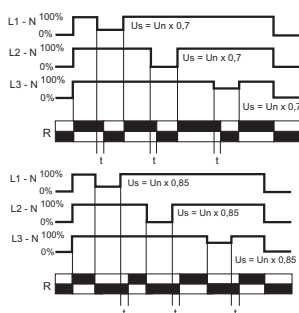
overview

- ◆ 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



TCP-V
PCP-V

normal function

TCP-V-I

invers function

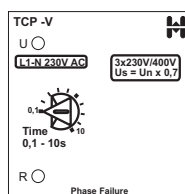
Phase failure relay 3-phase and neutral

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

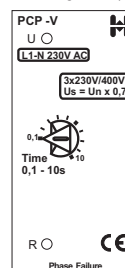
At a loss of one phase (> 30% under nominal voltage) the reaction time t starts. At the end of time t the output relay R de-energises. Time t is adjustable between 0.1s and 10s, and is used to time out short transients which would otherwise cause nuisance tripping.

The relay energises again, when phase L1, L2 and L3 return to the correct range.

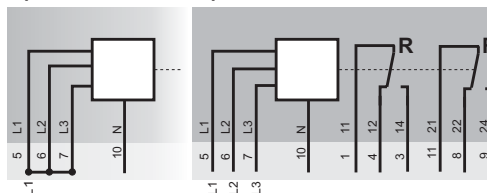
The TCP-V may be used for monitoring a 1-phase system, in which case L1, L2 & L3 must be connected together (see below).



1-phase connection



3-phase connection



specification

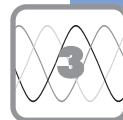
supply voltage variation	nominal voltage +10% / -20%
frequency range	48 - 63 Hz
duty cycle	100%
reaction timer	0,1 - 10s
reset time	< 100ms
output relay specification	max. 6A 230V~
Ue/Ie AC-15	120V/4A 240V/3A
Ue/Ie DC-13	24V/2A
expected life time	DPCO SPCO
mechanical	2 x 10 ⁶ resp. 1 x 10 ⁷ operations
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

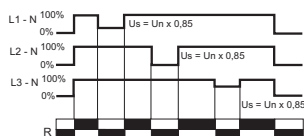
overview

- ◆ 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)

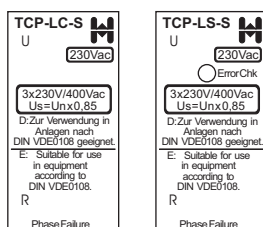
The TCP-LC is a phase failure relay for monitoring 4-wire, 3-phase systems for phase failure or phase voltage reduction down to $U_n \times 0,85$ or less. When the control relay detects all 3 phases within the correct range the output relay **R** energises.

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 ($> U_n \times 0,9$).

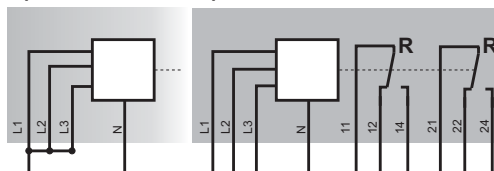
The TCP-LC may be used for monitoring a 1-phase system, in which case L1, L2 & L3 must be connected together (see below).

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*	e _{AL}	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

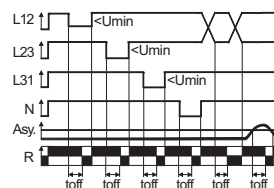
overview

- ◆ 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



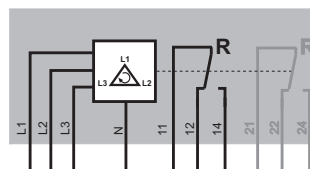
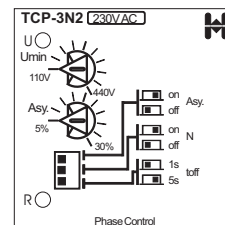
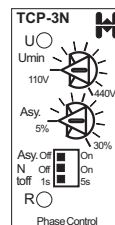
A load from 0,5kW detects the device with a AS-setting < 10% and the reverse voltage of consumers.

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

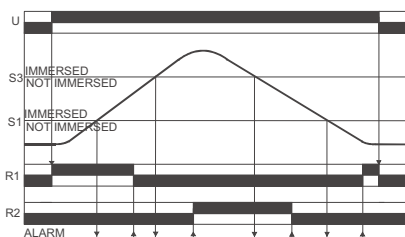
part no	supply	output	relay type	housing types
TCP-3N	3x 110-440V~	30VA	SPCO	1 B
TCP-3N2	3x 110-440V~	30VA	DPCO	2 C

3 phase monitoring relay (phase to neutral measurement)

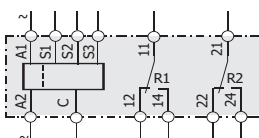
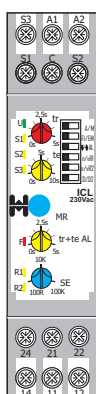
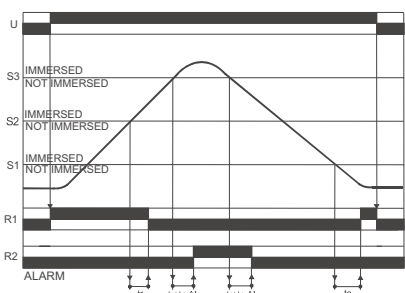




function: filling with two sensors and max. alarm



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

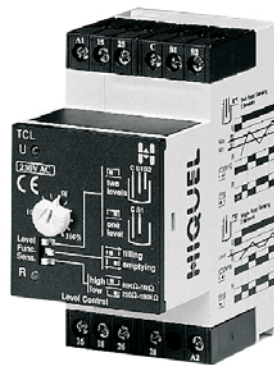
part no	supply	output	sup. galv. iso*	e _{AL}	housing types
ICL 400Vac	400V~ 2,5VA/1W	DPCO	yes	-	L
ICL 230Vac	230V~ 2,5VA/1W	DPCO	yes	-	L
ICL 115Vac	115V~ 2,5VA/1W	DPCO	yes	-	L
ICL 24Vac	24V~ 2,5VA/1W	DPCO	yes	-	L

* 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

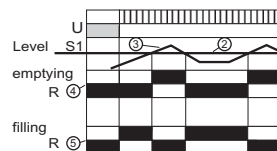
- Control relay active
- Control relay passive
- Contact closed
- Contact open

1 level
Single Point
Sensing
using 2 Sensors



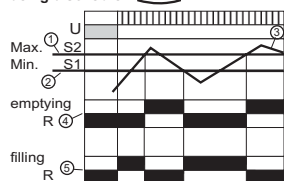
- ① max. level
- ② min. level
- ③ monitored level
- ④ Output relay, emptying function
- ⑤ Output relay, filling function

Control relay to monitor the level of conductive liquids



The TCL 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

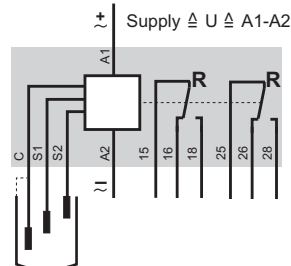
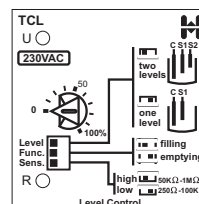


Single point sensing:
The relay changes over each time the liquid contacts C and S1.

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*	CE	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.

- ◆ 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

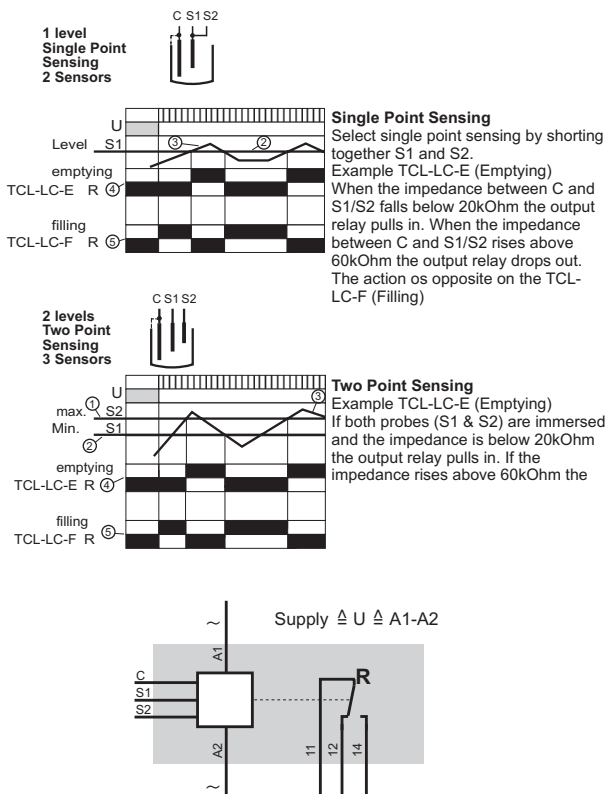
Function

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..*	HA	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 in/out is galvanically isolated from the power supply.

TCL-3

overview

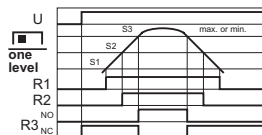
- ◆ monitors two or three levels of conductive liquids
- ◆ 3 x N.O. output max. 6A
- ◆ programmable filling or emptying mode
- ◆ programmable sensitivity 250 Ohm - 100 kOhm or 50 kOhm - 1 MOhm
- ◆ LED indicators for power-supply and all three relays
- ◆ 45mm DIN rail mount housing



Function

Control relay to monitor the level of conductive liquids

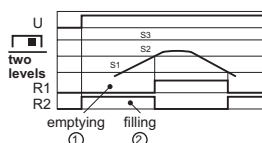
The TCL controls the level of conductive liquids in a conductive or non-conductive container and works by passing a low voltage through the liquid from suitable probes to an earth return which can either be the container or another probe.



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



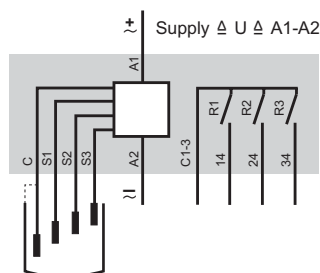
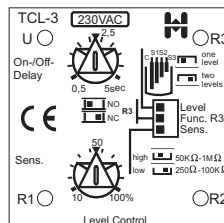
Two point sensing:

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

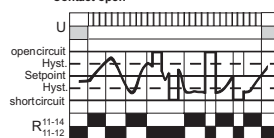


liquid level control, 3 levels



Function

Control relay active
Control relay passive
Contact closed
Contact open



Description

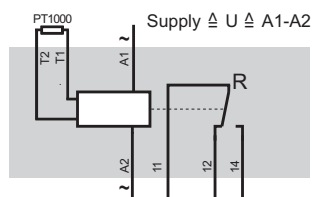
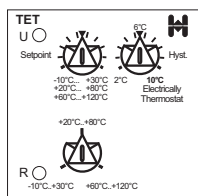
The measuring range is selected with the lower potentiometer three ranges are available:
-10°C...+30°C; +20°C...+80°C; +60°C...+120°C.

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*	certification	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

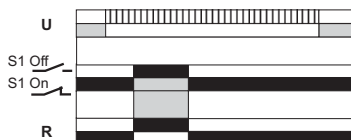
overview

- ◆ 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



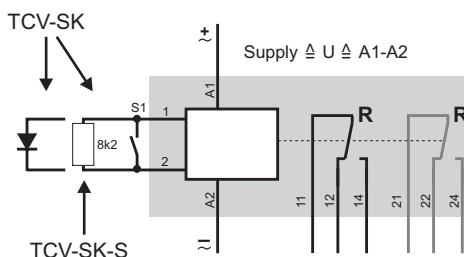
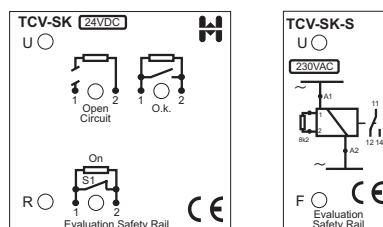
Control relay to monitor permanent safety rails on roller shutter doors

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

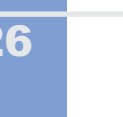
supply voltage variation	nominal voltage +10% / -15%
frequency range	48 - 63 Hz
duty cycle	100%
LED indicators	yellow open circuit green safety rail o.k. red failure
output relay specification	max. 6A 230V~ Ue/Ie AC-15 120V/4A 240V/3A Ue/Ie DC-13 24V/2A
expected life time	DPCO SPCO mechanical 2 x 10 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*	UL	housing types
TCV-SK 230Vac	230V~ 2,5VA	DPCO	yes	yes	C
TCV-SK 115Vac	115V~ 2,5VA	DPCO	yes	yes	C
TCV-SK 24Vac	24V~ 2,5VA	DPCO	yes	yes	C
TCV-SK 24Vdc	24V= 2W	DPCO	no	yes	C
TCV-SK-S 230Vac	230V~ 2,5VA	SPCO	yes	no	B
TCV-SK-S 115Vac	115V~ 2,5VA	SPCO	yes	no	B
TCV-SK-S 24Vac	24V~ 2,5VA	SPCO	yes	no	B
TCV-SK-S 24Vdc	24V= 2W	SPCO	no	no	B

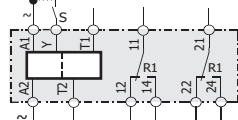
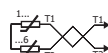
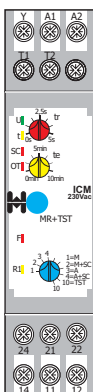
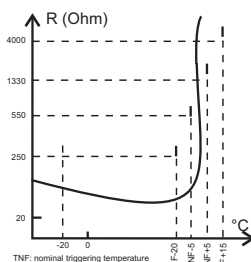
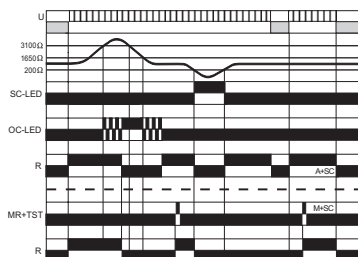
* The measurement input is galvanically isolated from the power supply





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*	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*	CE	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

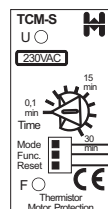
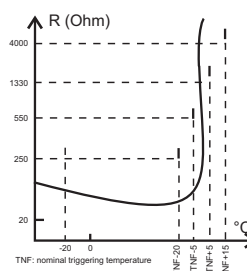
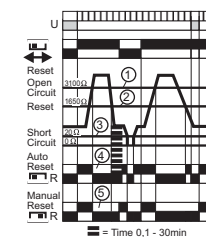
* The measurement input is galvanically isolated from the power supply



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



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.

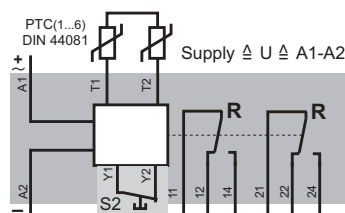
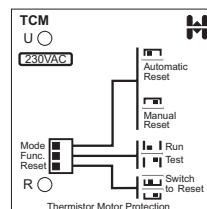
Front plate located DIP-Switches are used to select either.

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.



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

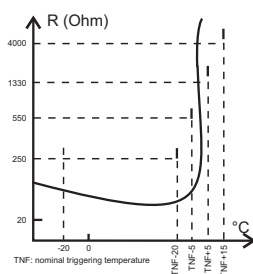
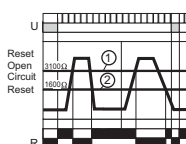




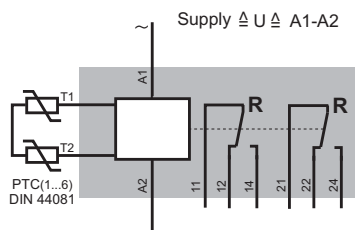
Function

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

- triggering threshold
- reset threshold



TNF: nominal triggering temperature



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

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	

* 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

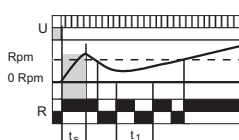
- under speed control with fault latching function
- SPCO output max. 6A
- input PNP 24Vdc, volt free contact and 15-40Vdc
- start surge delay 0.2-20s
- 4 selectable speed ranges
- LED indicators for power supply, relay and reaction timer
- 45mm DIN rail mount housing



Function

- Control relay active
 - Control relay passive
 - Contact closed
 - Contact open
- ① Underspeed threshold
② Monitored speed
ts... Start surge delay

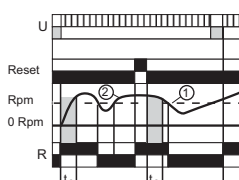
Auto Reset



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

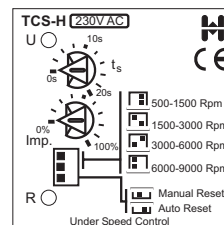
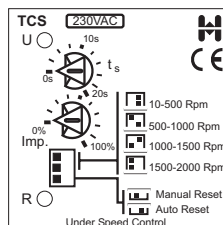


Auto Reset

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

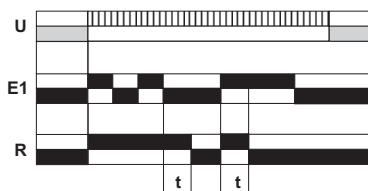
* The measurement input is galvanically isolated from the power supply





Function

Control relay active
 Control relay passive
 Contact closed
 Contact open

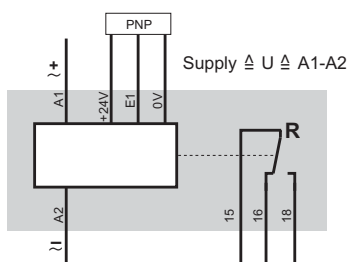


A Control relay to monitor changing impulses on a sensor
 After applying the supply voltage the relay waits to see the leading edge of an input pulse.
 When the pulse is detected the output relay energises. When there are no more pulses measured during time t , the output relay drops out.

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 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}	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

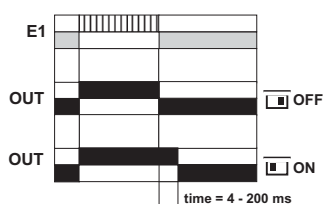
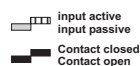
TCE

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

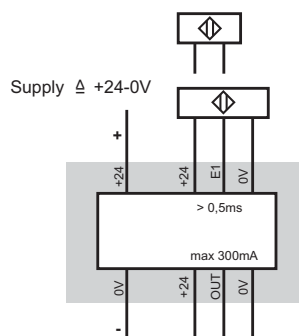
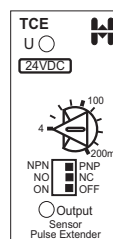


Control relay to extend sensor pulses

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*	UL US	housing types
TCE 24Vdc	24V= 1W	thyristor	no	-	B

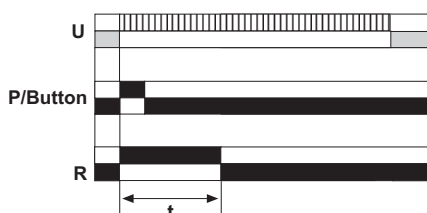
* The measurement input is galvanically isolated from the power supply





Function

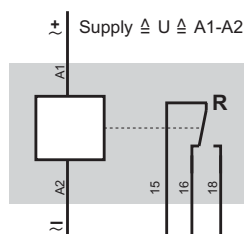
Control relay active
Control relay passive
Contact closed
Contact open



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

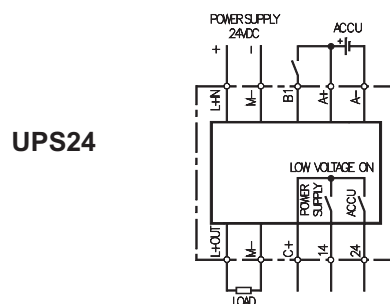
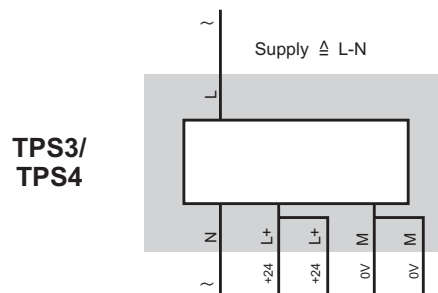
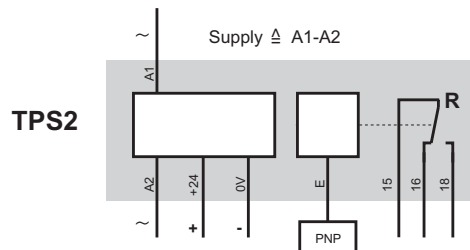
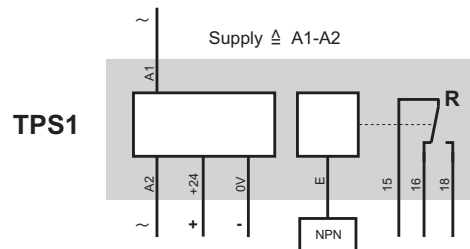
specification

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	US	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			-	





World of Automation



Chapter 3: Timing relays

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3 Chapter 3: Timing relays

- .01 ITM16**
- .02 ITM216**
- .03 ITM17**
- .04 TM**
- .05 TE/DER**
- .06 TR**
- .07 TB**
- .08 TW**
- .09 ITA**
- .10 TA**
- .11 ITS16**
- .12 TS**
- .13 ITI16**
- .14 TI**
- .15 ITT16**
- .16 DES/PES/TES**
- .17 DER-M**
- .18 PRER2/TOE/TOR**

ITM16

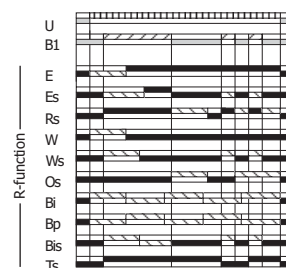
overview

- ◆ multi-function timing relay
- ◆ all common supply voltages on one unit
- ◆ 9 selectable timing ranges (1sec - 10d)
- ◆ 10 selectable timing functions
- ◆ SPCO configuration
- ◆ LED indicators for power supply, failure, status of the output relay, control contact & timer
- ◆ 22.5mm DIN rail mount housing



Multifunction

- Supply voltage (U) on
- Supply voltage (U) off
- Starting contact S on B1 closed
- Starting contact S on B1 open
- Output relay contact closed
- Output relay contact open
- Time is running



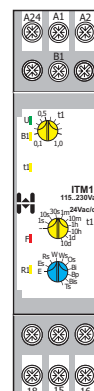
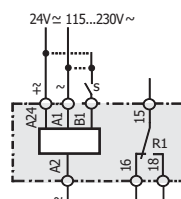
Functions:

- E...On delay
- Es...On delay with external control input
- Rs...Off delay with external control input
- W...On pulse single shot
- Ws...On pulse single shot with external control input
- Os...Off pulse with external control input
- Bi...Symmetrical recycler pulse first
- Bp...Symmetrical recycler pause first
- Bis...Symmetrical recycler pulse first with external control input
- Ts...Bistable

Time ranges

1s, 10s, 30s, 1m, 10m, 1h, 10h, 1d, 10d

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



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/1,5A
expected life time	SPCO
mechanical	10 x 10 ⁶ operations
electrical	1 x 10 ⁵ operations
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20°C bis +60 °C non condensing * EN 60947-5-1 VDE 0435

ordering information

part no	supply	output	relay type	housing types
ITM16	24V~ / 115..230V~	6VA / 1W	SPCO	L

* The measurement input is galvanically isolated from the power supply

multi-function



ITM216

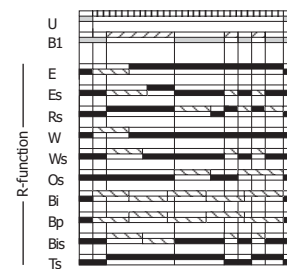
overview

- ◆ multi-function timing relay
- ◆ all common supply voltages on one unit
- ◆ 9 selectable time ranges (1sec - 10d)
- ◆ 3 selectable parallel functions
- ◆ 10 selectable timing functions
- ◆ 2x SPCO configuration
- ◆ LED indicators for power supply, failure, status of the output relay, control contact & timer
- ◆ 22.5mm DIN rail mount housing



Multifunction

- Supply voltage (U) on
- Supply voltage (U) off
- Starting contact S on B1 closed
- Starting contact S on B1 open
- Output relay contact closed
- Output relay contact open
- Time is running



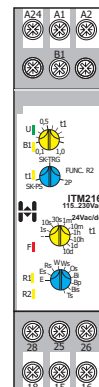
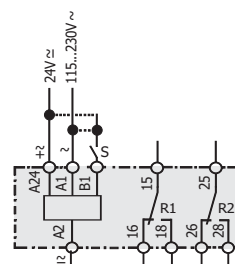
Functions:

- E...On delay
- Es...On delay with external control input
- Rs...Off delay with external control input
- W...On pulse single shot
- Ws...On pulse single shot with external control input
- Os...Off pulse with external control input
- Bi...Symmetrical recycler pulse first
- Bp...Symmetrical recycler pulse first
- Bis...Symmetrical recycler pulse first with external control input
- Ts...Bistable

Time ranges

1s, 10s, 30s, 1m, 10m, 1h, 10h, 1d, 10d

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



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/1,5A
expected life time	2 SPCO
mechanical	10 x 10 ⁶ operations
electrical	1 x 10 ⁵ operations
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20°C bis +60 °C non condensing

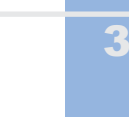
* EN 60947-5-1 VDE 0435

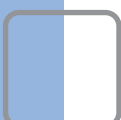
ordering information

part no	supply	output	relay type	housing types
ITM216	24V~ / 115..230V~	6VA / 1W	2x SPCO	L

* The measurement input is galvanically isolated from the power supply

multi-function



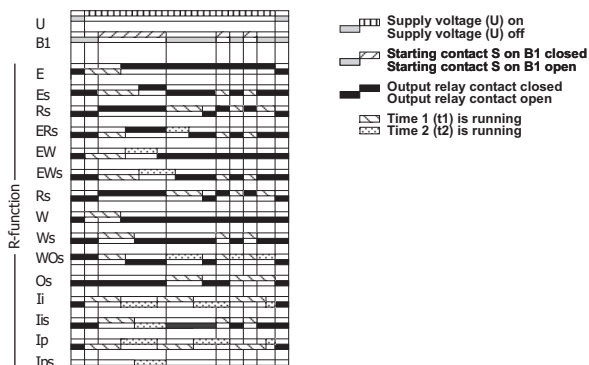


ITM17

overview

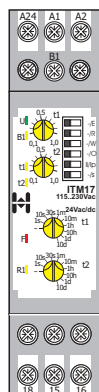
- ◆ multi-function timing relay
- ◆ all common supply voltages on one unit
- ◆ 2 separate timers
- ◆ 9 selectable time ranges
- ◆ 14 selectable timing functions
- ◆ SPCO configuration
- ◆ LED indicators for power supply, failure, status of the output relay, control contact and timers
- ◆ 22.5mm DIN rail mount housing

Multifunction



Functions

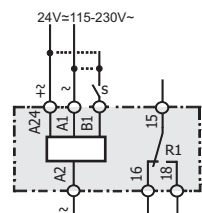
- E...On delay
- Es...On delay with external control input
- Rs...Off delay with external control input
- ERs...On delay and off delay with external control input
- EW...On delay and on pulse / delayed single shot
- EWs...On delay and on pulse / delayed single shot with external control input
- W...On pulse single shot
- Ws...On pulse single shot with external control input
- WOs...On pulse and off pulse with external control input
- Os...Off pulse with external control input
- Ii...Asymmetrical recycler pulse first
- Iis...Asymmetrical recycler pulse first with external control input
- Ip...Asymmetrical recycler pause first
- Ips...Asymmetrical recycler pause first with external control input



Time ranges

1s, 10s, 30s, 1m, 10m, 1h, 10h, 1d, 10d

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



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/1.5A
expected life time	SPCO
mechanical	10 x 10 ⁶ operations
electrical	1 x 10 ⁵ 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	relay type	housing types
ITM17	24V~ / 115..230V~	6VA / 1W	SPCO	L

* The measurement input is galvanically isolated from the power supply

- ◆ single, dual, multi & zoom supply voltage options
- ◆ 8 timing functions selected by DIP switch
- ◆ SPCO or DPCO output relay
- ◆ 6 selectable time ranges 0.1sec - 10 Hrs
- ◆ LED indicators for power supply and relay status
- ◆ 22.5mm DIN rail mount housing or 11pin plug in housing

specification

supply voltage variation		nominal voltage +10% / -15%		
		TM16 +10% / -10%		
		TM20,TM21,TM81,TM82 +5% / -10%		
supply selection		TM16/T3F selectable by a switch		
frequency range		48 - 63 Hz		
duty cycle		100%		
repeat accuracy		< 1% of the selected range		
relay type		1	2	3
output relay spec	230V~	6A	12A	10A
	le AC-15* 120V~	4A	2,5A	5A
	le AC-15* 240V~	3A	2,5A	4A
	le DC-13* 24V=	2A	2,0A	4A
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

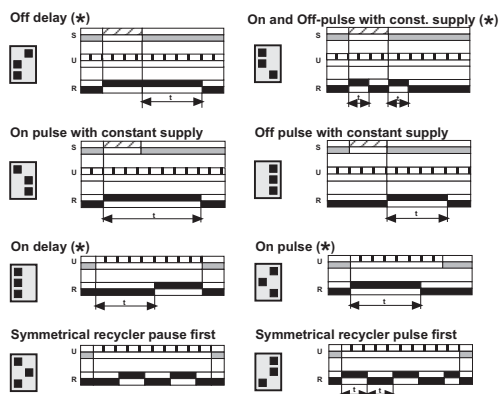
part no	supply	output	relay type	HIQUEL [®]	housing type
TM01	230V~ / 24V~=	6VA / 1VA	DPCO	1	yes B
TM16	115 - 230V~ / 24V~=	6VA / 1VA	SPCO	2	yes A
TM20	24 - 240V~=	2VA	SPCO	3	yes A
TM21	24 - 240V~=	2VA	DPCO	1	yes B
TM41	230V~ / 24V~=	6VA / 1VA	DPCO	1	no G
TM42	230V~ / 24V~=	6VA / 1VA	SPCO	1	no G
TM71	230V~ w. transformer	1,5VA	DPCO	1	no G
TM72	230V~ w. transformer	1,5VA	SPCO	1	no G
TM81	24 - 240 V~=	2VA	DPCO	1	no G
TM82	24 - 240 V~=	2VA	SPCO	1	no G
T3F*	115 - 230V~ / 24V~=	6VA / 1VA	SPCO	2	yes A

other voltages on request



Multifunction

- Starting contact S on B1 closed
- Starting contact S on B1 open
- Supply voltage(U) on
- Supply voltage(U) off
- Output relay contact closed
- Output relay contact open

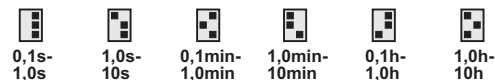


Remove supply voltage before making any changes to either time range or timing function.

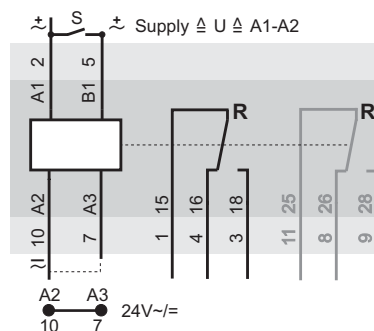
(*) available T3F functions

A detailed description of each of the timing functions will be found on the following 'single function' type pages.

Time ranges



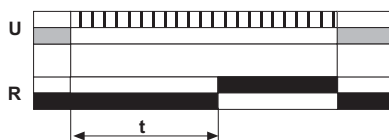
The required delay time within the range selected is set using the potentiometer on the front plate.





On delay

- Supply voltage on
Supply voltage off
- Output relay contact closed
Output relay contact open



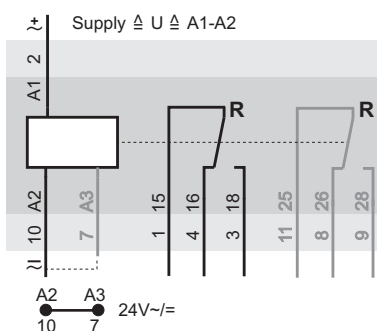
Remove supply voltage before making any changes to either time range or timing function.

On the application of the supply voltage, time delay t commences. At the end of the time delay the output relay pulls in. When the supply voltage is removed the output relay drops out and the time relay resets ready for the next timing cycle. If the supply voltage is removed during time t , the output relay will drop out, the unexpired time will be cancelled and the time relay will reset.

Time ranges



The time ranges are selected using the DIP switch settings illustrated left, and the required delay time is set using the potentiometer on the front plate.



TE/DER

overview

- single or dual supply voltage options
- SPCO or DPCO output relay
- 6 selectable time ranges
- LED indicators for power supply and contact
- 22.5mm DIN rail mount housing or 11pin plug in housing

specification

supply voltage variation	nominal voltage +10% / -15%	
frequency range	48 - 63 Hz	
max. delay time	100%	
repeat accuracy	< 1% of the selected range	
relay type	1	2
output relay spec	230V~	6A 10A
le AC-15*	120V~	4A 5A
le AC-15*	240V~	3A 4A
le DC-13*	24V=	2A 4A
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	relay type	HIQUEL	housing types
TE01	230V~ / 24V~	6VA / 1W	DPCO	1	yes B
TE04	115V~ / 24V~	6VA / 1W	DPCO	1	yes B
DER230	230V~ / 24V~	6VA / 1W	SPCO	2	yes A
DER115	115V~ / 24V~	6VA / 1W	SPCO	2	yes A
TE12	230V~	6VA	SPCO	2	yes A
TE13	24V~	1W	SPCO	2	yes A
TE15	115V~	6VA	SPCO	2	yes A
TE41	230V~ / 24V~	6VA / 1W	DPCO	1	no G
TE42	230V~ / 24V~	6VA / 1W	SPCO	1	no G
TE71	230V~ w. transf.	2VA	DPCO	1	no G

other voltages on request

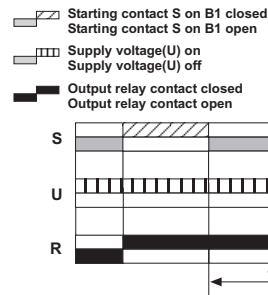
TR

overview

- ◆ single or dual supply voltage options
- ◆ SPCO or DPCO output relay
- ◆ 6 selectable time ranges 0.1sec - 10Hrs
- ◆ LED indicators for power supply and relay status
- ◆ 22.5mm DIN rail mount housing or 11pin plug in housing



Off delay



Remove supply voltage before making any changes to either time range or timing function.

On the application of the supply voltage the time relay energises ready for the timing cycle. When the starting contact **S** is closed the output relay pulls in immediately. Time delay **t** starts when the starting contact is opened and the output relay drops out at the end of the time delay. If the supply voltage is removed before, or during time **t**, the output relay will drop out immediately and the time relay will reset ready for the next timing cycle.

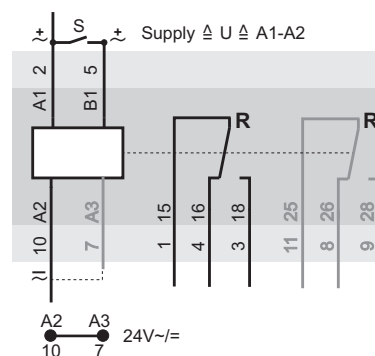
Important application note:

On types **TR12,13 & 15** only, small inductive devices (relays etc.), can be connected between the **B1** terminal and ground (-ve) such that they energise when the **A1-B1** start contact is made. A snubber circuit should be included for larger devices. **Do not do this on types TR01 & 04.**

Time ranges



The time ranges are selected using the DIP switch settings illustrated left, and the required delay time is set using the potentiometer on the front plate.



specification

supply voltage variation		nominal voltage +10% / -15%	
frequency range		48 - 63 Hz	
max. delay time		100%	
repeat accuracy		< 1% of the selected range	
relay type		1	2
output relay spec	230V~	6A	10A
le AC-15*	120V~	4A	5A
le AC-15*	240V~	3A	4A
le DC-13*	24V=	2A	4A
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

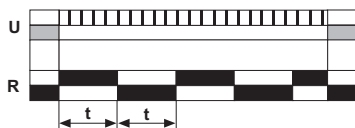
part no	supply	output	relay type	HIQUEL	housing type
TR01	230V~/24V~=	6VA / 1W	DPCO	yes	B
TR04	115V~/24V~=	6VA / 1W	DPCO	yes	B
TR12	230V~	6VA	SPCO	yes	A
TR13	24V~=	1W	SPCO	yes	A
TR15	115V~	6VA	SPCO	yes	A
TR41	230V~ / 24V~=	6VA / 1W	DPCO	no	G
TR42	230V~ / 24V~=	6VA / 1W	SPCO	no	G
TR71	230V~ w. transf.	2VA	DPCO	no	G
TR72	230V~ w. transf.	2VA	SPCO	no	G

other voltages on request



Symmetrical recycler

Supply voltage on
 Supply voltage off
 Output relay contact closed
 Output relay contact open



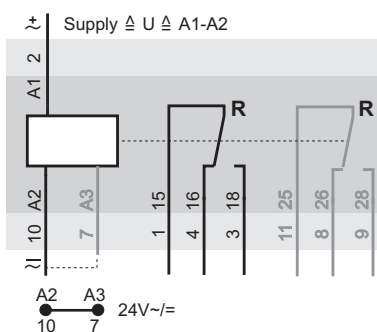
Remove supply voltage before making any changes together time range or timing function.

On the application of the supply voltage the output relay pulls in and timing period t starts.
At the end of time t the output relay drops out and remains dropped out for a period equal to time t .
An on-off action with a 1:1 time ratio continues until the supply voltage is removed when the time relay will reset ready for the next timing cycle.
If the supply voltage is removed during an 'On' period the output relay will drop out immediately, the remaining time will be cancelled and the time relay resets ready for the next timing cycle.

Time ranges



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



TB

overview

- ◆ single or dual supply voltage options
- ◆ SPCO or DPCO output relay
- ◆ 6 selectable time ranges 0.1 sec - 10Hrs
- ◆ LED indicators for power supply and relay status
- ◆ 22.5mm DIN rail mount housing or 11pin plug in housing

specification

supply voltage variation	nominal voltage +10% / -15%	
frequency range	48 - 63 Hz	
max. delay time	100%	
repeat accuracy	< 1% of the selected range	
relay type	1 2	
output relay spec	230V~	6A 10A
le AC-15*	120V~	4A 5A
le AC-15*	240V~	3A 4A
le DC-13*	24V=	2A 4A
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	relay type	HIQUEL	housing types
TB01	230V~ / 24V~	6VA / 1W	DPCO	1	yes B
TB04	115V~ / 24V~	6VA / 1W	DPCO	1	yes B
DBR230	230V~ / 24V~	6VA / 1W	SPCO	2	yes A
DBR115	115V~ / 24V~	6VA / 1W	SPCO	2	yes A
TB12	230V~	6VA	SPCO	2	yes A
TB13	24V~	1W	SPCO	2	yes A
TB15	115V~	6VA	SPCO	2	yes A
TB41	230V~ / 24V~	6VA / 1W	DPCO	1	no G
TB42	230V~ / 24V~	6VA / 1W	SPCO	1	no G
TB71	230V~ w. transf.	2VA	DPCO	1	no G

other voltages on request

- ◆ single or dual supply voltage options
- ◆ SPCO or DPCO output relay
- ◆ 6 selectable time ranges 0.1sec - 10Hrs
- ◆ LED indicators for power supply and relay status
- ◆ 22.5mm DIN rail mount housing or 11pin plug in housing

specification

supply voltage variation	nominal voltage +10% / -15%	
frequency range	48 - 63 Hz	
max. delay time	100%	
repeat accuracy	< 1% of the selected range	
relay type	1	2
output relay spec	230V~	6A 10A
le AC-15*	120V~	4A 5A
le AC-15*	240V~	3A 4A
le DC-13*	24V=	2A 4A
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

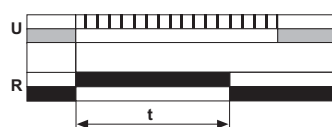
part no	supply	output	relay type	HIQUEL [®]	housing type
TW01	230V~ / 24V~	6VA / 1W	DPCO	1	yes B
TW04	115V~ / 24V~	6VA / 1W	DPCO	1	yes B
DWR230	230V~ / 24V~	6VA / 1W	SPCO	2	yes A
DWR115	115V~ / 24V~	6VA / 1W	SPCO	2	yes A
TW12	230V~	6VA	SPCO	2	yes A
TW13	24V~	1W	SPCO	2	yes A
TW15	115V~	6VA	SPCO	2	yes A
TW41	230V~ / 24V~	6VA / 1W	DPCO	1	no G
TW42	230V~ / 24V~	6VA / 1W	SPCO	1	no G
TW71	230V~ w. transf.	2VA	DPCO	1	no G

other voltages on request



On pulse

Supply voltage on
Supply voltage off
Output relay contact closed
Output relay contact open



Remove supply voltage before making any changes to either time range or timing function.

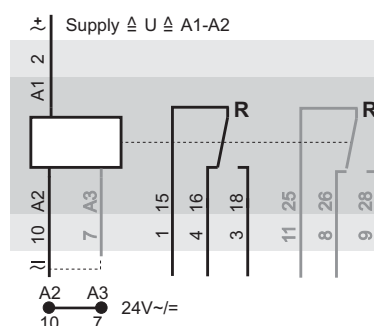
On the application of the supply voltage the output relay pulls in for the duration of time t and then drops out. The time relay resets ready for the next timing cycle when the supply voltage is removed.

If the supply voltage is removed during time t the output relay drops out, the remaining time is cancelled and the time relay resets.

Time ranges

0,1s-1,0s	1,0s-10s	0,1min-1,0min	1,0min-10min	0,1h-1,0h	1,0h-10h
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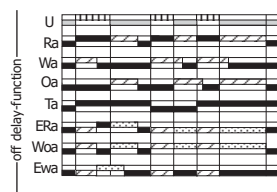
The required delay time within the range selected is set using the potentiometer on the front plate.





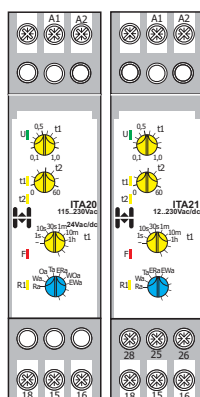
Multifunction of true off delay

- Supply voltage (U) on
- Supply voltage (U) off
- Starting contact S on B1 closed
- Starting contact S on B1 open
- Output relay contact closed
- Output relay contact open
- Time 1 (t1) is running
- Time 2 (t2) is running



Functions:

- Ra...Off delay without auxiliary voltage
- Wa...On pulse single shot without auxiliary voltage
- Oa...Off pulse without auxiliary voltage
- Ta...Bistable without auxiliary voltage
- ERa...On- and off delay without auxiliary voltage
- WOa...On pulse single shot and off pulse without auxiliary voltage
- Ewa...On delay and on pulse single shot without auxiliary voltage



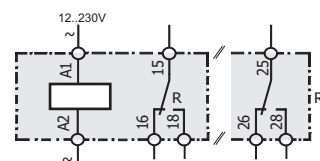
Time range t1

1s, 10s, 30s, 1m, 10m, 1h

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

Time range t2

fixed 60s



ITA

overview

- ◆ zoom supply voltage
- ◆ SPCO or DPCO output relay
- ◆ 6 selectable time ranges (up to 1hrs)
- ◆ LED indicators for power supply, failure, relay status and timer
- ◆ 22.5mm DIN rail mount housing

specification

supply voltage variation	nominal voltage +10% / -15%
frequency range	43-63 Hz
duty cycle	100%
repeat accuracy	< 1% of the selected range
output relay specification	230V~ 10A
le AC-15*	120V~ 2,5A
le AC-15*	240V~ 2,5A
le DC-13*	24V= 2,5A
expected life time	
mechanical	5 x 10 ⁶ operations
electrical	1 x 10 ⁴ 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
ITA20	12..230V~ =	0,2W SPCO	L
ITA21	12..230V~ =	0,2W DPCO	L

TA

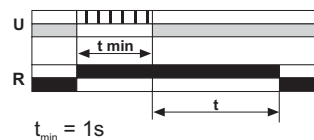
overview

- ◆ single or dual supply voltage options
- ◆ SPCO or DPCO output relay
- ◆ 4 selectable time ranges 1s - 3m
- ◆ LED indicators for supply voltage and relay status
- ◆ 22.5mm DIN rail mount housing or 11pin plug in housing



True off delay

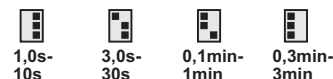
Supply voltage on
 Supply voltage off
 Output relay contact closed
 Output relay contact open



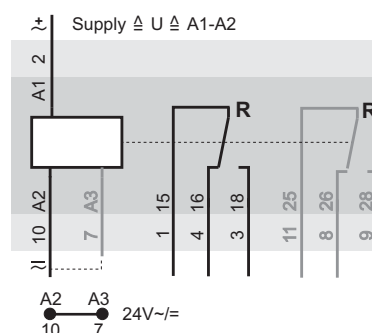
Remove supply voltage before making any changes to either time range or timing function.

On the application of the supply voltage the output relay pulls in. When the supply voltage is removed the output relay remains pulled in and time delay t commences. At the end of the time delay the output relay drops out and the time relay resets ready for the next timing cycle. If the supply voltage is reapplied during time t , time t will not time out and the output relay will remain pulled in until the supply voltage is removed for a time longer than t .

Time ranges



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



specification

supply voltage variation		nominal voltage +10% / -15%		
frequency range		48 - 63 Hz		
duty cycle		100%		
repeat accuracy		< 1% of the selected range		
relay type		4	5	
output relay spec.		230V~	8A	5A
le AC-15*		120V~	5A	4A
le AC-15*		240V~	5A	3A
le DC-13*		24V=	4A	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		

* EN 60947-5-1 VDE 0435

ordering information

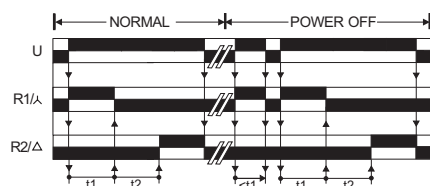
part no	supply	output	relay type	CE	housing types
TA01	230V~ / 24V~	6VA / 1W	DPCO	5	yes B
TA02	230V~	6VA	SPCO	4	yes A
TA03	24V~	1W	SPCO	4	yes A
TA04	115V~ / 24V~	6VA / 1W	DPCO	5	yes B
TA05	115V~	6VA	SPCO	4	yes A
TA41	230V~ / 24V~	6VA / 1W	DPCO	5	yes G
TA42	230V~ / 24V~	6VA / 1W	SPCO	5	yes G
TA71	230V~ w. transf.	2VA	DPCO	5	yes G
TA72	230V~ w. transf.	2VA	SPCO	5	yes G

other voltages on request





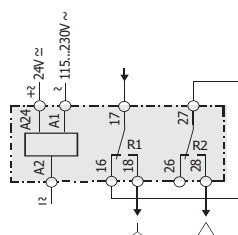
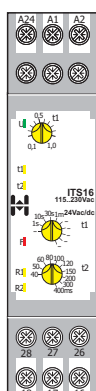
Star-Delta-Timer



Time ranges

1s, 10s, 30s, 1m, 10m, 1h, 10h, 1d, 10d and 40, 50, 60, 80, 100, 120, 150, 200, 300, 400ms

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



ITS16

overview

- ◆ Star-Delta-Start
- ◆ All common supply voltages on one unit
- ◆ 4 selectable time ranges
- ◆ 10 selectable dwell times
- ◆ 2 x SPCO configuration
- ◆ LED indicators for power supply, failure, status of the output relay and timers
- ◆ 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/1,5A
expected life time	2 x SPCO
mechanical	10 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	relay type	housing types
ITS16	24V~ / 115..230V~	6VA / 1W	2x SPCO	L

TS overview


- ◆ single or dual supply voltage options
- ◆ 2 x SPNO output relay
- ◆ 2 star period time ranges
- ◆ 4 dwell times selected by dip switch
- ◆ LED indicators for power supply and relay status
- ◆ 22.5mm DIN rail mount housing or 11pin plug in housing

specification

supply voltage variation	nominal voltage +10% / -15%
frequency range	48 - 63 Hz
max. delay time	100% of the selected range
repeat accuracy	< 1% of the selected range
output relay specification	max. 10A 230V~
Ue/Ie AC-15*	120V/5A 240V/4A
Ue/Ie DC-13*	24V/4A
expected life time	SPNO
mechanical	1 x 10 ⁷ operations
electrical	1 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

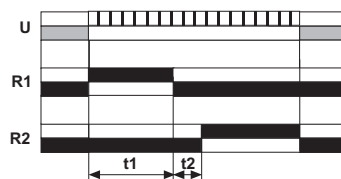
part no	supply		output	relay type	 US	housing type
TS02	230V~	6VA	2 SPNO	-	yes	A
TS03	24V~	1W	2 SPNO	-	yes	A
TS05	115V~	6VA	2 SPNO	-	yes	A
TS06	415V~	6VA	2 SPNO	-	yes	A
TS42	230V~ / 24V~	6VA / 1W	2 SPNO	-	no	G
TS44	115V~ / 24V~	6VA / 1W	2 SPNO	-	no	G
TS72	230V~ w. transf.	2VA	2 SPNO	-	no	G
TS74	115V~ w. transf.	2VA	2 SPNO	-	no	G

other voltages on request



Star-delta start timer

- Supply voltage on
- Supply voltage off
- Output relay contact closed
- Output relay contact open



Remove supply voltage before making any changes to either time range or timing function.

On the application of the supply voltage the star relay pulls in immediately for the duration of the star time set. When the star time expires the star relay drops out and the dwell time begins. At the end of the dwell time the delta relay pulls in. When the supply voltage is removed the delta relay drops out and the time relay resets ready for the next timing cycle.

Time ranges

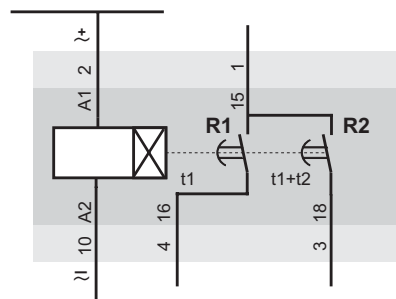
star time (=t1) required delay time is set using the potentiometer on the front plate



dwell time (=t2)



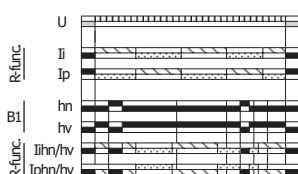
Supply \triangle U \triangle A1-A2





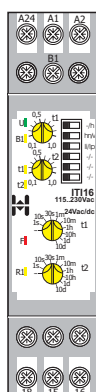
Asymmetrical recycler

- Supply voltage (U) on
- Supply voltage (U) off
- Starting contact S on B1 closed
- Starting contact S on B1 open
- Time 1 (t1) is running
- Time 2 (t2) is running



Functions:

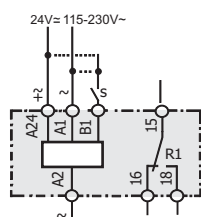
- li...Asymmetrical recycler pulse first
- lp...Asymmetrical recycler pause first
- lihn...Asymmetrical recycler pulse first with normal inhibit
- lphn...Asymmetrical recycler pause first with normal inhibit
- lihv...Asymmetrical recycler pulse first with inverse inhibit
- lphv...Asymmetrical recycler pause first with inverse inhibit



Time ranges

1s, 10s, 30s, 1m, 10m, 1h, 10h, 1d, 10d

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



ITI16

overview

- asymmetrical recycler
- all common supply voltages on one unit
- 6 different asymmetrical functions
- 2 separate timers
- 9 selectable time ranges
- 'pulse first' or 'pause first' selectable function
- real pause function
- SPCO configuration
- LED indicators for power supply, failure, status of output relay, control contact & 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/1,5A
expected life time	SPCO
mechanical	10 x 10 ⁶ operations
electrical	1 x 10 ⁵ 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	relay type	housing types
ITI16	24V~ / 115..230V~	6VA / 1W	SPCO	L

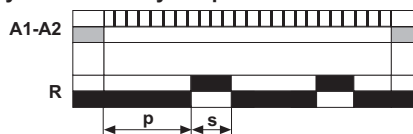
- ◆ “pulse first” or “pause first” adjustable
- ◆ single, dual or zoom supply voltage options
- ◆ SPCO or DPCO output relay
- ◆ 2 x 6 selectable time ranges 0.1sec - 30Hrs
- ◆ LED indicators for power supply and relay status
- ◆ 22.5mm DIN rail mount housing or 11pin plug in housing



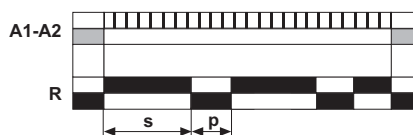
Asymmetrical recycler

Supply voltage on
 Supply voltage off
 Output relay contact closed
 Output relay contact open

asymmetrical recycler pause first



asymmetrical recycler signal first



specification

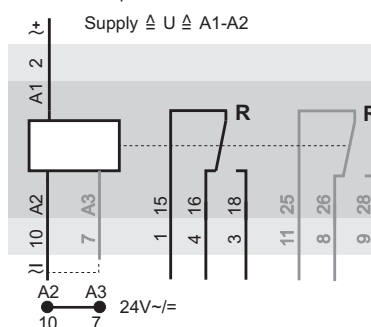
supply voltage variation	nominal voltage +10% / -15%			
frequency range	48 - 63 Hz			
max. delay time	100%			
repeat accuracy	< 1% of the selected range			
relay type	1	2	3	4
output relay spec. R_{TH}	10A	10A	8A	6A
le AC-15* 115Vac	2,5A	1,5A	1,5A	3,5A
le AC-15* 230Vac	2,5A	1,5A	1,5A	3A
le DC-13* 24Vdc	2,5A	1,5A	1,5A	2,5A
expected life time	SPCO	SPCO	DPCO	DPCO
mechanical	1 x 10 ⁷	1 x 10 ⁷	1 x 10 ⁷	5 x 10 ⁶
electrical	15 x 10 ⁴	1 x 10 ⁵	8 x 10 ⁴	1 x 10 ⁵
screws	pozidrive 1			
screw tightening torque	0,6...0,8Nm			
operating conditions	-20 to +60°C non condensing			

* EN 60947-5-1 VDE 0435

Time ranges



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



ordering information

part no	supply	output	relay type	c _{FL} R _{TH}	housing types
T101	230V~ / 24V~	6VA / 1W	DPCO	3	No B
T104	115V~ / 24V~	6VA / 1W	DPCO	3	No B
T106	400V~	6VA	SPCO	1	No A
T108	12V~	6VA / 1W	SPCO	2	No A
T109	12V~	6VA / 1W	DPCO	3	No B
T116	115V..230V~/24V~	6VA / 1W	SPCO	2	No A
T141	230V~ / 24V~	6VA / 1W	DPCO	4	No G
T142	230V~ / 24V~	6VA / 1W	SPCO	4	No G
T171	230V~ w. Trafo	2VA	DPCO	4	No G
T172	230V~ w. Trafo	2VA	SPCO	4	No G

other voltages on request

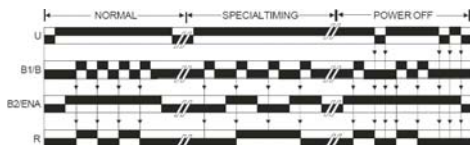


ITT16

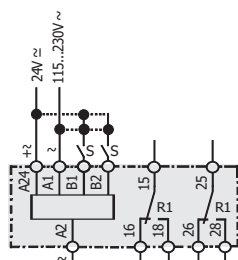
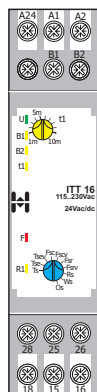
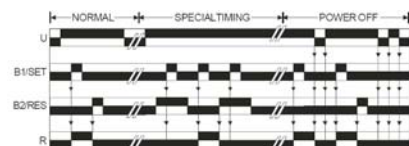
overview

- ◆ zoom supply voltage
- ◆ 3 toggle functions
- ◆ 4 flip-flop functions
- ◆ 3 timerelay functions
- ◆ DPCO output relay
- ◆ LED Indicators for power supply, failure, output relay, control contacts and timer
- ◆ 22.5mm DIN rail mount housing

Tse – Toggle with starting contact and enable



Fsc - Flip-Flop with starting contact and prior reset



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~ 24V/1,5A 115V/1,5A 230V/1,5A 24V/1,5A
expected life time	DPCO
mechanical	10 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*	housing types
ITT16	24V~ / 115...230V~	6VA / 1W DPCO	yes	L

* The measurement input is galvanically isolated from the power supply

DES/PES/TES

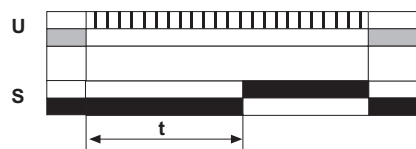
overview

- ◆ supply voltage 12-240V~
or 200-440V~
- ◆ thyristor output 700mA max.
- ◆ 6 selectable time ranges (DES/PES)
0.1sec - 10Hrs
- ◆ 11.25mm or 22.5mm rail mount housing
or 11pin plug in housing



On delay with thyristor output

Supply voltage on
Supply voltage off
Thyristor open
Thyristor closed



Remove supply voltage before making any changes to either time range or timing function.

On the application of the supply voltage, time delay t commences. At the end of the time delay the thyristor switches the full supply voltage through to the load connected to the A2 terminal (max. load 700mA continuous, 20A <10mS). If the supply voltage is removed during time t , the unexpired time will be cancelled and the timer will reset.

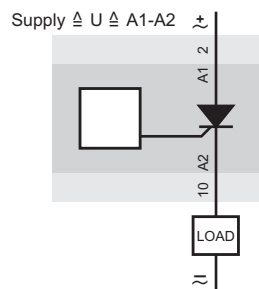
Note:

A small leakage current (2 - 2.5mA) passes through the thyristor during the timing period. Care should be taken to ensure that very sensitive devices connected to the A2 terminal are not affected.

Time ranges (DES/PES)



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



specification

supply voltage variation	nominal voltage +10% / -15%
frequency range	50 - 60 Hz
duty cycle	100%
repeat accuracy	≤ 100% of the selected range
thyristor output	$I_{max} = 700mA$ $I_{min} = 5mA$ $I_{peak} = 20A (<10ms)$ $I_{leakage} = 2,5mA \sim 2mA =$
drop out voltage	5V
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20 to +60 °C non condensing

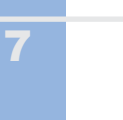
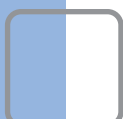
* EN 60947-5-1 VDE 0435

ordering information

part no	supply	consumption	output	time ranges	housing type
DES	12-240V~	2,5mA	thyristor	6/0,1s...10h	A
PES	12-240V~	2,5mA	thyristor	6/0,1s...10h	G
TES	200-440V~	1mA	thyristor	1/1...10s	O

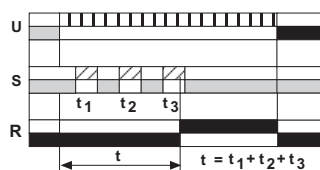
on delay with thyristor output





On delay with constant supply, contact start, contact interruptible

- Starting contact S at B1 closed
- Starting contact S at B1 open
- Supply voltage (U) on
- Supply voltage (U) off
- Output relay contact closed
- Output relay contact open



Remove supply voltage before making any changes to either time range or timing function.

On the application of the supply voltage the time relay energises ready for the timing cycle.

When the starting contact **S** is closed the time delay starts.

At the end of the time delay the output relay pulls in.

If the start contact is opened during time **t** the time delay pauses and recommences when the start contact is closed.

When the supply voltage is removed the output relay drops out and the time relay resets ready for the next timing cycle.

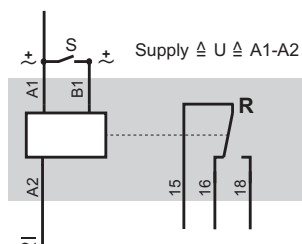
If the supply voltage is removed during time **t**, the output relay will drop out, the unexpired time will be cancelled and the time relay will reset.

This time relay can be energised with the start contact closed in which case the on-delay time period will start immediately in the same way.

Time ranges



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



DER-M

overview

- ◆ supply voltage 24-240V~
- ◆ SPCO output relay
- ◆ 7 selectable time ranges 0.1sec - 30Hrs
- ◆ LED indicators for power supply and relay status
- ◆ 22.5mm DIN rail mount housing

specification

supply voltage variation	nominal voltage +5% / -10%
frequency range	0-150 Hz
max. delay time	100% of the selected time range
repeat accuracy	< 1% of the selected range
output relay specification	max. 10A 230V~
Ue/Ie AC-15	120V/5A 240V/4A
Ue/Ie DC-13	24V/4A
expected life time	SPCO
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	relay type	housing types
DER-M	24 - 240V~	2VA	SPCO	A

PRER2/TOE/TOR

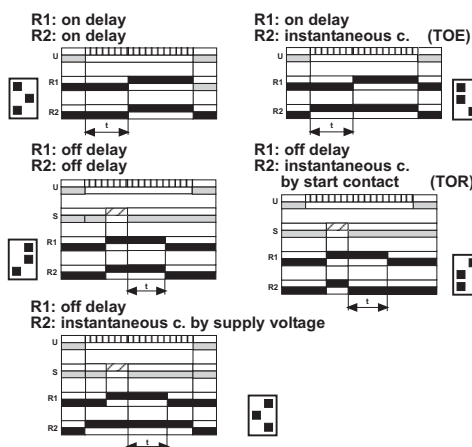
overview

- ◆ dual voltage supply
- ◆ 2 x SPCO output relay
- ◆ 6 selectable time ranges 0.1sec - 10Hrs
- ◆ PRER2: 5 timing functions selected by dip switch
- TOE: on delay - instantaneous contact
- TOR: off delay - instantaneous contact
- ◆ LED indicators for power supply and relay status
- ◆ 22.5mm DIN rail mount housing or 11pin plug in housing



on / off delay - instantaneous contact (PRER2)

- Starting contact S on Pin 5 closed
- Starting contact S on Pin 5 open
- Supply voltage (U) on
- Supply voltage (U) off
- Output relay contact closed
- Output relay contact open

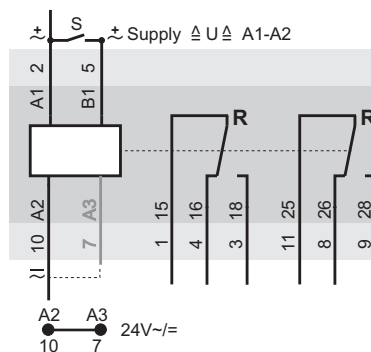


Remove supply voltage before making any changes to either time range or timing function.

Time ranges (PRER2, TOE, TOR)



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



specification

supply voltage variation	nominal voltage +10% / -15%			
frequency range	48 - 63 Hz			
max. delay time	100% of the selected range			
repeat accuracy	< 1% of the selected range			
relaytype	1	2		
output relay specification				
le AC-15*	250V~	6A	1A	
le DC-13*	30V=	4A	1,5A	
expected life time				
mechanical	1 x 10 ⁷		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				

* EN 60947-5-1 VDE 0435

ordering information

part no	supply	output	relay type	c	housing type
PRER2 230V/24V	230V~/24V~	6VA/1W	2 SPCO	1	G
PRER2 115V/24V	115V~/24V~	6VA/1W	2 SPCO	1	G
TOE 230V/24V	230V~/24V~	6VA/1W	2 SPCO	2	B
TOE 115V/24V	115V~/24V~	6VA/1W	2 SPCO	2	B
TOR 230V/24V	230V~/24V~	6VA/1W	2 SPCO	2	B
TOR 115V/24V	115V~/24V~	6VA/1W	2 SPCO	2	B



World of Automation



Chapter 4: Signal converting relays

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4 Chapter 4: signal converting relays

- .01 K4S/K2W**
- .02 DMVR**
- .03 K1S/K1W**
- .04 SW1/SW2/SW3**
- .05 ANU/ANI**
- .06 LSM**
- .07 MU-PT100/MU-PT1000**
- .08 MU-TC**
- .09 MU-UI**
- .10 MU-DMS**
- .11 K1T/K2T**
- .12 TV../TD..**

K4S/K2W

overview

- ◆ PLC transistor output to power switching converter
- ◆ relay output max. 6A
- ◆ coil voltage 24V= or 12V=
- ◆ common positive or negative
- ◆ LED indicators for output relays
- ◆ 22.5mm DIN rail mount housing



specification

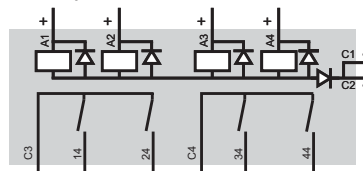
coil voltage	nominal voltage +10% / -15%	
duty cycle	100%	
output relay specification	max. 6A 230V~	
relay type	1	
le AC-15*	120V~	5A
le AC-15*	240V~	4A
le DC-13*	24V=	4A
expected life time	DPCO	SPCO
mechanical	2 x 10 ⁶ resp. 1 x 10 ⁷ operations	
electrical	1 x 10 ⁵ resp. 1 x 10 ⁵ operations	
screws	pozidrive 1	
screw tightening torque	0,6..0,8Nm	
operating conditions	-20 to +60°C non condensing	

* EN 60947-5-1 VDE 0435

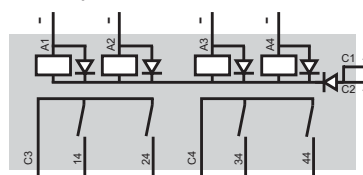
ordering information

part no	supply	output	relay type	CE	housing type
K4S-24P	24V= 360mW	4 x SPNO	1	-	B
K4S-24N	24V= 360mW	4 x SPNO	1	-	B
K4S-12P	12V= 360mW	4 x SPNO	1	-	B
K4S-12N	12V= 360mW	4 x SPNO	1	-	B
K2W-24P	24V= 360mW	2 x SPCO	1	-	B
K2W-24N	24V= 360mW	2 x SPCO	1	-	B
K2W-12P	12V= 360mW	2 x SPCO	1	-	B
K2W-12N	12V= 360mW	2 x SPCO	1	-	B

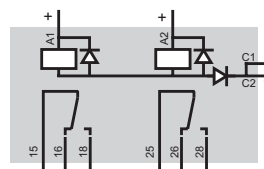
K4S-24P, K4S-12P



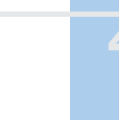
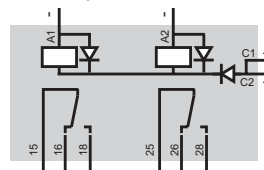
K4S-24N, K4S-12N

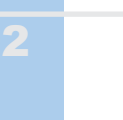
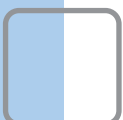


K2W-24P, K2W-12P



K2W-24N, K2W-12N





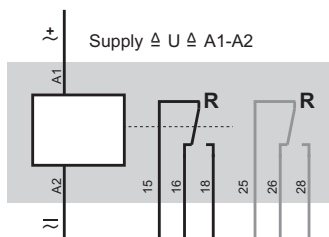
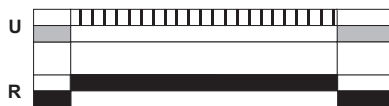
DMVR

overview

- ◆ multi-voltage relay
- ◆ SPCO or DPCO output max. 6A
- ◆ coil voltage 24-240V~=
- ◆ LED indicators for supply voltage and output relay
- ◆ 22.5mm DIN rail mount housing

PLC interface relay 24-240Vac/dc

- Supply voltage on
- Supply voltage off
- Output relay contact closed
- Output relay contact open



specification

coil voltage	nominal voltage +10% / -15%		
duty cycle	100%		
relay type	1	3	
output relay spec	230V~	6A	10A
le AC-15*	120V~	4A	5A
le AC-15*	240V~	3A	4A
le DC-13*	24V=	2A	4A
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	relay type	certification	housing types
DMVR	24 - 240V~=	2VA	SPCO	3	A
DMVR2	24 - 240V~=	2VA	DPCO	1	B

other voltages on request

K1S/K1W

overview

- ◆ PLC transistor output to power switching converter
- ◆ relay output max. 10A SP relay
1.25A DP relay
- ◆ coil voltage 230V~ or 24V~
- ◆ common positive or negative
- ◆ LED indicator for relay status
- ◆ 11.25mm DIN rail mount housing



specification

coil voltage	nominal voltage +10% / -15%		
duty cycle	100%		
nominal current	15mA		
suppressor circuit	freewheeling diode and varistor		
relay type	1	2	
output relay spec.	230V~	10A	2A
le AC-15*	120V~	1,5A	-
le AC-15*	240V~	1,5A	-
le DC-13*	24V=	1,5A	-
on delay	<8ms		
off delay	<25ms		
contact material	AgCdO		
switching voltage	250V~ = 250V~ =		
input current	15A		
continuous current	10A		
min. switching capacity	>5mA		
max. switching frequency	600/h		
mechanical	2 x 10 ⁶ resp. 1 x 10 ⁷ operations		
electrical	1 x 10 ⁵ resp. 1 x 10 ⁵ operations		
screw tightening torque	0,5Nm		
operating conditions	-20 to +60°C non condensing		

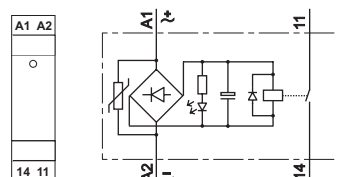
* EN 60947-5-1 VDE 0435

ordering information

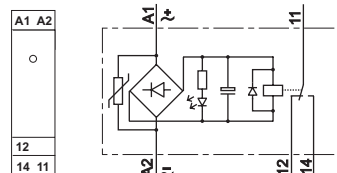
part no	supply	output	relay type	housing type
K1S 24Vac/dc	24V~ = 355mW	1 x SPNO	1	○
K1S 230Vac/dc	230V~ = < 1,2W	1 x SPNO	1	○
K1W 24Vac/dc	24V~ = 355mW	SPCO	1	○
K1W 230Vac/dc	230V~ = < 1,2W	SPCO	1	○
K2W 24Vac/dc	24V~ = 355mW	DPCO	2	○
K1W-S	24V~ = 355mW	SPCO	1	○
K1W-S-R	24V~ = 355mW	SPCO	1	○

other voltages on request

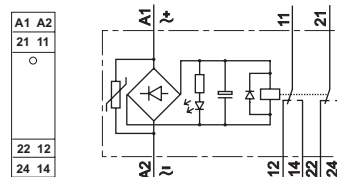
K1S



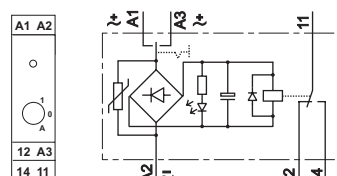
K1W



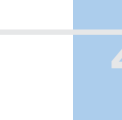
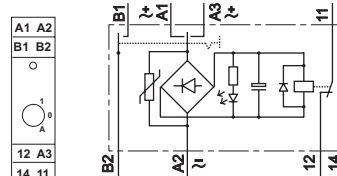
K2W



K1W-S



K1W-S-R



PLC interface relay in 11.25mm housing

SW1/SW2/SW3

overview



- ◆ coil voltage 24V~=
- ◆ SPCO output max. 10A
- ◆ trigger input with 1/0/Auto switch

SW1	3,0V ON	2,5V OFF
SW2	7,0V ON	6,5V OFF
SW3	2,0V ON	1,5V OFF
- ◆ LED indicators for output
- ◆ 11.25mm DIN rail mount housing

SW1/SW2/SW3:

The SW triggers are designed to control pumps, fans, burners etc. They are also designed to operate with an analogue 0-10VDC control signal.

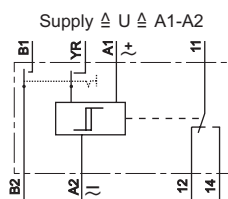
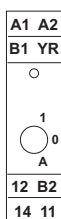
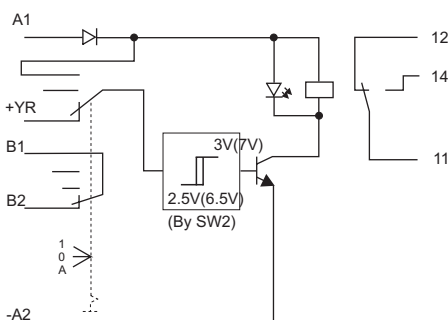
Trigger Function

As soon as the input voltage reaches the operating threshold (ON), in AUTO Mode, the relay pulls in.
If the input voltage falls below the cut off threshold (OFF), the relay drops out again.

A manual control facility with feedback contact, (mode 1) is incorporated for manual operation

The module can be operated in two modes which can be selected by the three-position switch (Auto, 0, 1).

- Switch position "1": The output relay is controlled via terminals A1, A2
- Switch position "Auto": The output relay is controlled by the trigger through terminals YR. The operating voltage must be available continuously at terminal A1.
- Switch position "0": The relay is switched off. Input signals at terminals A1 or YR are ineffective.



specification

coil voltage	nominal voltage +10% / -15%
duty cycle	100%
nominal current	15mA
suppressor circuit	freewheeling diode and varistor
relay type	1
output relay spec	230V~ 10A
le AC-15*	120V~ 5A
le AC-15*	240V~ 4A
le DC-13*	24V= 4A
on delay	<8ms
off delay	<25ms
contact material	AgCdO
switching voltage	250V~
input current	16A
continuous current	10A
min. switching capacity	5mA
max. switching frequency	600/h
mechanical	2 x 10 ⁶ resp. 1 x 10 ⁷ operations
electrical	1 x 10 ⁵ resp. 1 x 10 ⁵ operations
screw tightening torque	0,5Nm
operating conditions	-20 to +60 °C non condensing

* EN 60947-5-1 VDE 0435

ordering information

part no	supply	output	relay type	housing types
SW1 24Vac/dc	24V~= 600mW	SPCO	1	○
SW2 24Vac/dc	24V~= 600mW	SPCO	1	○
SW3 24Vac/dc	24V~= 600mW	SPCO	1	○

ANU/ANI

overview

- ◆ supply voltage 24V~
- ◆ feedback contact for manual or automatic mode
- ◆ protection against incorrect connection
- ◆ short circuit protection
- ◆ LED indicator proportional to output level
- ◆ 22.5mm DIN rail mount housing



Description:

ANU/ANI are used with automatic control systems (BMS, PLC, PC) that provide a 0-10V or 0-20mA signal for controlling variables such as temperature, speed, position etc.

In automatic mode ("Auto") the analogue signal from the control system (terminals YR & L) is re-transmitted to the controlled device (ratio 1:1).

In manual mode ("Manu") the analogue signal from the control system is isolated and the ANU/ANI inject a signal (terminals Y &) which can be adjusted from 0 to 10V or 0-20mA by the potentiometer.

The switch position (mode) can be monitored externally on terminals S1 - S2 (feed-back contact).

The brightness of the LED "Y" is proportional to the output signal level.

The output is short circuit protected.

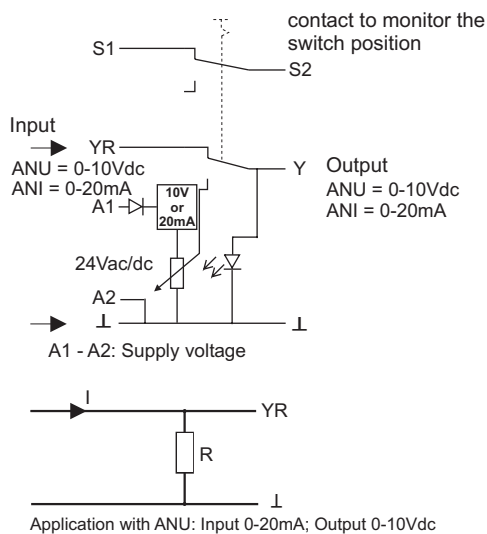
specification

supply voltage variation	nominal voltage +20% / -15%
frequency range	48 - 63 Hz
duty cycle	100%
nominal current	24V~/35mA 24V~/11mA
contact material	silver alloy
switch	S1-S2 28V~/2A
current consumption	max. Y _R 10V _{DC} 2mA
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20 to +60°C non condensing

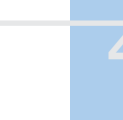
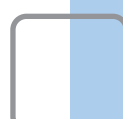
ordering information

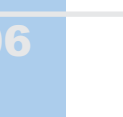
part no	supply	output	relay type	HIQUEL	housing type
ANU	24V~ < 1VA	0-10V=	-	-	B
ANI	24V~ < 1VA	0-20mA=	-	-	B

ANU



Current input with external resistor is possible.
z.B.: 0-20mA and R = 500 Ohm
terminal YR to terminal L = 0 - 10V



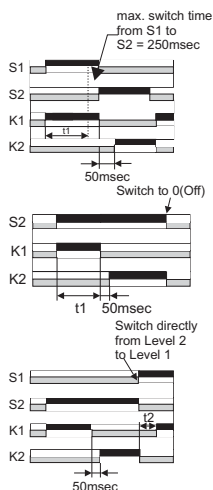


Description:

The LSM was designed specifically to control two-speed fan motors. The LSM is controlled by a two-position switch, which is connected directly to the LSM (S1, S2). The motor contactors are controlled by the two outputs (K1, K2).

The LSM will automatically control the speed selection so that the operator cannot switch the fan on from stand-still to high speed, or off when running in high speed.

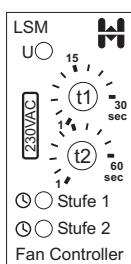
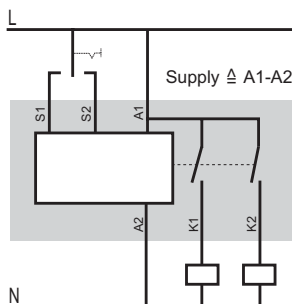
The 3 functions are:



1.) In switch position 1 the motor will run in low speed during the set time t1. After the time t1 has expired it is possible to switch over to position 2 for high speed. The switch over time is max. 250 msec. If this is exceeded the LSM goes to function 2.

2.) If switch position 2 (high speed) is selected before switch position 1, the motor will be forced to run for the time t1 (low speed). After t1 there will be an interval of 50 msec before the motor goes into high speed.

3.) Once in high speed, if the input is switched from position 2 to position 1 Or 0 (=stop), the high speed contact will switch off and the motor will be free wheel for the duration of timer t2 after which the low speed contact will switch on if the switch is in position 1, or will coast to a stop if switch position 0 is selected.



LSM

overview

- ◆ power supply 230V~
- ◆ 2 adjustable timers
- ◆ 2 relay outputs 230V~
- ◆ LED indicators for level 1+2
- ◆ 22.5mm DIN rail mount housing

specification

supply voltage variation	nominal voltage +10% / -15%
frequency range	48-63Hz
duty cycle	100%
repeat accuracy	<1% of the selected range
output relay specification	max. 6A 230V~
relay type	1
le AC-15*	120V~ 5A
le AC-15*	240V~ 4A
le DC-13*	24V= 4A
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	relay type	housing types
LSM 230VAC	230V~ 8VA	2 x SPNO	1	A

MU-PT100/PT1000

overview

- ◆ temperature to analogue signal transducer
- ◆ high linearity, long term stability, high accuracy
- ◆ 4 selectable temperature ranges
- ◆ current and voltage outputs
- ◆ 2, 3 or 4 wire PT sensor connections
- ◆ 22.5 or 45mm DIN rail mount housing



Description

The offset of the output signal is selected with the first DIP switch, the measurement range is selected with the other two DIP switches.

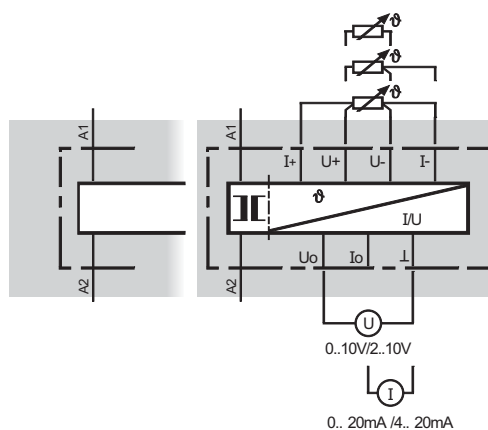
The different probe connection types are detected automatically.

The use of shielded and twisted-pair cable is recommended. Connect the shield of the cable (if used) to the connector "I-". "U+/I+" and "U-/I-" are twisted together (if twisted cable used).

Do not lay the PT probe cable close to supply voltage cables.

specification

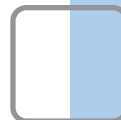
supply voltage variation	nominal voltage +10% / -10%
input	PT100/PT1000
connection	2, 3 or 4 wire
temperature ranges	-30°C to 100°C
	0°C to 100°C
	0°C to 200°C
	0°C to 300°C
current output	
accuracy	<0,1%
max. output load	550 Ohm
temperature coefficient	<0,01%/K
voltage output	
accuracy	<0,3%
max. output current	<5mA
temperature coefficient	<0,01%/K
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20 to +60°C non condensing



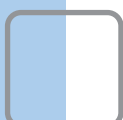
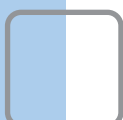
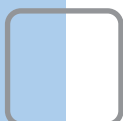
ordering information

part no	supply	sup. galv. iso.*	HIQUEL	housing type
MU-PT100/24Vdc	24V= 1,5W	no	-	B
MU-PT100/24Vac	24V~ 2,5VA	yes	-	B
MU-PT100/115Vac	115V~ 2,5VA	yes	-	C
MU-PT100/230Vac	230V~ 2,5VA	yes	-	C
MU-PT1000/24Vdc	24V= 1,5VA	no	-	B
MU-PT1000/24Vac	24V~ 2,5VA	yes	-	B
MU-PT1000/115Vac	115V~ 2,5VA	yes	-	C
MU-PT1000/230Vac	230V~ 2,5VA	yes	-	C

* PT100/PT1000 and the output signals are galvanically isolated from the power supply



temperature transducer PT100/PT1000

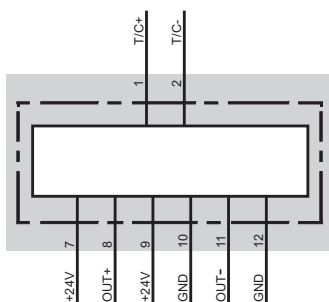


Description:

MU-TC uses microprocessor-controlled high resolution 16-bit dual-slope, integrating A/D converter to acquire a thermocouple signal and cold junction compensation input.

The configurable input offers a wide range of J, K, T, R, S, E, B type thermocouples and the output is linear to temperature. Therefore, stock investment for spare parts can be reduced and the highest system flexibility can be achieved.

Thermoelements			
Type	1	2	3
J	ON	ON	ON
K		ON	ON
T	ON		ON
R			ON
S	ON	ON	
E		ON	



MU-TC

overview

- ◆ thermocouple to analogue signal transducer
- ◆ supply voltage 24Vdc
- ◆ high linearity, long term stability
- ◆ high temperature stability
- ◆ selectable thermocouple input
- ◆ 23mm DIN rail mount housing

specification

supply voltage	24V=	±10%
power consumption	1.4W	
input	Type "J"	-40°C...760°C
	Type "K"	0°C...1000°C
	Type "T"	-100°C...400°C
	Type "E"	0°C...1000°C
	Type "S"	500°C...1750°C
	Type "R"	500°C...1750°C
output	Type "B"	500°C...1800°C
	0-10V	0.5 Ohm
temperature drift	±2°C	
isolation	1.000V=	
screw tightening torque	0,5Nm	
operating conditions	0 to +50°C	non condensing

ordering information

part no	supply	output	relay type	housing types
MU-TC	24V=	0-10V=	-	I

MU-UI

overview

- ◆ strain-gauge to analogue signal transducer
- ◆ supply voltage 24V=
- ◆ high linearity, long term stability
- ◆ high temperature stability
- ◆ selectable input and output signal
- ◆ 23mm DIN rail mount housing



transducer for strain gauge sensors

Specification

supply voltage	24V= 10%
power consumption	0,85 Watt voltage output 1,2 Watt current output
input	
Bipolar	+/-10mV, 0/-50mV, +/-100mV, +/-0,5V, +/-1V, +/-5V, +/-10V; +/-20mA
Unipolar	0-10mV, 0-50mV, 0-100mV, 0-500mV, 0-1V, 5-5V, 0-10V; 0-20mA
output	
Bipolar	+/-5V, +/-10V
Unipolar	0-10V 0-20mA
accuracy	+/- 0,1% FSR (typ.)
temperature drift	150ppm typ
screw tightening torque	0,5Nm
operating conditions	0 to +50°C non condensing

Input Range (SW2)									
Bipolar	Unipolar	1	2	3	4	5	6	7	8
+/-10mV	0~10mV	ON							
+/-50mV	0~50mV		ON						
+/-100mV	0~100mV			ON					
+/-0,5mV	0~0,5V				ON				
+/-1V	0~1V					ON			
+/-5V	0~5V						ON		
+/-10V	0~10V							ON	
+/-20mA	0~20mA								ON

Table 1: switch positions of input

Output Range (SW1)									
Output Range	Input Range	1	2	3	4	5	6	7	8
-5V	-10mV, -50mV, -100mV, 0,5V, -1V, -5V, -20mA, 0~10mV, 0~50mV, 0~100mV, 0~0,5V, 0~1V	ON		ON					ON
0-20mA	-10mV, -50mV, -100mV, 0,5V, -1V, -5V, -20mA, 0~10mV, 0~50mV, 0~100mV, 0~0,5V, 0~1V, 0~10V		ON		ON		ON		ON
-10V	-10mV, -50mV, -100mV, 0,5V, -1V, -5V, -20mA, 0~10mV, 0~50mV, 0~100mV, 0~0,5V, 0~1V, 0~10V	ON		ON					ON
0-10V	-10mV, -50mV, -100mV, 0,5V, -1V, -5V, -20mA, 0~10mV, 0~50mV, 0~100mV, 0~0,5V, 0~1V, 0~10V	ON		ON				ON	

Table 2: switch positions of output

Configuration

Figure 1 shows the terminal wiring of MU-UI. Positive power terminals 9 and 7 are internally connected, as are negative terminals 12 and 10. MU-UI uses single 24V=.

Tables 1 and 2 above show the switch positions to configure input and output range. The I/O configuration switches are located inside the module. To reach the switches, you need to remove the DIN-rail bracket by sliding it down.

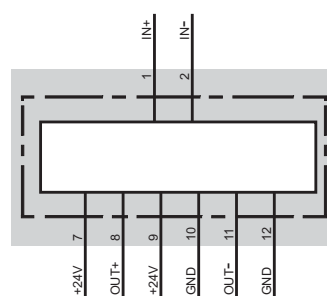
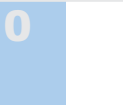


Figure 1. terminal wiring of MU-UI

ordering information

part no	supply	output	relay type	housing type
MU-UI	24V=	+/-5V, +/-10V, 0-10V, 0-20mA	-	I



MU-DMS

overview

- ◆ isolated strain-gauge to analogue signal transducer
- ◆ supply voltage 24V=
- ◆ high linearity, long term stability
- ◆ high temperature stability
- ◆ selectable output signal
- ◆ adjustment of user specified signals
- ◆ 23mm DIN rail mount housing



Input Range (SW2)					
Range	1	2	3	4	5
+/-10mV	ON				
+/-20mV		ON			
+/-30mV			ON		
+/-50mV				ON	
+/-100mV					ON

Table 1: switch positions of input

Output Range (SW1)								
Range	1	2	3	4	5	6	7	8
+/- 5V	ON		ON					ON
+/- 10V	ON		ON					
0~10V	ON		ON				ON	
0~20mA		ON		ON			ON	

Table 2: switch positions of output

Configuration

Figure 1 shows the terminal wiring of MU-DMS. Positive power terminals 9 and 7 are internally connected, as are negative terminals 12 and 10. MU-DMS uses single 24V=.

Tables 1 and 2 above show the switch positions to configure input and output range. The I/O configuration switches are located inside the module. To reach the switches, you need to remove the DIN-rail bracket by sliding it down.

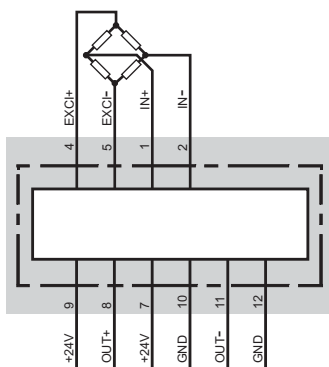


Figure 1: Terminal wiring of MU-DMS

specification

supply voltage	24V= ± 10%
power consumption	1,85 Watt at voltage output 2,15 Watt at current output
input	+/-10mV, +/-20mV, +/-30mV, +/-50mV, +/-100mV max. 60mA
output	Bipolar +/-5V, +/-10V Unipolar 0-10V 0-20mA 0-500Ohm (load.)
accuracy	+/- 0,1% FSR (typ.)
temperature drift	150ppm typ
screw tightening torque	0,5Nm
operating conditions	-10 to +70°C non condensing

ordering information

part no	supply	output	relay type	housing types
MU-DMS	24V= 2W	+/-5V, +/-10V, 0-10V, 0-20mA	-	I

K1T/K2T

overview

- ◆ interface relay with photomos output
- ◆ wide voltage range (different ranges)
- ◆ 10kHz bandwidth
- ◆ LED indicators
- ◆ protected against incorrect polarity
- ◆ K1T - one line coupler
- ◆ K2T - two line couplers
- ◆ 22.5mm DIN rail mount housing



specification

supply voltage	nominal voltage $\pm 10\%$
duty cycle	100%
protection circuit	VDR
voltage deviation	$\pm 20\%$
	(duration of deviation less than 5s,
	no output change)
turn-on time	
DC-version	$< 10\mu s$
AC/DC-version	$< 20ms$
turn-off time	
DC-version	$< 40\mu s$
AC/DC-version	$< 40ms$
isolation voltage	2,5kV
on-state voltage	$< 3V$
output voltage range	24Vac/dc.. 230Vac/dc
max. load current	500mA ac/dc
output	photomos
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20 to +60°C no condensing

* EN 60947-5-1 VDE 0435

ordering information

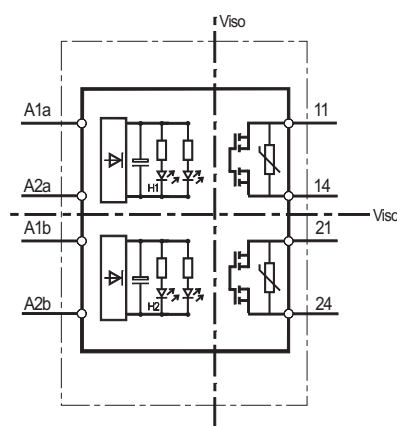
part no	input	Ri*	I _{cont} *	(U _{out} · I _{out}) _{MAX@f}	f _{@MAX(U_{out} · I_{out})}	housing type
K1T 12Vdc..30Vdc	12V~..30V=	1,5k Ω	$< 8mA$	(230V*500mA)@1Hz	10.000Hz@ (230V*40mA)	B
K1T 12Vac/dc..30Vac/dc	12V~/=..30V~/=	1,5k Ω	$< 8mA$	(230V*500mA)@1Hz	5Hz@ (230V*100mA)	B
K1T 24Vac/dc..230Vac/dc	24V~/=..230V~/=	6,0k Ω	$< 21mA$	(230V*500mA)@1Hz	5Hz@ (230V*100mA)	B
K2T 12Vdc..30Vdc	12V~..30V=	1,5k Ω	$< 8mA$	(230V*500mA)@1Hz	10.000Hz@ (230V*40mA)	B
K2T 12Vac/dc..30Vac/dc	12V~/=..30V~/=	1,5k Ω	$< 8mA$	(230V*500mA)@1Hz	5Hz@ (230V*100mA)	B
K2T 24Vac/dc..230Vac/dc	24V~/=..230V~/=	6,0k Ω	$< 21mA$	(230V*500mA)@1Hz	5Hz@ (230V*100mA)	B

other voltage on request

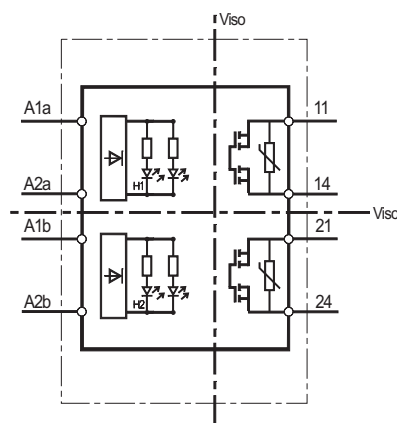
* Ri = power-on input resistance

* I_{cont} = current through input pin after 5 sec

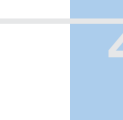
K2T xxac/dc

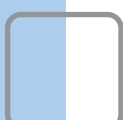
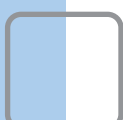
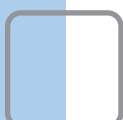
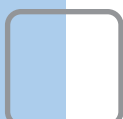
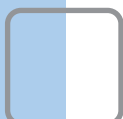


K2T xxdc



interface relay with photomos output

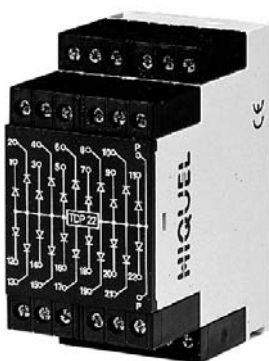




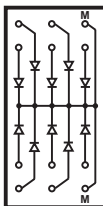
TV../TD..

overview

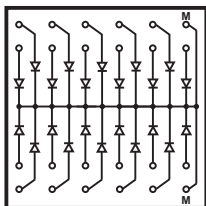
- ◆ multi way diode boxes
- ◆ common cathode for alarm integration
- ◆ common anode for lamp testing
- ◆ up to 34 1000v diodes in one housing
- ◆ 22.5/45/67.5mm DIN rail housing or 11pin plug in housing



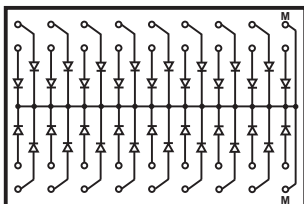
TDM 10



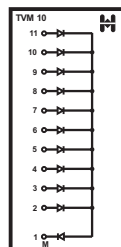
TDM 22



TDM 34

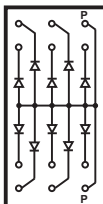


TVM 10

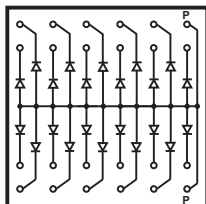


Multi-way diode box for the integration of multiple alarm circuits where any one of a number of alarm signals will activate an output.

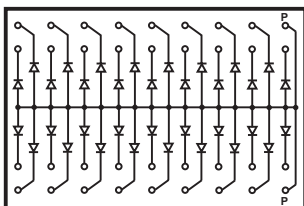
TDP 10



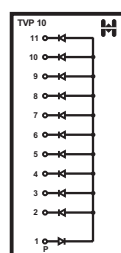
TDP 22



TDP 34



TVP 10



Multi-way diode box for lamp testing where one switch connected to the diode box input will test the continuity of lamp circuits.

specification

diode max current	1,0 A
diode max voltage	1000 V
diode voltage drop	0,7 V
screws	pozidrive 1
screw tightening torque	0,6..0,8Nm
operating conditions	-20 to +60°C non condensing

ordering information

part no	supply	output	relay type	FL	housing type
TVM 10	10	1	-	-	G
TVP 10	1	10	-	-	G
TDM 10	10	2	-	-	B
TDP 10	2	10	-	-	B
TDM 22	22	2	-	-	D
TDP 22	2	22	-	-	D
TDM 34	34	2	-	-	F
TDP 34	2	34	-	-	F



World of Automation



Chapter 5: Special purpose

HIQUEL[®]
HIGH QUALITY ELECTRONICS

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5

Chapter5 : special purpose

.01 MODADA / WT-SUB9

.02 ESG

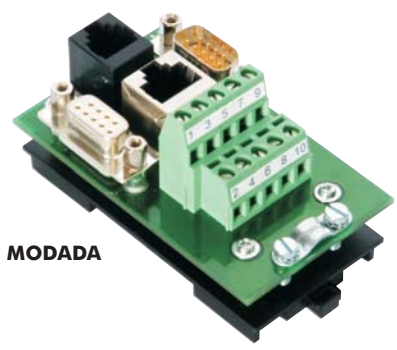
.03 Examples

.04 Examples

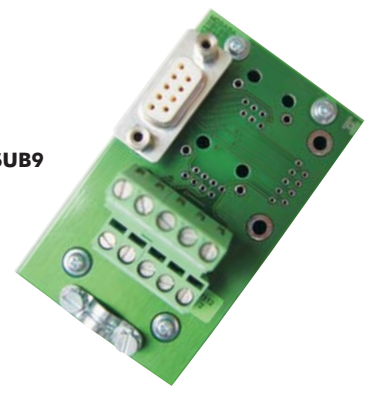
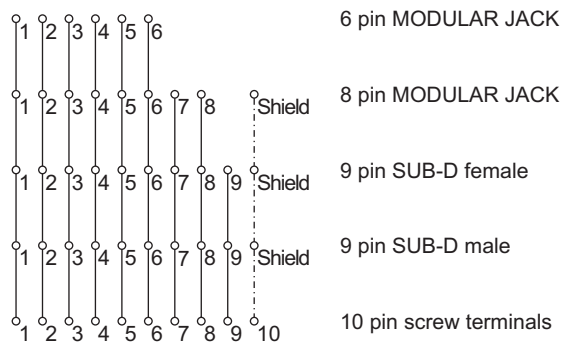
MODADA / WT-SUB9

Übersicht

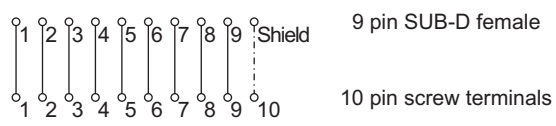
- MODADA**
 low cost universal DIN-rail mounting module to connect different connectors, the modular provides the following possibilities:
 D-SUB9 male and female, MODULAR JACK 6, MODULAR JACK 8, screw terminals
- WT-SUB9**
 low cost universal DIN-rail mounting module for DB-9 connector to screw terminals



MODADA



WT-SUB9



specification

MODADA	
U max.	50V~/=
I max.	0,5A
dimensions	85 x 47,5 x 45mm
WT-SUB9	
U max.	50V~/=
I max.	0,5A
dimensions	77,5 x 45 x 51mm
screw tightening torque	0,5Nm

ordering information

part no	supply	output	relay type	eSALUS	housing type
MODADA	-	-	-	-	special
WT-SUB9	-	-	-	-	special

ESG

overview

- ◆ single-phase speed controller with control functions and external temperature inputs
- ◆ power supply 230V~
- ◆ load 0.5-2.2kW resistive or inductive
- ◆ 2 digital inputs 12V= or 24V=
- ◆ up to 8 potentiometers
- ◆ up to 2 Pt1000 temperature sensors
- ◆ up to 2 analogue inputs 0-10V or 0-20mA
- ◆ up to 4 SPCO outputs
- ◆ DIN rail mounting (300x105x76mm)



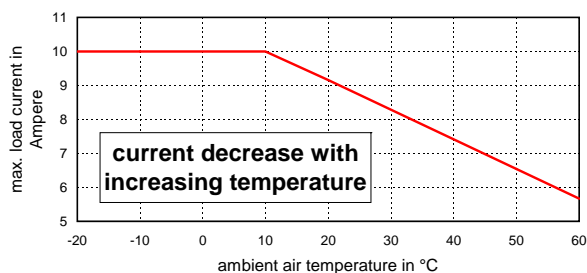
specification

supply voltage	230V~ +10% / -15%
frequency range	50-60Hz ±2Hz
power	0,5 - 2,2 kW
loads	resistive or inductive
protection class	IP10 (IP54 on request)
analogue values	0-10V, 0-20mA, 4-20mA
actual values	Pt1000
outputs	max 4 SPCO
output relay specification	max. 5A 230V~/30V=
relay type	1
AC-15* 120V~	5A
AC-15* 240V~	4A
DC-13* 24V=	4A
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	-10 to +50 °C non condensing

* EN 60947-5-1 VDE 0453

The ESG is typically used for controlling single-phase capacitor start motors in a variety of systems. Applications include heating, ventilation and pumping systems. The ESG can also be used for the control of lighting systems. In heating and ventilation systems, Pt1000's are used to measure the temperature to regulate output levels (motor speed) and switch-points are controlled according to the levels set by potentiometers.

On standard models the load output is switched on within a range of 20-45°C and switched off within a range of 10-35°C. These ranges can be changed to suit specific applications. Additional potentiometers set the temperature set point and minimum and maximum load output level, thus controlling the motor speed. Depending on the model, additional potentiometers are also available to set alarm levels and external/ambient temperature levels. Output relays signal 'running' and 'alarm' conditions, with over temperature alarm and cooling start relays featured on some types.

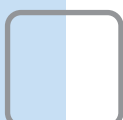
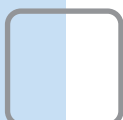


ordering information

part no	supply	output	relay type	set points	temperatures	analogue output
ESG-S0	230V~	6W	-	7 potentiometers	-	0-10V, 0-20mA
ESG-S1	230V~	8W	2 x SPCO	5 potentiometers	1 x PT1000	0-10V, 0-20mA
ESG-S2	230V~	12W	3 x SPCO	6 potentiometers	1 x PT1000	0-10V, 0-20mA
ESG-S4	230V~	12W	4 x SPCO	8 potentiometers	2 x PT1000	0-10V, 0-20mA

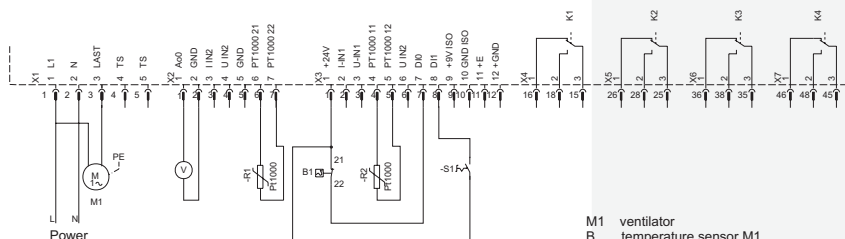
other voltages on request



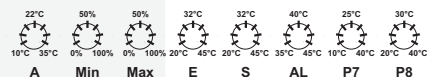


example 1

please note that the potentiometer ranges are for illustrative purposes only and can be set to meet individual customer requirements



- M1 ventilator
- B temperature sensor M1
- R1 PT1000-outside sensor
- R2 PT1000-indoor sensor
- K1 status on
- K2 status alarm (intern or extern)
- K3 overtemperature
- K4 start aircondition
- S1 switch to ambient temperature operation



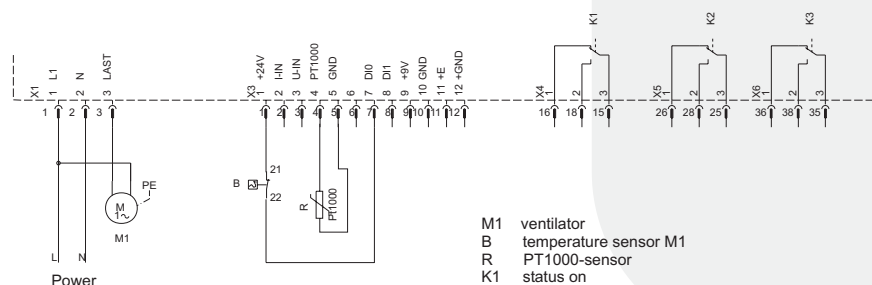
A = switch off point
 Min = min. rpm
 Max = max. rpm
 E = switch on point
 S = set point value
 AL = alarm
 P7 = set point value outside temp.
 P8 = set point value ambient temp.

ESG-S4 230V AC

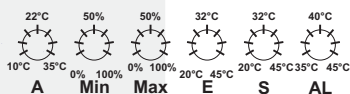
HIQUEL



example 2



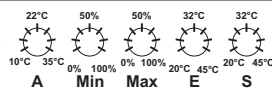
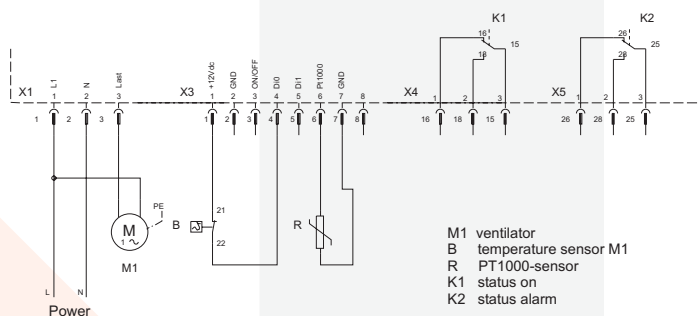
- M1 ventilator
- B temperature sensor M1
- R PT1000-sensor
- K1 status on
- K2 status alarm (intern or extern) Klaxon
- K3 overtemperature



A = switch off point
 Min = min. rpm
 Max = max. rpm
 E = switch on point
 S = set point value
 AL = alarm

ESG-S 2

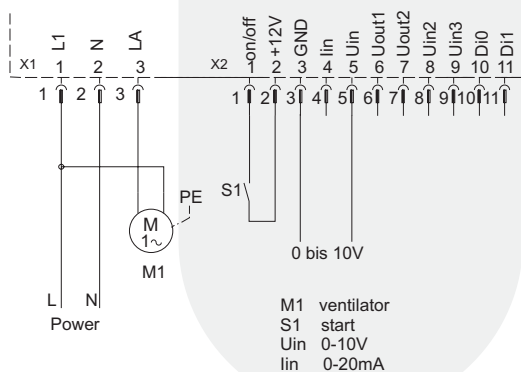
example 3



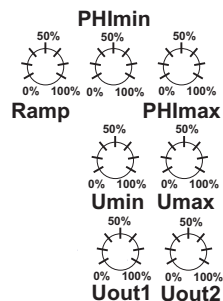
A = switch off point
Min = min. rpm
Max = max. rpm
E = switch on point
S = set point value

ESG-S 1

example 4



On	Off	
<input type="radio"/>	<input type="radio"/>	J1 ramp
<input type="radio"/>	<input type="radio"/>	J2 inverse
<input type="radio"/>	<input type="radio"/>	J3 input-offset
<input type="radio"/>	<input type="radio"/>	J4 not assigned
<input type="radio"/>	<input type="radio"/>	J5 current/voltage



ESG-S0