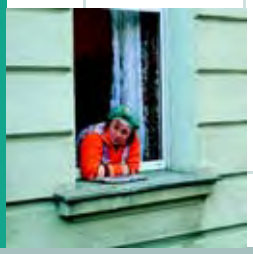
Monitoring Devices



Introduction

Overview

Devices		Application	Standards	Usage		
				Non-res.bldgs.	Res. bldgs.	Industry
	**Indicators lights** 5TE5 8	Optical signaling in installations and control circuits to indicate switching states or faults	DIN VDE 0710-1	•		•
	**Bells, buzzers** with power supply 4AC3 004, 4AC3 104	Bells or buzzers with 230 V AC connection in a device that can also be push-button-operated with safety extra-low voltage 12 V AC.	DIN EN 61558-2-8		•	
	**Fault signaling units** • 5TT3 460 centralized fault signaling unit • 5TT3 461 expansion fault signaling unit	Evaluation and display of fault alarms and alarm messages for monitoring industrial plants and control units	IEC 60255, DIN VDE 0435-303	• •		• •
	**Dusk switches** 7LQ2 1, 5TT3 3	For demand-oriented switching of lighting installations for shop windows or paths in order to cut costs.	EN 60730	•	•	
	**Temperature controllers** 7LQ2 0	Controlling and limiting temperatures	EN 60730	•	•	•
	Fuse monitors 5TT3 170	Monitoring of all types of fuses	IEC 60255, DIN VDE 0435	•		•
	**Circuit relays** 5TT3 171	Shutdown of unused lines	IEC 60255, DIN VDE 0435		•	
	**Phase /phase sequence monitors** 5TT3 421/5TT3 423	Monitoring of the phase sequence of a system and the power supply	IEC 60255, DIN VDE 0435			•

Overview

Devices		Application	Standards	Usage		
				Non-res. bldgs.	Res. bldgs.	Industry
	**Voltage relays**					
	• 5TT3 400 to 5TT3 403 undervoltage relays	Monitoring of the power supply of emergency lighting in public buildings	IEC 60255, DIN VDE 0435-303, DIN VDE 0108	•		
	• 5TT3 404 to 5TT3 406 undervoltage relays			•		
	• 5TT3 407 short-time voltage relays	Monitoring of the power supply for short-time failures of 20 ms	–			•
	• 5TT3 408 undervoltage/overvoltage relay	Monitoring of the power supply for ensuring operational parameters for devices or plant sections	IEC 60255, DIN VDE 0435			•
	• 5TT3 410 undervoltage/overvoltage relay	Monitoring of the neutral conductor for breaks	DIN VDE 0633	•		•
	• 5TT3 19 overvoltage relay	Monitoring of the power supply for ensuring operational parameters for devices or plant sections	IEC 60255, DIN VDE 0435			•
	**Current relays** 5TT6 1	Monitoring of emergency and signal lighting and motors	IEC 60255, DIN VDE 0435-303	•		•
	Priority switches 5TT6 10	Switching of system loads in residential buildings	IEC 60669 (VDE 0632), BTO § 6 Section 4		•	
	Insulation monitors for industry 5TT3 4	Monitoring of the insulation resistance in non-grounded systems	IEC 60255, IEC 61557			•
	**Power factor monitors** 5TT3 472	For monitoring of the underload of motors up to approx. 5 A AC by making power factor measurements	IEC 60255 IEC 61557			•
	Level relays 5TT3 430/5TT3 435	Control of liquid levels in containers	IEC 60255, DIN VDE 0435	•		•
	Thermistor motor protection relays 5TT3 43	Thermal protection of motor windings	IEC 60255, DIN VDE 0435			•

Definitions

I_e = rated operational current
U_e = rated operational voltage
I_c = rated control supply current
U_c = rated control supply voltage
P_s = rated operational capacity
1 MW = 18 mm modular width

Transparent cap

Adding a transparent cap extends the 55 mm mounting depth of a device to 70 mm. This is a useful option for improving the appearance of the distribution board.

5TE5 8 indicator lights

Overview

Changing of lamps and caps without the use of tools

Caps and lamps can safely be replaced during operation without the use of tools. Transparent caps in different colors allow signaling of system states according to IEC 60073, e.g. red: danger, yellow: warning/caution and green: safety.

Always correctly polarized

The lamps, depending on the voltage either glow lamp or diode, are nested in a slotted base. Thus correct polarization is always ensured for DC applications.

Preferred positions for the busbar mounting of N conductors

In order to be able to mount the N terminals on busbars, preferred positions are provided for them at the device. This also applies to the 5TE8 switches with pilot lamps.
The option for busbar mountings is described in Chapter "Miniature circuit-breakers".

Triple light indicator

A light indicator with three lamps and green caps enables three-phase signaling within one modular width. A cap set is available for a "traffic light warning" according to IEC 60073 with "red: danger, yellow: warning/caution, green: safety."

Color coding acc. to IEC 60073

Color	Significance		
	Safety of people or environment	Process state	System state
red	Danger	Emergency	Faulty
yellow	Warning/Caution	Abnormal	
green	Safety	Normal	
blue	Stipulation		
white **gray** **black**	No special significance assigned		

Technical specifications

DIN VDE 0710-1			5TE5 8
Rated operational voltage U_e	max.	V AC	230 (for a different voltage see 5TG8 lamps)
Rated power dissipation P_v		VA	see lamp 5TG8
Clearances	between the terminals	mm	> 7
Terminals/tightening torque	± screw (Pozidrive); Nm		1; 1.2
Conductor cross-sections	rigid flexible with sleeve	mm^2 min. mm^2	1.5 ... 6 1
Permissible ambient temperature		°C	-5 ... +40
Resistance to climate	acc. to DIN 50015 at 95 % relative air humidity	°C	45

			5TG8 05.
Rated power dissipation P_v			
• LED		VA	0.4
• glow lamp		VA	0.4

Selection and ordering data

		U_e	Conductor cross-sections	MW	Order No.	Weight 1 item	PS*/ P. unit
		V AC	up to mm^2			kg	Items
	**Indicator lights for a max. cable length of up to 5 m**						
	with 1 red lamp	230	6	1	**5TE5 800**	0.060	1/12
	with 2 lamps, red and green				**5TE5 801**	0.056	1/12
	with 3 green lamps				**5TE5 802**	0.063	1/12
	**Indicator lights for a max. cable length of up to 250 m**						
	with 1 red lamp	230	6	1	**5TE5 804**	0.060	1/12

Accessories

		I_e	U_e	Order No.	Weight 1 item	PS*/ P. unit
		mA	V		kg	Items
Lamps for manual replacement for voltages other than 230 V or as spare lamps with inscription label						
	LED	0.4	AC/DC 12	**5TG8 050**	0.001	1
	LED		AC/DC 24	**5TG8 051**	0.001	1
	LED		AC/DC 48	**5TG8 052**	0.001	1
	LED		AC/DC 60	**5TG8 053**	0.001	1
	glow lamp		AC 115 DC 110	**5TG8 054**	0.001	1
5TG8 050	glow lamp		230 AC DC 220	**5TG8 055**	0.001	1
Cap sets for manual changing of colored caps					1 set	
	red, transparent (1 set = 5 items)			**5TG8 061**	0.002	1 set
	green, transparent (1 set = 5 items)			**5TG8 062**	0.002	1 set
	yellow, transparent (1 set = 5 items)			**5TG8 063**	0.002	1 set
	blue, transparent (1 set = 5 items)			**5TG8 064**	0.002	1 set
	white, transparent (1 set = 5 items)			**5TG8 066**	0.002	1 set
	red and green (1 set = 10 lamps per color), yellow, blue and white (1 set = 5 lamps per color)			**5TG8 067**	0.012	1 set
5TG8 061	red, green, yellow (1 set = 3 items)			**5TG8 070**	0.002	1 set

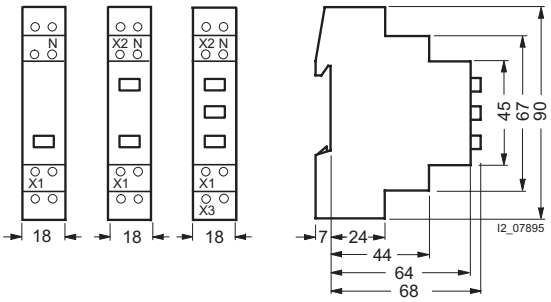
11

* You can order this quantity or a multiple thereof.

5TE5 8 indicator lights

Dimensional drawings

5TE5 800 5TE5 801 5TE5 802
5TE5 804



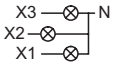
Schematics

Circuit diagrams

5TE5 800

5TE5 801

5TE5 802



5TE5 804

Overview

Integrated power supply

The bell or the buzzer is fitted with a transformer as a combination device in a space-saving casing of only 2 MW. Actuation is using safety extra-low voltage 12 V AC.

Typical applications

Bells or buzzers with 230 V AC connection as a combination device that can also be pushbutton-operated with safety extra-low voltage 12 V AC. These devices are used in residential buildings.

Technical specifications

Data acc. to DIN EN 61558-2-8			4AC3 004	4AC3 104
Rated operating capacity P_s		VA	4	
Rated operational voltage U_e		V AC	230	
Operating range × U_c	at 50/60 Hz		0.9 ... 1.1	
Secondary rated voltage U_{sec}		V AC	12	
Rated frequency		Hz	50	
Operating range frequency		Hz	48 ... 62	
Rated power dissipation P_V	in no-load operation	W	1.7	
Volume	in 1-m distance	dB (A)	82	66
Protective separation	creepage and clearances	mm	3	
Insulation class			B	
Test voltage, 50 Hz 1 minute	primary against secondary winding	kV	> 3.75	
Terminals	± screw (Pozidrive)		1	
Conductor cross sections	rigid flexible with sleeve	mm^2 min. mm^2	1.5 ... 8 0.75	
Permissible ambient temperature		°C	-10 ... +25	
Permissible humidity		%	≤ 80	
Degree of protection	acc. to DIN EN 60529		IP20	
Protection class	acc. to DIN EN 60730		II	

Selection and ordering data

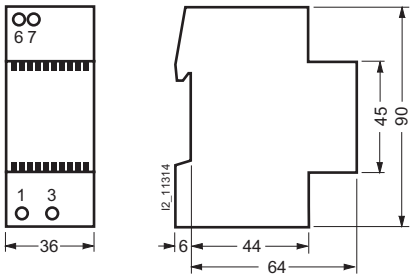
		U_e	U_c	MW	Order No.	Weight 1 item	PS*/ P. unit
		V AC	V AC			kg	Items
	**Bell** with transformer for safety extra-low voltage, which can be pushbutton-operated with extra-low voltage. Volume 82 dB (A) at a 1 m distance	230	12	2	**4AC3 004**	0.280	1
	**Buzzer** with transformer for safety extra-low voltage, which can be pushbutton-operated with extra-low voltage. Volume 66 dB (A) at a 1 m distance	230	12	2	**4AC3 104**	0.270	1

* You can order this quantity or a multiple thereof.

4AC3 0, 4AC3 1 bells, buzzers

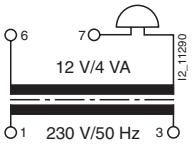
Dimensional drawings

4AC3 004
4AC3 104



Schematics

4AC3 004



4AC3 104

Overview

- 4 fault signal inputs with LED
- 1 LED as centralized fault indicator
- One unit each for centralized fault indication and acoustic signaling
- With acknowledgment for acoustic indicators
- Open-/closed-circuit principle to the 4 inputs can be set via jumpers X1-X2
- A maximum of 39 expansion fault signaling units 5TT3 461 can be connected to the 5TT3 460 centralized fault signaling unit.

Function

A fault is indicated as a centralized fault at the LED, and a centralized fault indication is initiated. The LED is lit as long as the fault exists. Until the acknowledgment, momentary faults can be identified by the remaining centralized fault.

Technical specifications

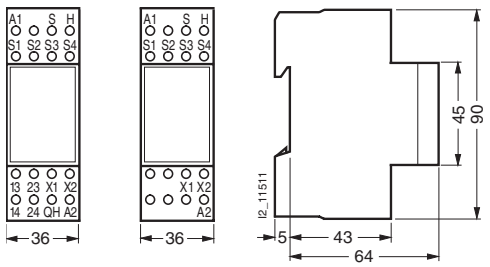
Data acc. to DIN VDE 0435-110, -303, IEC 60255			5TT3 460	5TT3 461
Rated control voltage U_c		V AC	230	
Operating range × U_c			0.8 ... 1.1	
Rated frequency		Hz	50/60	
Fault signaling inputs S1 to S4		V AC	230	
Noise pulse duration		ms	≥ 100	
Acknowledgment pulse duration		ms	≥ 200	
Rated operational voltage U_c		V AC	230	–
Rated operational current I_e		A	5	–
Minimum contact load		V/mA	10/100	–
Terminals	1 screw (Pozidrive)		1	
Conductor cross-sections	rigid flexible with sleeve	max. mm² min. mm²	2 × 2.5 1 × 0.5	
Permissible ambient temperature		°C	-20 ... +60	
Humidity class	acc. to IEC 60068-2-30		F	

Selection and ordering data

		U_e	I_e	U_c	MW	Order No.	Weight 1 item	PS*/ P. unit
		V AC	A	V AC			kg	Items
	**Centralized fault signaling unit with transparent cap**	250	5	230	2	**5TT3 460**	0.130	1
	**Expansion fault signaling unit with transparent cap**	250			2	**5TT3 461**	0.110	1

Dimensional drawings

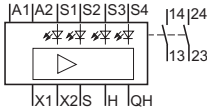
5TT3 460 5TT3 461



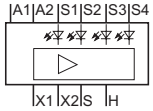
Schematics

Circuit diagrams

5TT3 460



5TT3 461



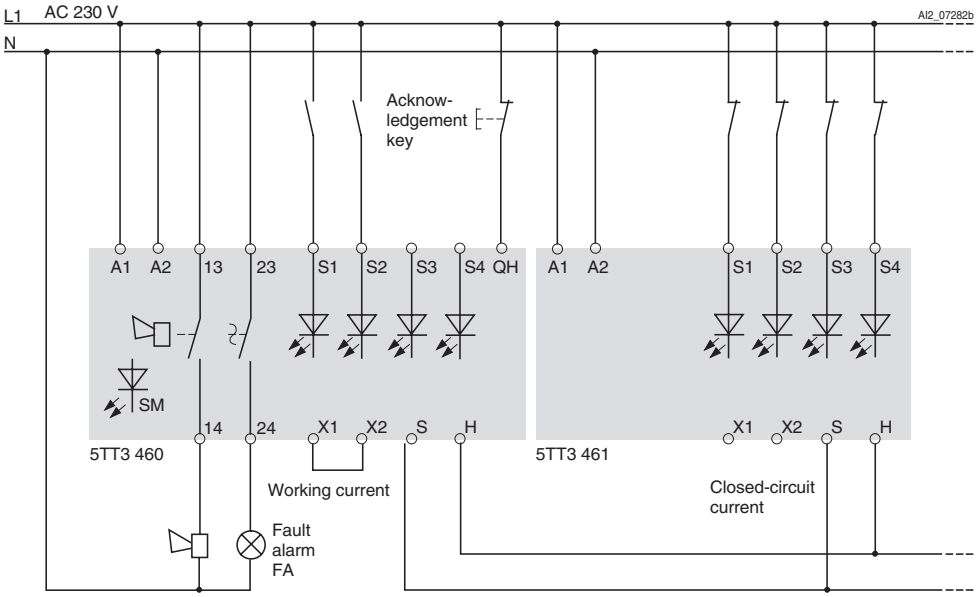
11

* You can order this quantity or a multiple thereof.

5TT3 46 fault signaling units

Schematics

Switching example, functional diagram



The terminals A1, S1 to S4 and QH must be operated in-phase. If no external acknowledgment key is connected, terminal QH must be laid to L1.

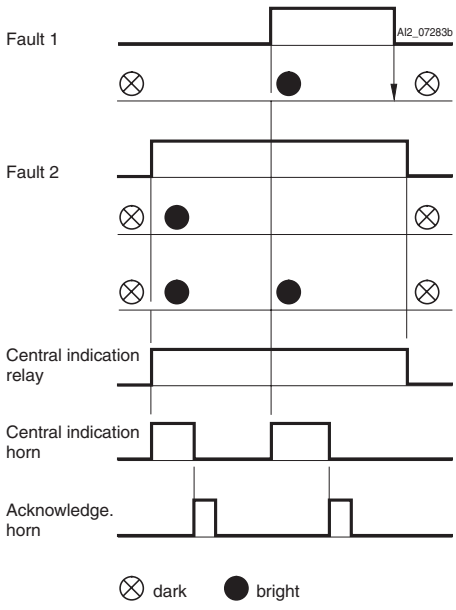
If jumper X1/X2 is fitted, open-circuit protection (otherwise closed-circuit protection).

Contacts 13/14 and 23/24 close in the event of an incoming fault. The assigned LED lights up and the centralized fault indication LED SM.

The alarm sensor (contact 13/14) is switched off using the acknowledgment key. The assigned LED and the centralized fault indication LED continue to light up and contact 23/24 remains closed until the fault is eliminated.

Cables S and H carry an extra-low voltage. In the case of long connections between different distribution boards a shielded cable must be laid parallel to the installed load lines.

As a light signal sensor for the group messages, we recommend the device 5TE5 7 or 5TE5 8; as alarm sensor, the devices 5TT3 450 to 5TT3 453.



Overview

	7LQ2 100	7LQ2 101	7LQ2 102	7LQ2 103	5TT3 303
Setting ranges in lux	2 ... 500	2 x 2 ... 500	2 ... 500	2 x 2 ... 500	2 ... 2000
Adjustable time delay	no	yes	no	yes	–
Switching status indication	yes	yes	yes	yes	yes
Light sensor, max. cable length	20 m	20 m	20 m	20 m	–
Switching channels	1	2	1	2	1
Incandescent lamp load	2000 W	2 x 2000 W	2000 W	2 x 2000 W	1200 W

Function

A light sensor measures the level of daylight. Switching depends on the desired brightness. A time delay and the switching hysteresis prevent clock-pulse behavior.

The sensor must be mounted so that it is not influenced by the lighting (feedback).

Energy saving

Dusk switches are used for the demand-oriented switching of lighting installations for shop windows or paths in order to cut operating costs.

A single light sensor serves several switching channels

The devices 7LQ2 101 and 7LQ2 103 have 2 switching channels that can be set independently of each other. 12 of these devices can be switched parallel to a light sensor. This saves the multiple installation of light sensors in a single system. All switching channels operate independently of each other and can be adjusted individually.

Technical specifications

Data acc. to EN 60730			7LQ2 100	7LQ2 101	7LQ2 102	7LQ2 103	5TT3 303
Rated control voltage U_c		V AC	230				
Operating range × U_c	at 50/60 Hz		0.8 ... 1.2				0.85 ... 1.1
Rated frequency		Hz	48 ... 62				50
Measuring range, setting range		Lux	2 ... 500	2 × 2 ... 500	2 ... 500	2 × 2 ... 500	2 ... 2000
Time delay	fixed adjustable	s	75 ± 25 –	– 2 × 50 ... 100	75 ± 25 –	– 2 × 50 ... 100	50 –
Contact	μ-contact		1 NO contact	2 NO contacts	1 NO contact	2 NO contacts	1 NO contact
Contact switching	closes with approaching darkness	terminals	3/4	5/6 and 9/10	3/4	5/6 and 9/10	–
Status indication, LED	switching status indication switching state OFF switching state ON		instantaneous green red				– – –
Rated operational voltage U_e		V AC	250				
Rated operational current I_s	for p.f. = 1 for p.f. = 0.4	A A	16 4				10 2
Incandescent lamp load		W	2000	2 × 2 000	2000	2 × 2 000	1200
Different phases	actuator/contact permissible contact/contact		yes –	yes yes	yes –	yes yes	– –
Electrical isolation	creepage and clearances actuator/contact contact/contact	 mm mm	 4 –	 4 4	 4 –	 4 4	 – –
Rated impulse withstand voltage U_{imp} 1.2/50 μs	actuator/contact contact/contact	kV kV	> 2.5 –	> 2.5 > 2.5	> 2.5 –	> 2.5 > 2.5	– –
Minimum contact load		V; mA	10; 100				
Terminals	+/- screw (Pozidrive)		1				
Conductor cross-sections	rigid flexible with sleeve	mm^2 min. mm^2	1.5 ... 6 0.75				1.5 0.5
Permissible ambient temperature	device light sensor	°C °C	-10 ... +55 -30 ... +70				– –
Permissible humidity	device light sensor	% %	< 80 < 98				– –
Resistance to climate	acc. to DIN 50016						FW 24
Degree of protection	acc. to DIN EN 60529 device light sensor		 IP20 IP55		 IP65		 IP54 –
Protection class	acc. to DIN EN 61010		II				

11

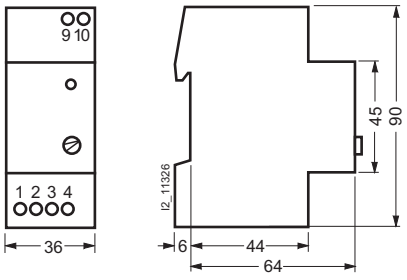
7LQ2 1, 5TT3 3 dusk switches

Selection and ordering data

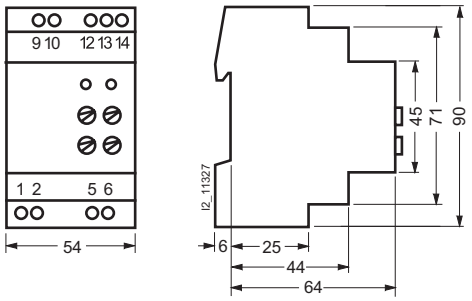
	U_e V AC	I_e A	U_c V AC	MW	Order No.	Weight 1 item kg	PS*/ P. unit Items
 7LQ2 100	**Dusk switches**						
	setting range 2 ... 500 lux						
	1-channel version, with light sensor for surface mounting, IP55						
	250	16	230	2	**7LQ2 100**	0.210	1
	2-channel version, with light sensor, for surface mounting, IP55 expandable to 24 channels through parallel switching of 12 devices, which can be mutually controlled through a light sensor.						
	250	16	230	3	**7LQ2 101**	0.210	1
	1-channel version, with light sensor for flush wall mounting, IP65						
	250	16	230	2	**7LQ2 102**	0.210	1
 7LQ2 103	2-channel version, with light sensor, for flush wall mounting, IP65 expandable to 24 channels through parallel switching of 12 devices, which can be mutually controlled through a light sensor.						
	250	16	230	3	**7LQ2 103**	0.210	1
	setting range 2 ... 2000 lux						
	1-channel version, with integrated light sensor, for surface wall mounting						
 5TT3 303	250	10	230	2	**5TT3 303**	0.190	1
	**Replacement light sensor**						
	with watertight/resistant resin molding material, heat-resistant to 70°C						
	degree of protection IP55, for 7LQ2 100 and 7LQ2 101, for surface mounting, 2 ... 500 Lux				**7LQ2 910**	0.060	1
	degree of protection IP65, for 7LQ2 102 and 7LQ2 103, for flush wall mounting, 2 ... 500 Lux				**7LQ2 911**	0.060	1

Dimensional drawings

7LQ2 100
7LQ2 102



7LQ2 101
7LQ2 103

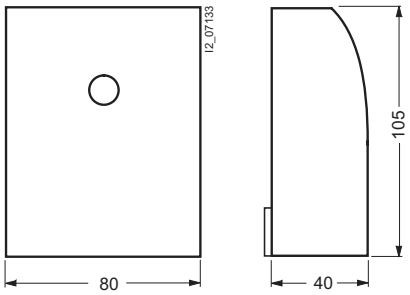


* You can order this quantity or a multiple thereof.

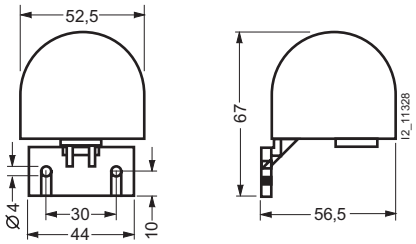
Dimensional drawings

5TT3 303

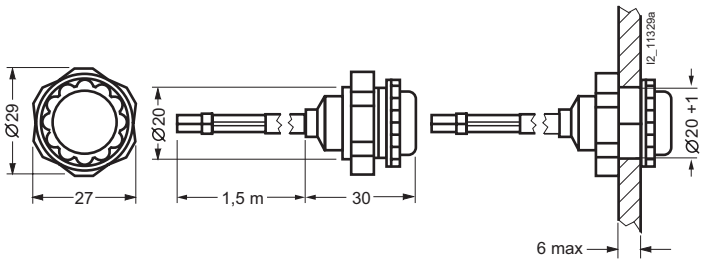
Wall-mounted version



7LQ2 910

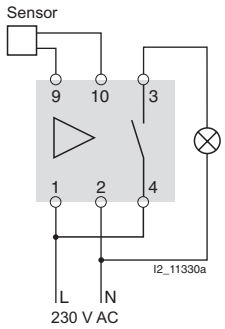


7LQ2 911

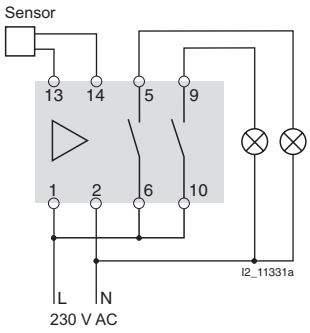


Schematics

Dusk switches
7LQ2 100
7LQ2 102

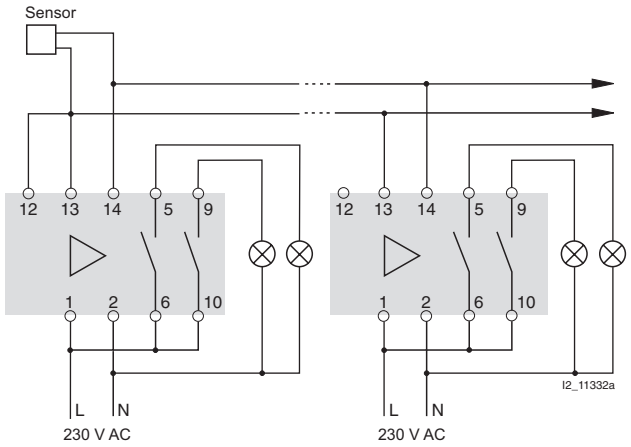


Dusk switches
7LQ2 101
7LQ2 103



The cable length between the device and the light sensor must not exceed a maximum of 20 m. The conductor cross-section must be a minimum of 2 x 0.75 mm^2.

Up to 12 dusk switches with a single sensor
7LQ2 101
7LQ2 103



Up to 12 dusk switches can be operated with a single sensor

If the device measures a light level below the set value or if the device is no-voltage, the contacts are in the position shown.

- If the surrounding light level increases by approx. 30 to
- 100 % above the set value, the light is switched off after the set time delay.
- If the surrounding light level falls below the set value, the light is switched on after the set time delay.

11

7LQ2 0 temperature controllers

Overview

	7LQ2 001	7LQ2 002	7LQ2 003	7LQ2 005
Setting ranges in °C	-30 ... +30	0 ... +60	+40 ... +100	+2 ... +400
Switching status indication	yes	yes	yes	yes
Adjustable switching hysteresis in °C	1 ... 5	1 ... 5	1 ... 5	1 ... 20
Temperature sensor, measuring element	KTY 11-6	KTY 11-6	KTY 11-6	for PT100
Max. cable length	100 m	100 m	100 m	100 m

Application

The temperature controllers are used for controlling or limiting temperatures in residential and non-residential buildings, as well as in industrial areas. They're used for heating registers, panel and hot air heating and direct floor heating, as a limiting thermostat for air-conditioning systems and cooling systems, switchgear cabinet cooling, etc. as well as for temperature control in humid and dusty rooms. Can also be used for inaccessible room temperature setting for rooms in public buildings, such as schools, dayrooms and comparable applications.

Function

Electronic 2-element temperature controllers with LED red/green for voltage indication, switching status indication and temperature sensor monitoring. The temperature sensor with the measuring element KTY or a PT100 measuring element is monitored for short circuits and interruptions.

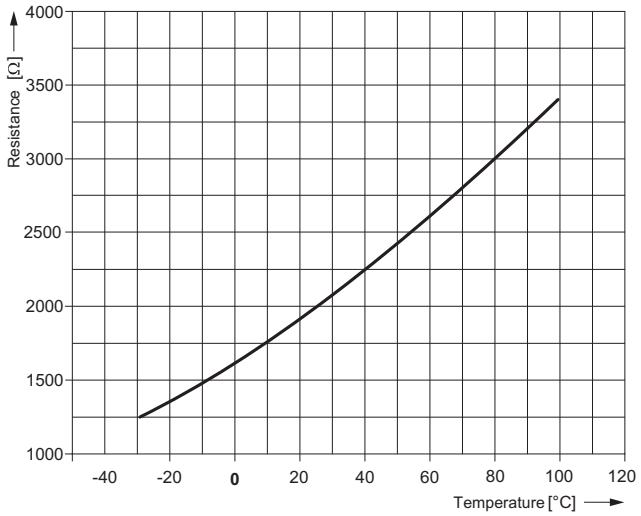
Technical specifications

Data acc. to EN 60730			7LQ2 001	7LQ2 002	7LQ2 003	7LQ2 005
Rated control voltage U_c		V AC	230			
Operating range × U_c	at 50/60 Hz		0.8 ... 1.2			
Rated frequency		Hz	48 ... 62			
Measuring range, setting range		°C	-30 ... +30	0 ... +60	+40 ... +100	2 ... +400
Switching hysteresis	adjustable	°C	1 ... 5			4 ... 20
Contact	µ-contact		1 CO contact			
Contact switching	closes with rising temperature	terminals	3/4			
Status indication, LED	switching status indication actuating voltage switching state ON break or short circuit of sensor conductor		 green red red flashing			
Rated operational voltage U_e		V AC	250			
Rated operational current I_s	for p.f. = 1 for p.f. = 0.4	A A	16 4			
Different phases	actuator/contact permissible		yes			
Electrical isolation	creepage and clearances actuator/contact	mm	4			
Rated impulse withstand voltage U_{imp} 1.2/50 µs	actuator/contact	kV	> 2.5			
Minimum contact load		V; mA	10; 100			
Terminals	± screw (Pozidrive)		1			
Conductor cross-sections	rigid flexible with sleeve	mm^2 min. mm^2	1.5 ... 6 0.75			
Permissible ambient temperature	device temperature sensor	°C °C	-10 ... +55 -30 ... +105			-10 ... +55 –
Permissible humidity	device temperature sensor	% %	≤ 80 ≤ 98			≤ 80 –
Degree of protection	acc. to DIN EN 60529 device temperature sensor		 IP20 IP65			 IP20 –
Protection class	acc. to DIN EN 61010		II			

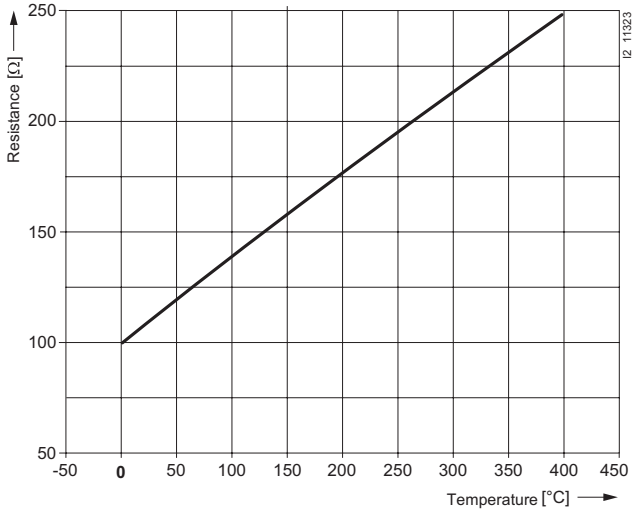
Selection and ordering data

		U_e	I_e	U_c	MW	Order No.	Weight 1 item	PS*/ P. unit
		V AC	A	V AC			kg	Items
	**Temperature controllers**							
	with temperature sensor KTY 11-6							
	Setting range -30 ... +30 °C, 1 changeover	250	16	230	2	**7LQ2 001**	0.200	1
	Setting range 0 ... +60 °C, 1 changeover	250	16	230	2	**7LQ2 002**	0.200	1
	Setting range +40 ... +100 °C, 1 changeover	250	16	230	2	**7LQ2 003**	0.200	1
7LQ2 001	**Temperature controller without temperature sensor**							
	for PT 100 measuring element (not included in delivery)							
	Setting range +2 ... +400 °C, 1 changeover	250	16	230	2	**7LQ2 005**	0.170	1
	**Replacement temperature sensor KTY 11-6**							
	safety class IP65, for 7LQ2 001, 7LQ2 002 and 7LQ2 003, molded, with watertight/resistant resin molding material, with 1 m silicone line, heat-resistant up to 105 °C, can be extended up to 100 m							
				230		**7LQ2 900**	0.030	1

Characteristic curves



Resistor characteristic curves KTY11-6



Resistor characteristic curves PT100 acc. to EN 60751 (96)

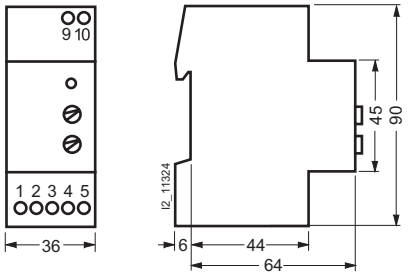
11

* You can order this quantity or a multiple thereof.

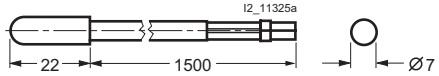
7LQ2 0 temperature controllers

Dimensional drawings

7LQ2 00.



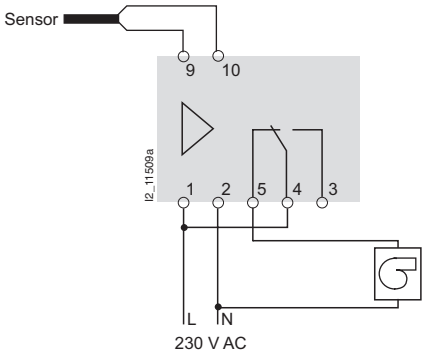
7LQ2 900



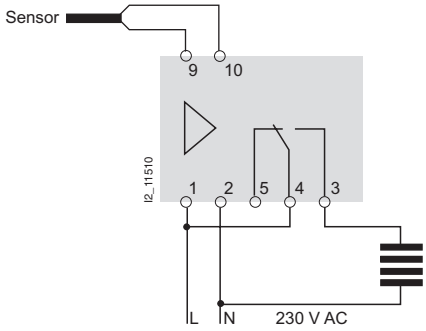
Schematics

Switching examples

7LQ2 0 temperature controller in cooling operation with adjustable functioning temperature difference



7LQ2 0 temperature controller in heating operation with adjustable functioning temperature difference



The cable length between the device and the temperature sensor must not exceed a maximum of 100 m. The conductor cross-section must be a minimum of 2 x 0.75 mm^2.

Overview

- For all fuse systems
- Signal is output even when load is shut off
- Also suitable for asymmetrical networks, networks with harmonics or motors with feedback
- With two display LEDs, 1 for "Fuse OK" and 1 for "Fuse Failed"

Application

For the fuse monitoring of all kinds of fuses, in particular for the automatic shutdown and closing lockout of three-phase a.c. motors in the event of the failure of one or more phase fuses.

Note:
The internal resistance of the measuring paths of the fuse monitor is in the MΩ-range so that the VDE regulations with regard to touch voltage are met in the event of faulty fuses, (>1 000 Ω/V).
To isolate, the main switch must be switched off. The enclosed label should be affixed to the switchgear as a reminder.

Technical specifications

Data acc. to DIN VDE 0435-110, IEC 60255			**5TT3 170**
Rated control voltage U_c		V	3x 380 ... 415 AC
Operating range × U_c			0.8 ... 1.1
Rated frequency		Hz	50 ... 400
Internal resistance	of measuring paths	Ω/V	> 1 000
Max. permissible rear feed		%	90
Response/release time		ms	< 50
Rated impulse withstand voltage U_{imp}	input/output	kV	> 4
Rated operational voltage U_e		V AC	250
Rated operational current I_e	AC-1	A	4
Electrical service life	in switching cycles at 1 A AC-11		1.5×10^5
Terminals	+/- screw (Pozidrive)		1
Conductor cross sections	rigid flexible with sleeve	max. mm^2 min. mm^2	2 × 2.5 1 × 0.5
Permissible ambient temperature		°C	-20 ... +45
Resistance to climate	acc. to DIN EN 60068-1		20/45/4

Selection and ordering data

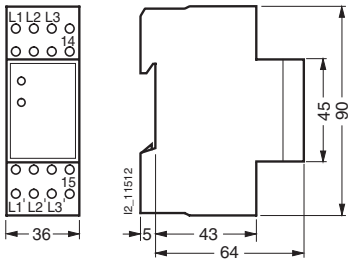
	U_e	I_e	U_c	MW	Order No.	Weight 1 item	PS*/ P. unit
	V AC	A	V			kg	Items
 **Fuse monitor with transparent cap,** for all low-voltage fuse systems. Can be used in asymmetric systems afflicted with harmonics and regenerative feedback motors. Alarm also for disconnected loads.	230	4	3x 380 ... 415 AC	2	**5TT3 170**	0.150	1

11

* You can order this quantity or a multiple thereof.

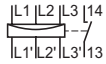
5TT3 170 fuse monitors

Dimensional drawings

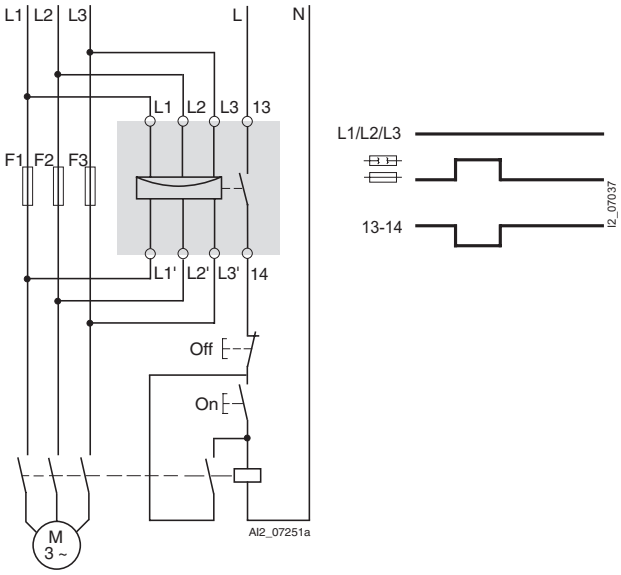


Schematics

Circuit diagram



Switching example: functional diagram



If the fuse fails, the motor is immediately disconnected (prevention of two-phase run). After changing the fuse, the motor can be restarted by pressing the On button.
It is not possible to switch the motor on if the fuse is faulty, contrary to conventional motor circuit-breakers.

Note:
The internal resistance of the measuring paths of the fuse monitor is in the MΩ-range so that the VDE regulations with regard to touch voltage are met in the event of faulty fuses, (>1 000 Ω/V). To isolate, the main switch must be switched off. The enclosed label should be affixed to the switchgear as a reminder.

Overview

- Adjustable from 2 to 20 VA
- With status display for contact position
- With switch continuously ON
- With safety information on stickers for outlets and distribution boards

Application

For disconnecting the voltage or field circuit of electrical systems even when loads are disabled.
The gateway switches off the plant section, but is not a device for ensuring isolation in the sense of safe disconnection.

Function

If loads are disconnected manually, and if the gateway measures a usage of only 2 to 20 VA (adjustable), it disconnects the cable to the system voltage and switches over to extra-low voltage. As soon as loads are reconnected, the gateway detects the increase in usage and switches back to the system voltage.

It detects resistive, capacitive and inductive loads.
The gateway cannot detect a load with electronic power supply units, e.g. electronically controlled vacuum cleaners. It is advisable to connect these types of devices to a base load resistance (PTC resistor) so that the gateway always switches back to system voltage.

Technical specifications

Data acc. to DIN VDE 0435-110, IEC 60255			**5TT3 171**
Rated control voltage U_c		V AC	230
Operating range × U_c			0.85 ... 1.15
Rated frequency		Hz	50/60
Rated power dissipation P_v	electronics contact	VA VA	5 2.6
Monitoring voltage		V	3
Response value	adjustable	VA	2 ... 20
Release value	% of the response value		70
Rated impulse withstand voltage U_{imp}	input/output	kV	> 4
Rated operational voltage U_e		V AC	250
Rated operational current I_e	AC-1 AC-11	A A	16 3
Contact			µ-contact
Electrical service life	in switching cycles at 3 A, AC-11		5×10^5
Terminals	+/- screw (Pozidrive)		1
Conductor cross sections	rigid flexible with sleeve	max. mm^2 min. mm^2	2 × 2.5 1 × 0.5
Permissible ambient temperature		°C	-20 ... +60
Degree of protection	acc. to DIN 60529		IP20
Protection class	acc. to DIN EN 60730-1		II
Humidity class	acc. to IEC 60068-2-30		F

Selection and ordering data

	U_e	I_e	U_c	MW	Order No.	Weight 1 item	PS*/ P. unit
	V AC	A	V AC			kg	Items
Circuit relay with transparent cap							
for disconnecting the voltage or field circuit of electrical systems even when loads are disabled.							
1 NC contact	250	16	230	1	**5TT3 171**	0.072	1
Base load resistance for electronic devices							
with 15-cm connection wires, end sleeves and shrink sleeving					**5TG8 222**	0.010	1

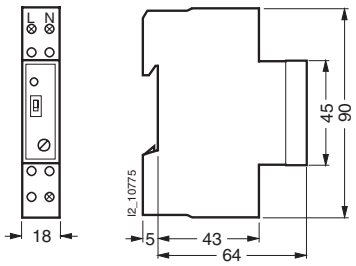
5TT3 171

11

* You can order this quantity or a multiple thereof.

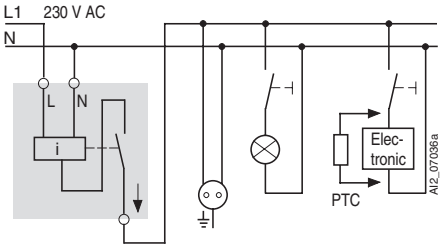
5TT3 171 circuit relays

Dimensional drawings



Schematics

Switching example



If the output falls to 2 to 20 VA (adjustable), the gateway disconnects the line from the system voltage and switches over to extra-low voltage.
Once consumption increases, it reconnects. An electronic load must be connected with the base load resistance 5TG8 222.

5TT3 42 phase / phase sequence monitors

Overview

- Phase monitor with 3-fold LED display
- Phase sequence monitor with single LED display

Application

For visual detection / signaling of phase failures in 3-phase system. The phase sequence is arbitrary. The device is also suitable for 1, 2 or 3-phase operation.

Indication of phase sequence in 3-phase system.

Technical specifications

Data acc. to DIN VDE 0435, IEC 60255			5TT3 421	5TT3 423
Rated control voltage U_c		V AC	230/400	400
Operating range × U_c			0.8 ... 1.1	
Rated frequency		Hz	50/60	
Rated power dissipation P_v	electronics contact	VA VA	9 0.2	
Rated operational voltage U_e		V AC	250	
Rated operational current I_e		A	4	
Minimum contact load		V/mA	10/100	
Rated insulation voltage U_i	between coil/contact	kV	4	
Contact	μ-contact (AC-11)	A	3	
Electrical isolation	creepage and clearances actuator/contact	mm	4	
Rated impulse withstand voltage U_{imp}	actuator/contact	kV	> 2.5	
Terminals	+/- screw (Pozidrive)		1	
Conductor cross-sections	rigid flexible with sleeve	max. mm^2 min. mm^2	2 × 2.5 –	
Degree of protection	acc. to DIN EN 60529		IP20	
Protection class	acc. to DIN EN 60730-1		II	
Permissible ambient temperature		°C	-20 ... +60	
Resistance to climate	acc. to DIN EN 60068-1		20/60/4	

Selection and ordering data

	U_e	I_e	U_c	MW	Order No.	Weight 1 item	PS*/ P. unit
	V AC	A	V AC			kg	Items
 **Phase monitor with transparent cap** with 3 green LEDs for 3 phases 1 CO contact	250	4	230/400	1	**5TT3 421**	0.060	1
 **Phase sequence monitor with transparent cap** with one green LED, which lights up for right-rotating field 1 CO contact	250	4	400	1	**5TT3 423**	0.050	1

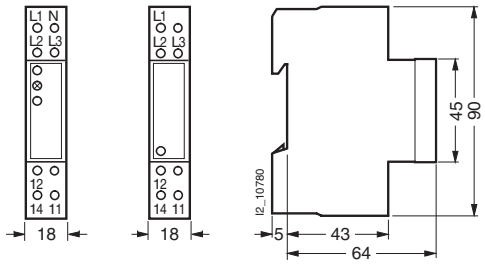
11

* You can order this quantity or a multiple thereof.

5TT3 42 phase / phase sequence monitors

Dimensional drawings

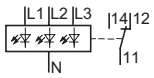
5TT3 421 5TT3 423



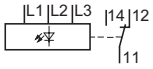
Schematics

Circuit diagrams

5TT3 421



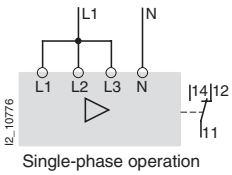
5TT3 423



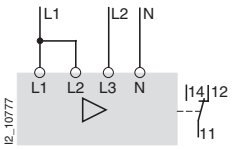
Switching examples

5TT3 421 voltage monitor

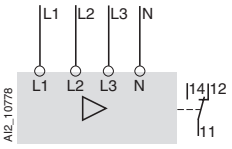
The voltage monitor can be operated either in 1, 2 or 3-phase operation.



Single-phase operation



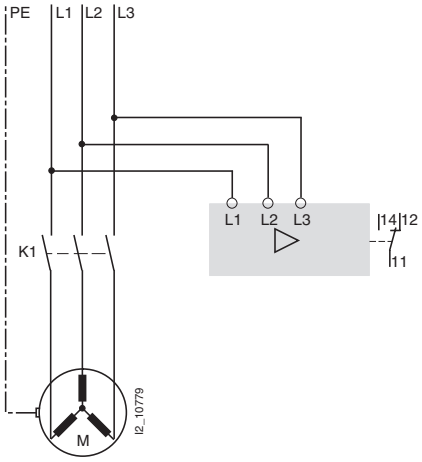
Two-phase operation



Three-phase operation

5TT3 423 phase sequence monitor

The phase sequence monitor must always be connected in 3-phase.



Overview

	5TT3 194	5TT3 195	5TT3 400	5TT3 401	5TT3 402	5TT3 403	5TT3 404	5TT3 405	5TT3 406	5TT3 407	5TT3 408	5TT3 410
General monitoring	•	•	•	–	•	–	•	–	–	–	–	–
Monitoring of safety light devices	–	–	–	•	–	•	–	•	–	–	–	–
Monitoring of medical facilities	–	–	–	–	–	–	–	–	•	–	–	–
Monitoring of N-conductor	–	–	–	–	–	–	–	–	–	–	–	•
Monitoring of short-time interruptions	–	–	–	–	–	–	–	–	–	•	–	–
Overvoltage	•	•	–	–	–	–	–	–	–	–	•	–
Undervoltage	–	–	•	•	•	•	•	•	•	•	•	–
1, 2, 3-phase against N	•	–	•	•	•	•	–	–	–	•	–	–
3 phases against N	–	•	–	–	–	–	•	•	•	–	•	–
Asymmetry detection	–	•	–	–	–	–	•	•	•	–	•	•
N-conductor monitoring	•	•	–	–	–	–	•	•	•	•	•	•
Reverse voltage detection	–	•	–	–	–	–	•	•	•	–	•	–
Short-time failure detection	–	–	–	–	–	–	–	–	–	•	–	–
Phase failure detection	•	•	•	•	•	•	•	•	•	•	•	–
Switching thresholds:	–	–	–	–	–	–	–	–	–	–	–	–
0.7 / 0.9 x U_c, not adjustable	–	–	•	–	•	–	•	–	–	–	–	–
0.8 / 0, 85 x U_c, not adjustable	–	–	–	–	–	–	–	–	–	•	–	–
0.85 / 0.95 x U_c, not adjustable	–	–	–	•	–	•	–	•	–	–	–	–
0.7 ... 0.95 x U_c, 5 % hysteresis, adjustable	–	–	–	–	–	–	–	–	•	–	–	–
0.7 ... 1.1 x U_c, 4 % hysteresis, adjustable	–	–	–	–	–	–	–	–	–	–	•	–
0.9 ... 1.3 x U_c, 4 % hysteresis, adjustable	•	•	–	–	–	–	–	–	–	–	•	–
Adjustable time delay	–	–	–	–	–	–	–	–	–	–	•	–
Contact: 1 CO contact	–	–	•	•	–	–	–	–	–	–	–	–
Contact: 2 COs	•	•	–	–	•	•	•	•	•	•	•	•

Application

General voltage monitoring

For general device and plant protection, voltage relays with switching thresholds of 0.7 x U_c, i.e. 161 V are used. If they have fixed, unchangeable switching thresholds, they switch back to normal operation at 0.85 x U_c, 195 V or at 0.9 x U_c, 207 V, depending on the version. If they have adjustable threshold values, they switch back to normal operation with 4 % hysteresis, 9 V.

1, 2 or 3 phases against N or 3 phases against N

All voltage relays require an N-conductor. Devices for 1, 2 or 3 phases against N can be used for 1, 2, or 3-phase operation. Devices for 3 phases against N require all three phases, whereby the sequence in which they are connected is irrelevant.

Asymmetry detection

If different voltages occur in a 3-phase network, this is called phase asymmetry. Some voltage relays detect an asymmetry of approx. 6 to 8 % of the phase-to-neutral voltage, i.e. approx. 14 to 16 V and switch off. This type of operation is used to protect motors against a "skew" (for example).

N-conductor monitoring

An N-conductor break causes a skew, depending on the phase load. In extreme cases, this could cause 380 V to be applied to a phase and destroy the connected devices. Each voltage relay with asymmetry detection is tripped by an N-conductor break, if the phase displacement is at least 14 to 18 V.

The 5TT3 410 N-conductor monitor detects a phase displacement of 5 %, which is roughly 12 V. This protects the connected devices earlier against overvoltage. The N-conductor monitor does not react if the voltage drops or rises in all phases simultaneously; but also if a phase is swapped with the N-conductor.

Reverse voltage detection

If a phase fails, the motors feed a reverse voltage to the missing phase. However, voltage relays with reverse voltage detection will disconnect in this case because they are monitoring the phase angle.

Phase failure detection

If a phase fails completely, the voltage relays disconnect with a delay as specified in the technical specifications.

Short-time failure detection

Short-time failures upwards of 20 ms cannot be detected with conventional voltage relays. However, they can occur in the case of system transfers or lightning strikes and can lead to uncertainty for sensitive process sequences or measuring procedures.
The 5TT3 407 short-time voltage relay has a reset function that allows a procedure to be permanently interrupted after a fault.

Series fuse 2 A

The voltage relays do not require a series fuse as device protection. However, they are often installed in junctions, i.e. in main supply systems with high fusing. In this case, the supply lead to the voltage relay must be short-circuit resistant. The series fuse only serves as line protection.

Monitoring of safety light devices

DIN VDE 0108 requires that buildings/rooms where "people meet" have emergency lighting. Depending on what the rooms are used for the emergency lighting must be switched on after 0.5 to 15 s if the voltage falls 15 % below the rated voltage of 230 V, i.e. 195 V. This switching threshold must not be adjustable. The voltage relays for safety light devices react after 150 ms. At 5 % undervoltage, i.e. at 218 V they already switch back to normal operation.

Monitoring of medical premises acc. to DIN VDE 0107

In the case of undervoltage, there is no guarantee that medical equipment will continue to function. Because of the risk this presents to patients, e.g. during operations, it is essential that systems switch to an emergency power supply in the event of undervoltage.

5TT3 1 and 5TT3 4 voltage relays

Technical specifications

Data acc. to DIN VDE 0435-110, -303, IEC 60255			5TT3 400 5TT3 401 5TT3 402 5TT3 403	5TT3 404 5TT3 405	5TT3 406	5TT3 194	5TT3 195
Rated control voltage U_c		V AC	230/400				400
Operating range × U_c (overload capability)			1.1			1.35	
Rated frequency		Hz	50/60				
Back-up fuse	terminals L1/L2/L3	A	2				
Response values × U_c	on-switching off-switching		0.9/0.95 0.7/0.85		4 % hysteresis 0.7 ... 0.95	 0.9 ... 1.3	
Minimum contact load		V/mA	10/100				
Phase asymmetry		%	–	6 ... 8		–	6 ... 8
Phase failure detection	at L1 or L2 at L3	ms ms	100 100			140 30	
N-conductor monitoring			–	yes		–	
Rated insulation voltage U_i	between coil/contact	kV	4				
Contact	μ-contact (AC-11)	A	4				
Electrical isolation	creepage and clearances actuator/contact	 mm	 3	 5.5			
Rated impulse withstand voltage U_{imp}	actuator/contact	kV	>2.5	>4			
Terminals	+/- screw (Pozidrive)		1				
Conductor cross-sections	rigid flexible with sleeve	max. mm^2 min. mm^2	2 × 2.5 0.5				
Permissible ambient temperature		°C	-20 ... +60				
Resistance to climate	acc. to DIN EN 60068-1		20/60/4				

Data acc. to DIN VDE 0435-110, IEC 60255			5TT3 407	5TT3 408	5TT3 410
Rated control voltage U_c		V AC	230/400		
Operating range × U_c (overload capability)			1.1	1.35	1.2
Rated frequency		Hz	50/60		
Back-up fuse	terminals L1/L2/L3	A	2		
Response values × U_c	Overvoltage: off-switching on-switching		 – –	 0.9 ... 1.3 U_c 4 % hysteresis	 – –
	undervoltage: off-switching on-switching		 0.8 0.85	 0.7 ... 1.1 U_c 4 % hysteresis	 – –
Minimum contact load		V/mA	10/100		
Phase asymmetry		%	6 ... 8		>5
Phase failure detection	at L1, L2 or L3	ms	≥20	100	–
OFF delay		s	–	0.1 ... 20	–
Automatic reclosing delay		s	0.2 ... 20	-	–
Rated insulation voltage U_i	between coil/contact	kV	4		
Contact	μ-contact (AC-11)	A	3	1	4
Electrical isolation	creepage distances and clearances contact/contact actuator/contact	 mm mm	 – 4	 4	 – 5.5
Rated impulse withstand voltage U_{imp}	actuator/contact	kV	>4		
Rated operational capacity P_s	AC operation: 230 V and p.f. = 1 230 V and p.f. = 0.4	 VA VA	 2000 1 250	 – –	 – –
	DC operation: U_e = 24 V and I_e = 6 A U_e = 60 V and I_e = 1 A U_e = 110 V and I_e = 0.6 A U_e = 220 V and I_e = 0.5 A	 W W W W	 max. 100 max. 100 max. 100 max. 100	 – – – –	 – – – –
Terminals	+/- screw (Pozidrive)		1		
Conductor cross-sections	rigid flexible with sleeve	max. mm^2 min. mm^2	2 × 2.5 0.5		
Permissible ambient temperature		°C	-20 ... +60		
Humidity class	acc. to IEC 60068-2-30		F		

Selection and ordering data

		U_e	I_e	U_c	MW	Order No.	Weight 1 item	PS*/ P. unit
		V AC	A	V AC			kg	Items
	Voltage relays with transparent cap							
 5TT3 194	for general overvoltage monitoring of 1, 2 or 3 phases against N, with reverse voltage and phase failure detection switching thresholds: 0.9 ... 1.3 x U_C, 4 % hysteresis, adjustable							
	contacts, 2 changeovers	230	4	230/400	2	**5TT3 194**	0.150	1
	for general overvoltage monitoring of 3 phases against N, with asymmetry, reverse voltage and phase failure detection, with N-conductor monitoring, switching thresholds: 0.7 ... 0.9 x U_C, not adjustable							
	contacts, 2 changeovers	230	4	230/400	2	**5TT3 195**	0.150	1
 5TT3 400	for general undervoltage monitoring of 1, 2 or 3 phases against N, with phase failure detection, switching thresholds: 0.7 and 0.9 x U_C, not adjustable							
	contacts, 1 changeover	230	4	230/400	1	**5TT3 400**	0.065	1
	for undervoltage monitoring of safety light devices of 1, 2 or 3 phases against N, with phase failure detection, switching thresholds: 0.85 and 0.95 x U_C, not adjustable							
	contacts, 1 changeover	230	4	230/400	1	**5TT3 401**	0.065	1
 5TT3 402	for general undervoltage monitoring of 1, 2 or 3 phases against N, with phase failure detection, switching thresholds: 0.7 and 0.9 x U_C, not adjustable							
	contacts, 2 changeovers	230	4	230/400	2	**5TT3 402**	0.110	1
	for general undervoltage monitoring of 1, 2 or 3 phases against N, with phase failure detection, switching thresholds: 0.9 ... 0.95 x U_C, 5 % hysteresis, adjustable							
	contacts, 2 changeovers	230	4	230/400	2	**5TT3 403**	0.110	1
 5TT3 404	for general undervoltage monitoring of 3 phases against N, with asymmetry, reverse voltage and phase failure detection, with N-conductor monitoring, switching thresholds: 0.7 and 0.9 x U_C, not adjustable							
	contacts, 2 changeovers	230	4	230/400	2	**5TT3 404**	0.110	1
	for undervoltage monitoring of safety light devices of 3-phases against N, with asymmetry, reverse voltage and phase failure detection, with N-conductor monitoring, switching thresholds: 0.85 and 0.95 x U_C, not adjustable							
	contacts, 2 changeovers	230	4	230/400	2	**5TT3 405**	0.110	1
 5TT3 407	for undervoltage monitoring of medical facilities of 3-phases against N, with asymmetry, reverse voltage and phase failure detection, with N-conductor monitoring, switching thresholds: 0.9 ... 0.95 x U_C, 5 % hysteresis, adjustable							
	contacts, 2 changeovers	230	4	230/400	2	**5TT3 406**	0.110	1
 5TT3 408	monitoring of short-time failure detection ≥ 20 ms of 1, 2 or 3-phases against N, with phase failure detection and N-conductor monitoring, switching thresholds: 0.8 ... 0.85 x U_C, not adjustable							
	contacts, 2 changeovers	230	4	230/400	2	**5TT3 407**	0.110	1
	for general under and overvoltage monitoring of 3 phases against N, with asymmetry, reverse voltage and phase failure detection, with N-conductor monitoring and adjustable time delay of 0.1 ... 20 s, switching thresholds: undervoltage: 0.7 ... 1.1 x U_C, 4 % hysteresis, adjustable overvoltage: 0.9 ... 1.3 x U_C, 4 % hysteresis, adjustable							
	contacts, 2 changeovers	230	4	230/400	2	**5TT3 408**	0.110	1

11

* You can order this quantity or a multiple thereof.

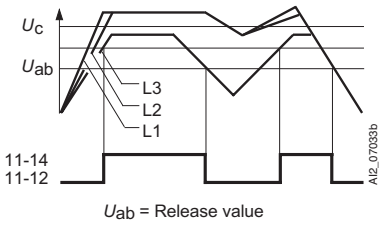
5TT3 1 and 5TT3 4 voltage relays

Selection and ordering data

		U_e	I_e	U_c	MW	Order No.		Weight 1 item	PS*/ P. unit
		V AC	A	V AC				kg	Items
	**N-conductor monitor with transparent cap** with asymmetry detection and N-conductor monitoring contacts, 2 changeovers	230	4	230/400	2	**5TT3 410**		0.110	1

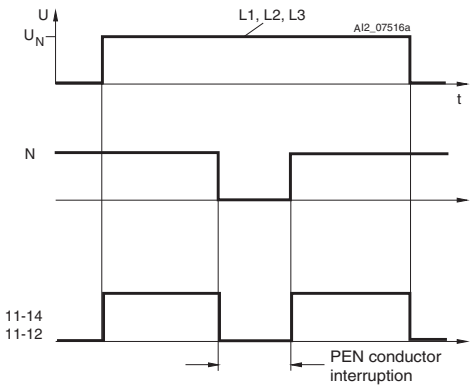
Characteristic curves

Timing interval of 5TT3 400 - 5TT3 406 undervoltage relays

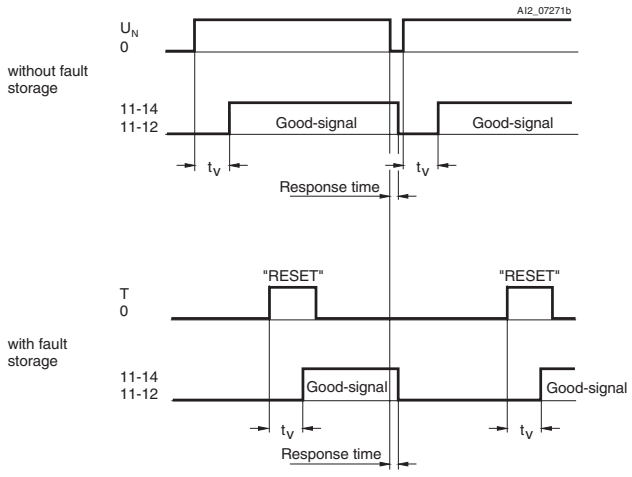


U_{ab} = Release value

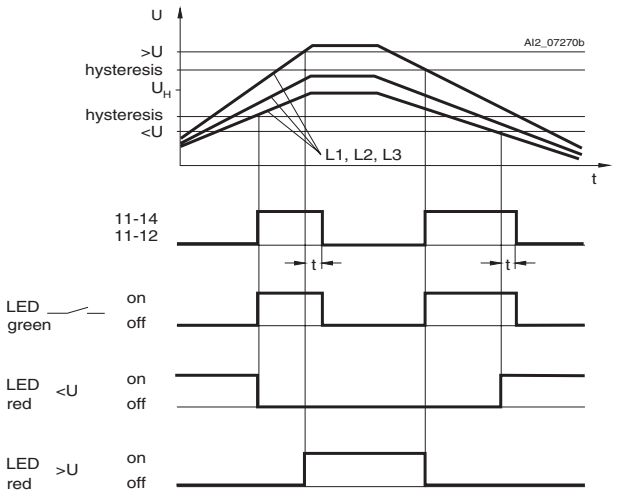
Timing interval of 5TT3 410 N-conductor monitor



Timing interval of 5TT3 407 short-time voltage relay



Timing interval of 5TT3 408 under/overvoltage relay



t_v: Adjustable automatic reclosing delay 0.2 to 20 s

The undervoltage relay switches at a phase asymmetry of 6 to 8 %, regardless of the response values for undervoltage. The above diagram shows the timing interval for undervoltage or asymmetry.

t: Adjustable OFF delay 0.1 to 20 s

The undervoltage relay switches at a phase asymmetry of 6 to 8 %, regardless of the response values for undervoltage. The above diagram shows the timing interval for undervoltage.

*** You can order this quantity or a multiple thereof.**

Dimensional drawings

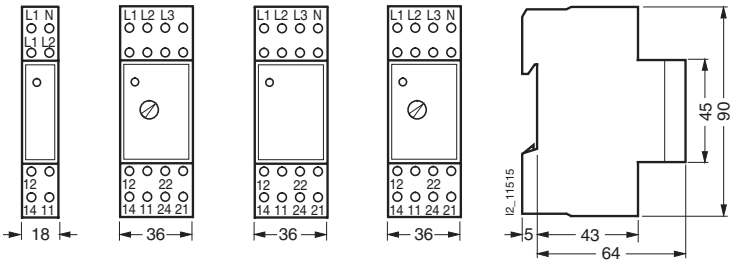
5TT3 1 and 5TT3 4 voltage relays

5TT3 400
5TT3 401

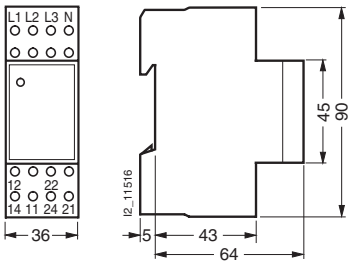
5TT3 402
5TT3 403

5TT3 404
5TT3 405
5TT3 407
5TT3 408

5TT3 194
5TT3 195
5TT3 406



5TT3 410 N-conductor monitor



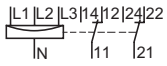
Schematics

Circuit diagrams

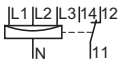
5TT3 194
5TT3 195

5TT3 402
5TT3 403
5TT3 404
5TT3 405

5TT3 406
5TT3 407
5TT3 408
5TT3 410

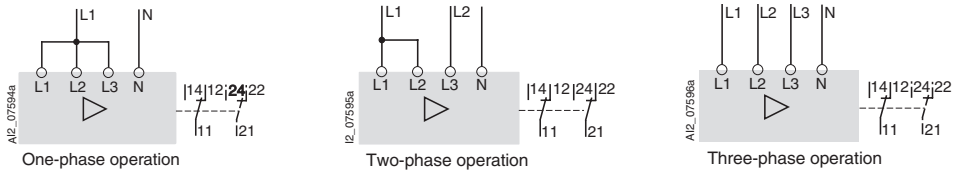


5TT3 400
5TT3 401



Switching example: 5TT3 195, 5TT3 40 voltage relays

1, 2, 3-phase operation against N

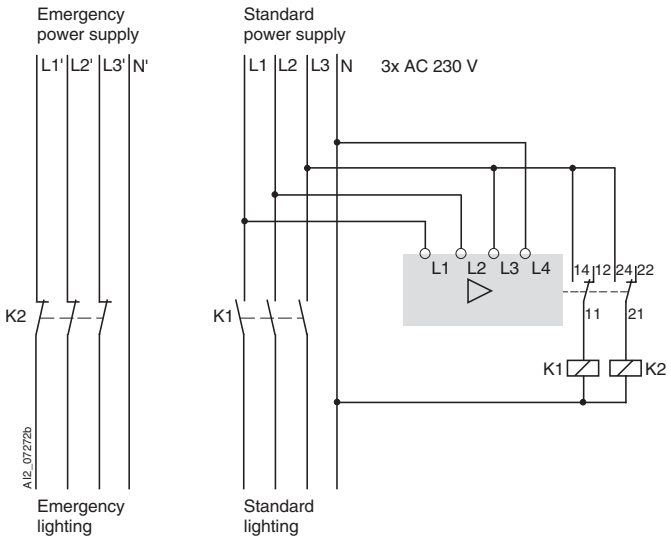


11

5TT3 1 and 5TT3 4 voltage relays

Schematics

Switching example:
5TT3 401, 5TT3 403, 5TT3 405 undervoltage relays

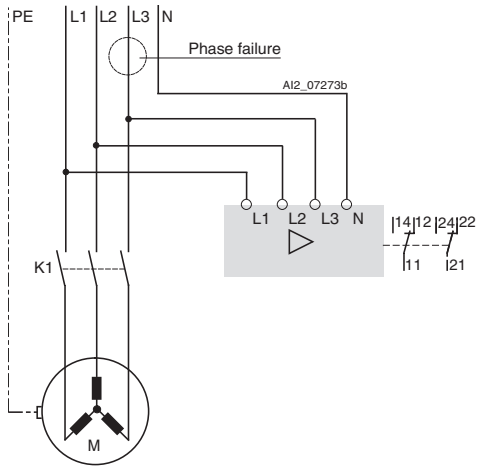


Application of the undervoltage relay is in accordance with DIN VDE 0108, which stipulates switching to a supply system for safety service after a fault. Buildings are distinguished according to use, such as business premises, exhibition areas or guest houses. These are all covered generically as rooms/buildings where "people meet/gather".

There is a fault if the voltage of the general power supply drops for 0.5 seconds >15 % in relation to the rated voltage (i.e. 195 V at 230 V).

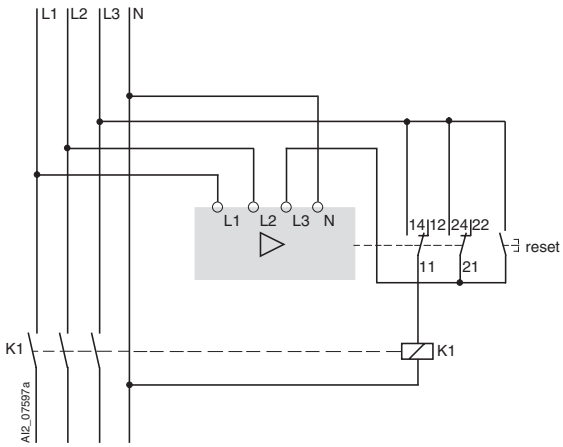
In this case, depending on the type of use of the building, the lighting must be switched to a safety power supply after 0.5 to 15 s. A safety power supply may be: battery system, generating set or a quick-starting standby generating set.

Switching example:
5TT3 404, 5TT3 405, 5TT3 406, 5TT3 408 voltage relays



These voltage relays can only be used for 3-phase operation. They monitor not only under and overvoltages in accordance with their description, but also reverse voltage, asymmetry and N-conductor breaks.

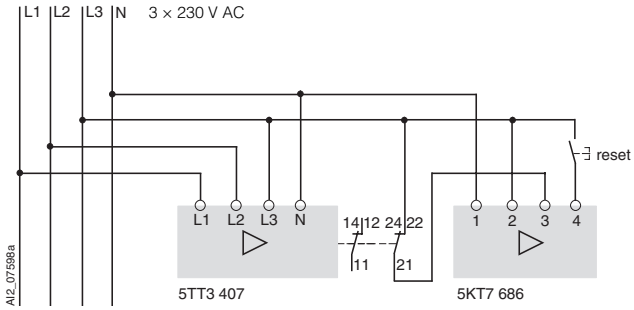
Switching example:
5TT3 407 short-time voltage relay



In the case of sensitive technical sequences, it is often not possible to tell whether this interrupt has interfered with the process sequence. The switch disconnects the power supply, which can then be switched back on using the reset pushbutton.

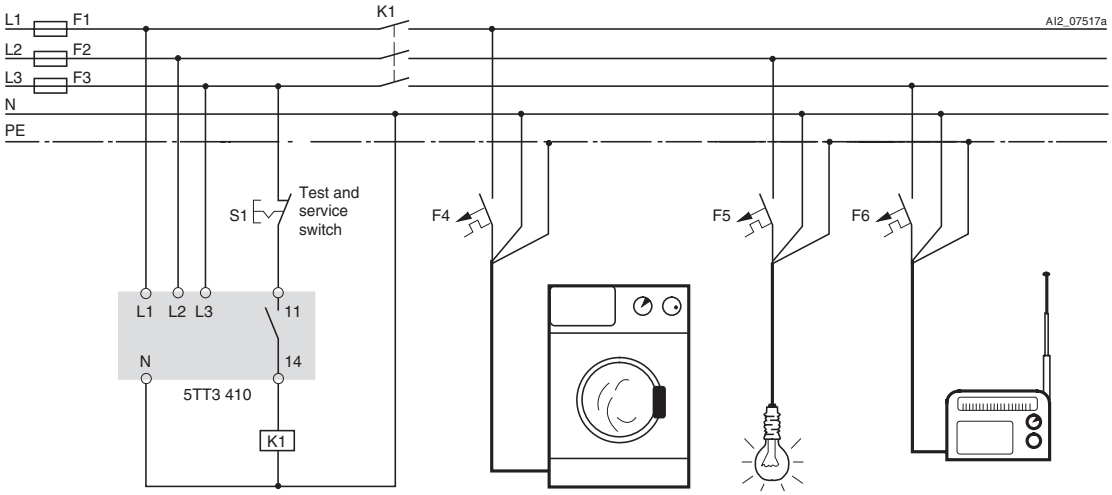
Schematics

Switching example: 5TT3 407 short-time voltage relay



In simple cases, it may be sufficient that a short-time interrupt is registered without the need to disconnect the power supply. In the case of a short-time interrupt, this is counted by the pulse counter. The pulse counter can be reset if required.

Switching example: 5TT3 410 N-conductor monitor



5TT6 1 current relays

Overview

Direct measurement, transformer measurement

All current relays can be connected with direct measurement or through transformers.

N potential

Versions 5TT6 113 to 5TT6 120 can be connected with separate N potential.

Response time

Current relays are not circuit-protection devices for lines. They switch with a delay in the ms range.

Overload capability

Independent of the set measuring range and set measured value, current relays can be permanently overloaded up to 15 A and 20 A; for 3 s; even up to 20 A and 30 A.

Device overview		5TT6 111	5TT6 112	5TT6 113	5TT6 114	5TT6 115	5TT6 120
Undercurrent		•	–	•	–	•	•
Overcurrent		–	•	–	•	•	•
1-phase		•	•	•	•	•	–
3-phase		–	–	–	–	–	•
Separate N potential		–	–	•	•	•	•
Measuring ranges:							
	0.1 ... 1 A	–	–	•	•	•	–
	0.5 ... 5 A	–	–	•	•	•	•
	1 ... 10 A	•	•	•	•	•	–
	1.5 ... 15 A	–	–	•	•	•	–
Contact	1 CO contact	•	•	–	–	–	–
	2 COs	–	–	•	•	•	•

Application

Current relays provide 1 and 3-phase monitoring of the over/under-current in an AC system. They are used to monitor lighting and motors.

Buildings/object-safe guiding lights

In the approach corridors of planes, high buildings must be fitted with position lighting. The same planning instructions apply to the monitoring of this type of lighting and runway lighting as the monitoring of emergency lighting.

Monitoring of emergency lighting with incandescent lamps

The function of emergency lighting acc. to DIN VDE 0108 must be checked at regular intervals. The operating current is continuously monitored using current relays. It is irrelevant whether this lighting is integrated in the general lighting system or just supplied on demand with emergency current.
The current relays is set so that it switches on at the max. lamp current. If an incandescent lamp fails, a fault is signaled.

Monitoring of motors

If the warning is sent early enough, the fault can be eliminated before the motor starts to overheat and the circuit-breaker switches the motor off.

Current relays reliably safeguard the monitoring of fault-free running motors and, in some cases are more suitable than a voltage relay, which is geared more towards motor protection.

Example: screw conveyor

Hard objects in screw conveyors, e.g. in sewage treatment plants, often lead to the conveyor system becoming blocked up. Appropriately set, the current relay signals over its contact(s) that a hazardous situation has occurred and threatens to block the motor.

Example: stirrer

As with the conveyor processes, changes to the viscosity can lead to an overload of the motors.

Example: crane motor control system

The current monitoring of the main motor (hoisting motor) ensures that the electrical holding brake is not released until the main motor is in operation and the load is held.

Example: dust extraction

In the interests of work safety and to protect against massive dust development, it is essential to ensured that the dust extraction system is working perfectly before a saw or sanding machine is switched on.

Function

Planning the monitoring of an incandescent lamp

Current relays have a hysteresis of approx. 4 %. The smallest lamp must not exceed the set measuring range by more than 8 %.

Example: 12 lamps à 100 W = 1200 W, which corresponds to a current of approx. 5.2 A. If a lamp fails, the current drops by 0.4 A. This 0.4 A corresponds to 8 % of the set measured value 5.2 A.

Response time

The response time of the fault signal is produced by the "Adjustable switching delay" (see relevant Technical specifications in Catalog ET B1) and an additional delay, which is determined from the actual current and the set value.

F	Pick-up ms	Dropout ms
1	10	250
2	70	70
5	120	30
10	180	15
20	220	10
30	240	12

$$F = \frac{I_{act}}{I_{meas}}$$

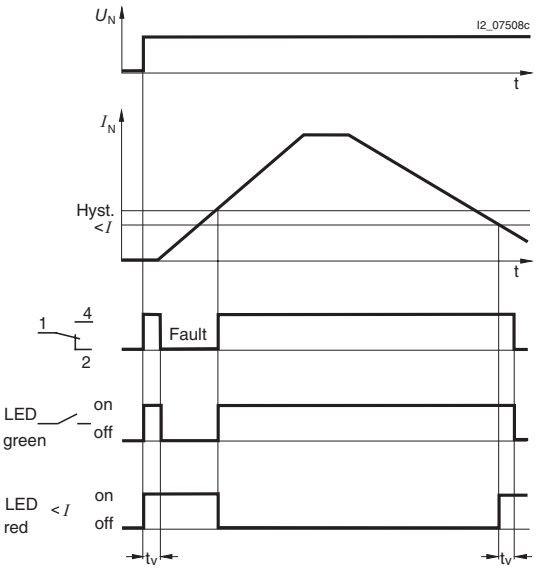
I_{act}: Actual current

I_{meas}: Set current threshold value to be measured

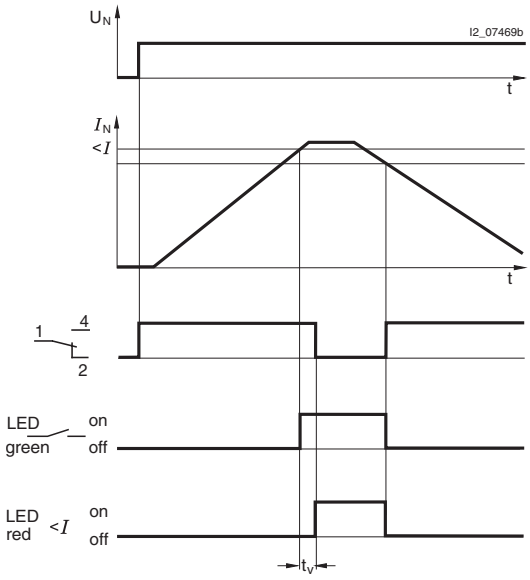
Pick-up: With an overcurrent relay, the contact 11-14 (21-24) to the fault signal closes when the actual current flowing is higher than the switching threshold. The relay picks up.

Dropout: With an undercurrent relay, the contact 11-12 (21-22) to the fault signal closes when the actual current flowing is lower than the switching threshold. The relay drops out.

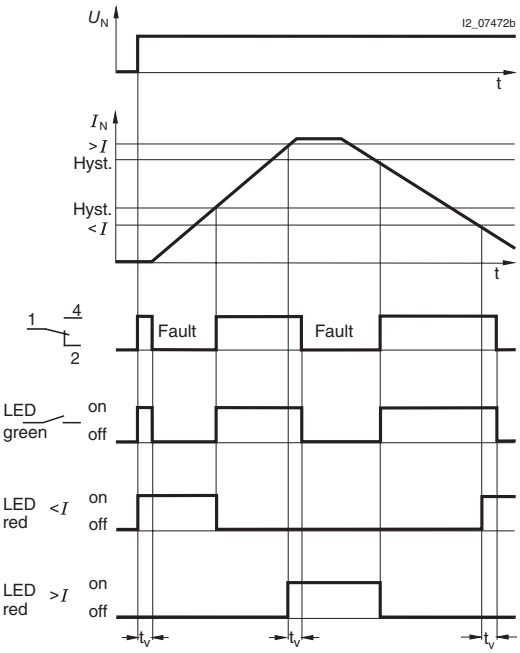
Function chart for 5TT6 1 undercurrent relay signal



5TT6 1 overcurrent relay signal



Function chart for 5TT6 115 under/overcurrent relay signal



Contrary to all other current relays, a fault signal is always output over the contact 11-14 (21-24). The red LEDs indicate whether the signal is for an undercurrent or an overcurrent.

5TT6 1 current relays

Technical specifications

Data acc. to DIN VDE 0435-303, IEC 60255			5TT6 111	5TT6 112
Rated control current I_c		A	1 ... 10	
Rated control voltage U_c		V AC	230	
Operating range U_c **Overload capability, continuous** **Overload capability, short-time**	 at 50 °C ambient-temperature max. 3 s	V A A	0.9 ... 1.1 15 20	
Rated frequency		Hz	50/60	
Response values × I_c	switching on infinitely variable, switching off non-adjustable		0.1 ... 1 4 % hysteresis	
Switching delay t_v	infinitely adjustable	s	0.1 ... 20	
Response time	non-adjustable	ms	1)	
Minimum contact load		V/mA	10/100	
Rated insulation voltage U_i	between coil/contact	kV	2.5	
Contact	μ-contact (AC-15) NO NC	 A A	 3 1	
Electrical isolation	creepage and clearances actuator/contact	mm	3	
Rated impulse withstand voltage U_{imp}	actuator/contact	kV	> 4	
Terminals	+/- screw (Pozidrive)		1	
Conductor cross-sections	rigid flexible with sleeve	max. mm^2 min. mm^2	2 × 2.5 1 × 0.5	
Permissible ambient temperature		°C	-20 ... +60	
Resistance to climate	acc. to DIN EN 60068-1		20/60/4	

Data acc. to DIN VDE 0435-303, IEC 60255			5TT6 113	5TT6 114	5TT6 115	5TT6 120
Rated control current I_c		 A A A A	4 ranges 0.1 ... 1 0.5 ... 5 1 ... 10 1.5 ... 15			1 area 0.5 ... 5
Rated control voltage U_c		V AC	230			
Operating range U_c **Overload capability, continuous** **Overload capability independent of Measuring range**	 at 50 °C ambient-temperature max. 3 s	V A A	0.9 ... 1.1 20 30			15
Rated frequency		Hz	50/60			
Response values × I_c	switching on infinitely variable, switching off non-adjustable		1 ... 10 4 % hysteresis			
Switching delay t_v	infinitely adjustable	s	0.1 ... 20			
Response time	non-adjustable	ms	see page 11/31			
Minimum contact load		V/mA	10/100			
Rated insulation voltage U_i	between coil/contact	kV	2.5			
Contact	μ-contact (AC-15) NO NC	 A A	 5 1			
Electrical isolation	creepage distances and clearances actuator/contact	mm	3			
Rated impulse withstand voltage U_{imp}	actuator/contact	kV	> 4			
Terminals	+/- screw (Pozidrive)		1			
Conductor cross-sections	rigid flexible with sleeve	max. mm^2 min. mm^2	2 × 2.5 1 × 0.5			
Permissible ambient temperature		°C	-20 ... +60			
Resistance to climate	acc. to DIN EN 60068-1		20/60/4			

1) Current corresponds to the rating of the continuous-flow heater.

Selection and ordering data

		U_e	I_e	Measuring range	MW	Order No.	Weight 1 item	PS*/ P. unit
		V AC	A	A AC			kg	Items
 5TT6 111	**Current relay with transparent cap for single-phase loads up to 230 V AC, auxiliary voltage and measuring circuit, not isolated**							
	undervoltage monitoring, single-phase							
	1 CO contact	230	5	1 ... 10	1	**5TT6 111**	0.065	1
	overvoltage monitoring, single-phase							
	1 CO contact	230	5	1 ... 10	1	**5TT6 112**	0.065	1
 5TT6 113	**Current relay with transparent cap for single-phase loads up to 230 V AC, auxiliary voltage and measuring circuit, isolated**							
	undervoltage monitoring, single-phase							
	2 COs	230	5	4 ranges 0.1 ... 1 0.5 ... 5 1 ... 10 1.5 ... 15	2	**5TT6 113**	0.122	1
	overvoltage monitoring, single-phase							
	2 COs	230	5	4 ranges 0.1 ... 1 0.5 ... 5 1 ... 10 1.5 ... 15	2	**5TT6 114**	0.122	1
 5TT6 115	over/undervoltage monitoring, single-phase							
	2 COs	230	5	4 ranges 0.1 ... 1 0.5 ... 5 1 ... 10 1.5 ... 15	2	**5TT6 115**	0.122	1
	**Current relay, mounting depth 55 mm, for 3-phase loads for 3 × 400 V AC, separate signal with N-wire connection**							
	over/undervoltage monitoring, 3-phase							
	2 changeovers each for overcurrent/undercurrent respectively	230	5	0.5 ... 5	4	**5TT6 120**	0.220	1

11

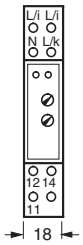
* You can order this quantity or a multiple thereof.

5TT6 1 current relays

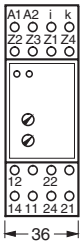
Dimensional drawings

5TT6 11 current relays

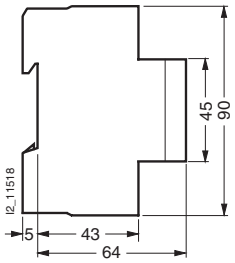
5TT6 111
5TT6 112



5TT6 113
5TT6 114

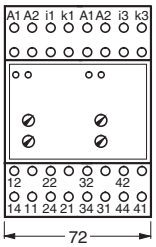


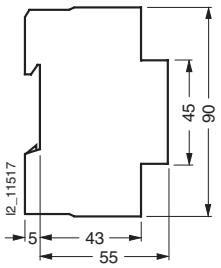
5TT6 115



5TT6 120 current relay

5TT6 120

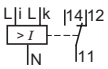




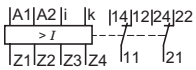
Schematics

Circuit diagrams

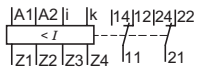
5TT6 111
5TT6 112



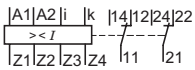
5TT6 113



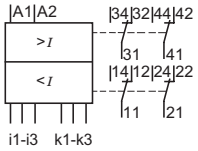
5TT6 114



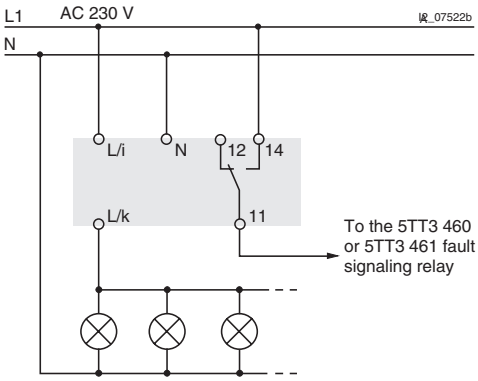
5TT6 115



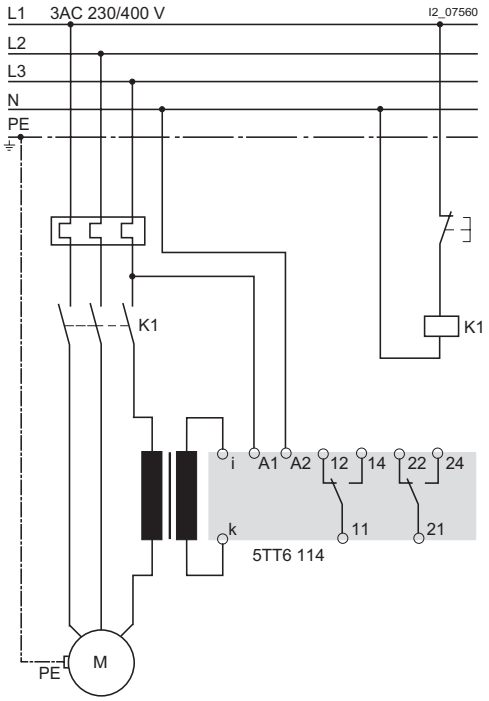
5TT6 120



Switching example: 5TT6 111 undercurrent relay

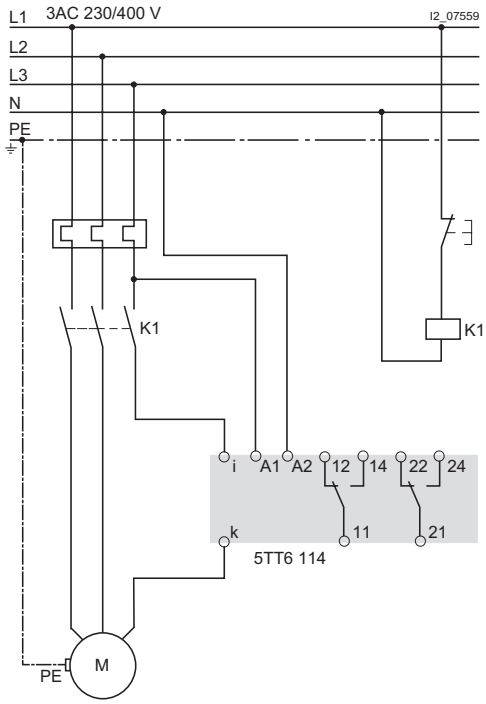


Switching example: 5TT6 114 with transformer measurement for overcurrent measurement

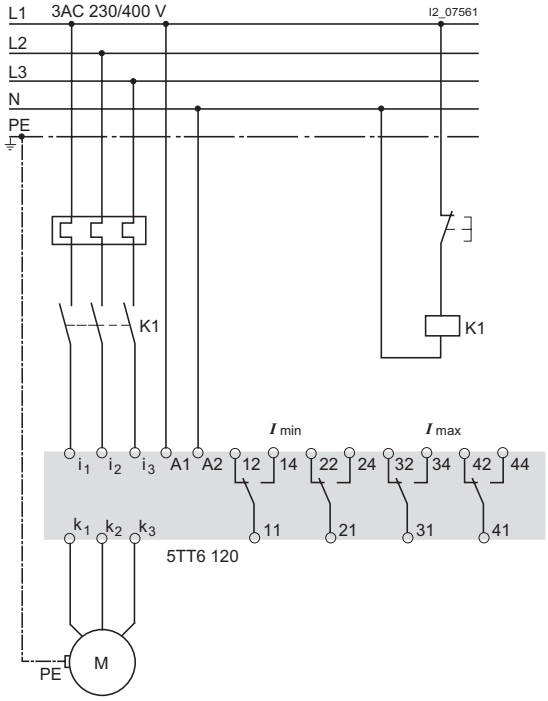


Schematics

Switching example: 5TT6 114 with direct measurement up to 15 A for overcurrent measurement



Switching example: 5TT6 120 with direct measurement up to 5 A for undercurrent/overcurrent measurement



11

5TT6 10 priority switches

Overview

- Control circuit terminals, sealable
- Reduction of the connection fee, which depends on the maximum load to be supplied (BTO, German Federal Regulation on Tariffs § 6 Section 4), when used in systems with continuous-flow heaters and electric storage heaters where the continuous-flow heaters are switched with priority.

Application

In mixed operation of electric hot water and electric storage heaters, the priority switch interrupts the charging procedure of the storage heater if hot water is required during the low-tariff time, thus limiting the connected load.

Technical specifications

Data acc. to EN 60669 (VDE 0632), BTO § 6 Section 4			5TT6 101	5TT6 102	5TT6 103
Rated control current I_c		A	40 [1]	54 [1]	6 ... 40 [1]
Rated frequency		Hz	50		
Response current		A	13 [2]	23 [2]	6
Rated operational capacity	for continuous-flow heaters up to 230 V AC to 3 × 230 V AC	 kW kW	 9 27	 12 36	 1.5 ... 9 4.5 ... 27
Rated impulse withstand voltage U_{imp}		kV	> 2.5		
Rated operational voltage U_e		V AC	250		
Rated operational current I_e	at U_e = 230 V AC	A	1		
Terminals	+/- screw (Pozidrive)		1		
Conductor cross-sections	coil, for conductor cross-sections up to contact, for conductor cross-sections up to	 mm^2 mm^2	 10 2 × 2.5		
Permissible ambient temperature		°C	-20 ... +40		
Resistance to climate	acc. to DIN 50016		FW 24		

1) Current corresponds to the rating of the continuous-flow heater.

2) Continuous rise not permissible.

Selection and ordering data

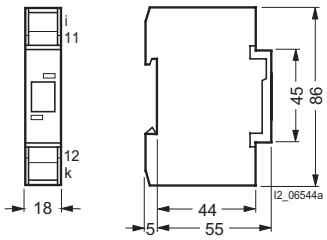
	U_e	I_e	Op. current	Cont. current	MW	Order No.		Weight 1 item	PS*/ P. unit
	V AC	A	A	A				kg	Items
Priority switches, mounting depth 55 mm									
for continuous-flow heaters up to 27 kW									
	230	40	13	40	1	**5TT6 101**		0.100	1
for continuous-flow heaters up to 33 kW									
	230	54	23	54	1	**5TT6 102**		0.100	1
for electronically controlled continuous-flow heaters up to 27 kW									
	230	40	6 ... 40	40	1	**5TT6 103**		0.100	1

5TT6 101

Dimensional drawings

5TT6 10 priority switches

5TT6 101, 5TT6 102, 5TT6 103
with terminal cover



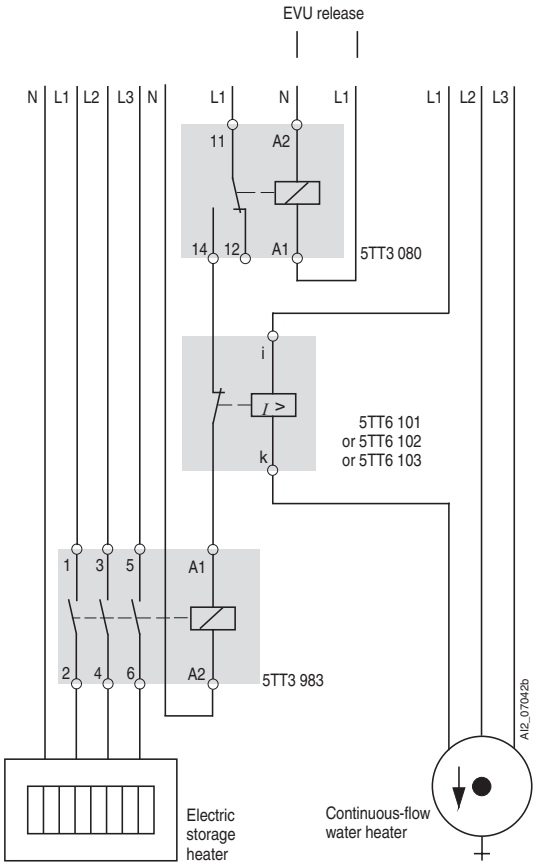
* You can order this quantity or a multiple thereof.

Schematics

Circuit diagrams

5TT6 101
5TT6 102
5TT6 103

Switching example 5TT6 10



In mixed operation of electric hot water and electric storage heaters, the priority switch interrupts the charging procedure of the storage heater if hot water is required during the low-tariff time, thus limiting the connected load.

5TT3 47 insulation monitors for industrial applications

Overview

Version for AC voltage:

- For AC voltage systems from 0 to 500 V AC and 10 to 1000 Hz
- Adjustable alarm value 2 to 100 kΩ
- Electrical insulation of measuring circuit, power supply and contact voltage
- Also supports monitoring in current-free systems

Version for direct voltage:

- For direct voltage systems from 12 to 280 V DC
- Adjustable alarm value 2 to 200 kΩ
- Selective insulation-fault detection according to L+ and L-.
- Electrical insulation of measuring circuit contact voltage

Both versions:

- Closed-circuit principle
- Adjustable fault storage and hysteresis
- LED display for operation and insulation faults
- With canceling and test button

Application

We recommend using insulation monitors in all non-grounded systems according to regulations:

- VDE 0100 Erection of power installations up to 1000 V
- VDE 0105 Operation of power installations up to 1000 V
- VDE 0113 Working and processing machines
- VDE 0118 Underground mining
- VDE 0168 Open-pit mining, quarries and others

Function

If the insulation resistance of the system falls below the value set at the device, the output relay drops out. If the insulation resistance improves after a while, the relay picks up again after a hysteresis. Alternatively the response can be stored through wiring. The reset is then implemented by pressing a pushbutton or by briefly disconnecting the device.
Actuating the test button "Test" simulates an insulation fault so that the functionality of the device can be tested.

Technical specifications

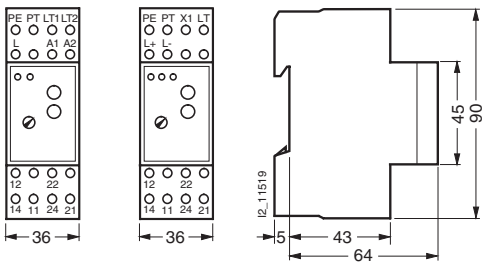
			5TT3 470	5TT3 471
Rated control voltage U_c		V AC V DC	220 ... 240 –	– 12 ... 280
Operating range × U_c	for AC supply for DC supply		0.8 ... 1.1 –	– 0.9 ... 1.25
Frequency range for U_c		Hz	45 ... 400	–
Rated power dissipation P_v	for AC supply for DC supply	approx. VA approx. W	2 –	– 1
Rated impulse withstand voltage U_{imp}	terminal A1 to A2 terminal L to PE terminals A1, A2 to L, PE terminals against contacts	kV kV kV kV	< 4 < 4 < 4 < 6	< 4 < 4 < 3 < 6
Measuring circuit			for AC systems	for direct voltage systems
Measurement voltage range U_{meas}		V AC V DC	0 ... 500 –	– 12 ... 280
Operating range × U_{meas}			0 ... 1.1	0.9 ... 1.1
Frequency range for U_{meas}		Hz	10 ... 1000	–
Alarm value	measuring shunt R_{AL}	kΩ	5 ... 10	5 ... 200
Setting of alarm value	on absolute scale		infinitely variable	infinitely variable
Alternating current internal resistance	internal testing resistor	kΩ	> 250	–
Direct current internal resistance	internal testing resistor L+ and L- acc. to PE	kΩ kΩ	> 250 –	– each 75
Measurement voltage	internal	approx. V DC	15	–
Max. measurement current	short circuit	mA	< 0.1	0.2 ... 4 depending on the voltage
Direct interference voltage	max. permissible	V DC	500	–
Response delay	at R_{AL} 50 kΩ and 1 µF and ∞ to 0.9 x R_{meas} and R_{meas} from ∞ to 0 Ω	 s s	 < 1.3 < 0.7	 0.8 0.4
Switching hysteresis	at R_{meas} 50 kΩ	%	15	10 ... 15
Contact	µ-contact		2 COs	2 COs
Rated operational voltage U_e		V AC	250	250
Rated operating current I_s	Thermal current I_{th} AC 13 at 24 V DC AC 13 at 250 V DC AC 15 AC 15 NO contact AC 15 NC contact	A A A A A A	4 – – – 5 2	 3 0.2 3 – –
Terminals	+/- screw (Pozidrive)		2	2
Conductor cross-sections	rigid flexible with sleeve	max. mm^2 min. mm^2	2 × 2.5 1 x 0.50	
Permissible ambient temperature		°C	-20 ... +60	
Degree of protection	EN 60529	°C	IP20	
Resistance to climate	acc. to EN 60068-1		20 / 060 / 04	

Selection and ordering data

		U_c	U_e	Measuring range	MW	Order No.	Weight 1 item	PS*/ P. unit
		V AC	V	k			kg	Items
 5TT3 470	**insulation monitor with transparent cap**							
	for monitoring the insulation resistance in ungrounded AC and three-phase systems, from 10 ... 1000 Hz							
	contacts, 2 changeovers	250	0 ... 500 V AC	5 ... 100	2	**5TT3 470**	0.160	1
	for monitoring the insulation resistance in non-grounded DC systems							
	contacts, 2 changeovers	250	12 ... 280 V DC	5 ... 200	2	**5TT3 471**	0.170	1

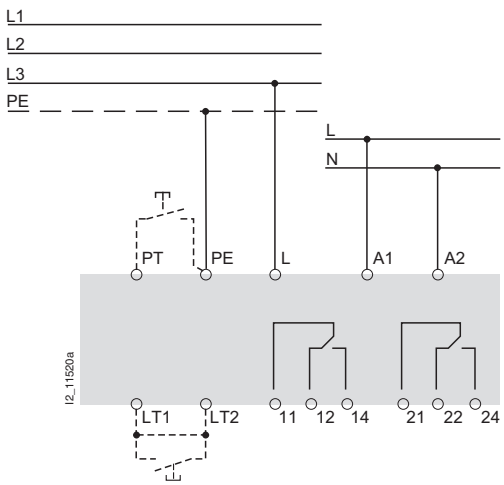
Dimensional drawings

5TT3 470 5TT3 471



Schematics

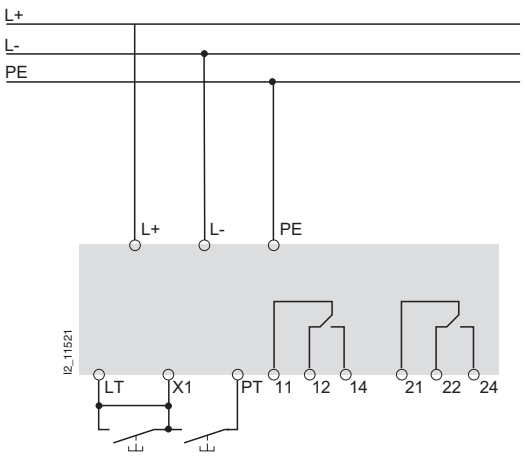
5TT3 470 for AC systems



Switching example for monitoring a non-grounded system of 3 AC 0 ... 500 V with a frequency of 10 ... 1000 Hz.

The actuating voltage of terminals A1 - A2 can be taken from the system being monitored. However, in this case it is important to comply with the voltage range according to the technical specifications.
With a jumper LT1 - LT2: A fault signal is not stored; the device is automatically released again if the insulation resistance improves.
Without a jumper LT1 - LT2: The error message is stored;
Pressing the pushbutton terminals LT1 - LT2 clears the fault signal.
Pressing the pushbutton terminals PT - PE simulates a fault.

5TT3 471 for direct voltage systems



Switching example for monitoring a non-grounded direct voltage system 12 ... 280 V DC.

The actuating voltage for the terminals L+ and L- is also the measurement voltage.

With a jumper LT - X1: A fault signal is not stored; the device is automatically released again if the insulation resistance improves.
Without a jumper LT - X1: The error message is stored;
Pressing the pushbutton terminals LT - X1 clears the fault signal.
Pressing the pushbutton terminals PT - X1 simulates a fault.

11

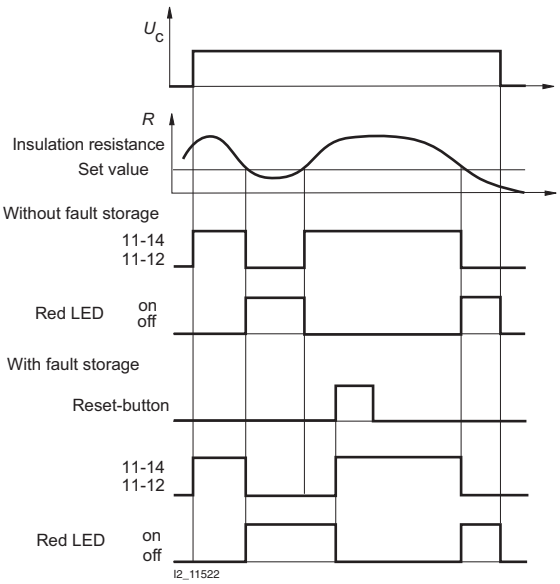
* You can order this quantity or a multiple thereof.

5TT3 47 insulation monitors for industrial applications

Further information

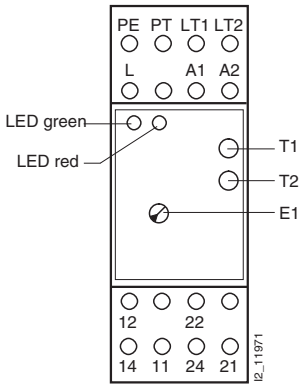
Function chart

5TT3 470, 5TT3 471



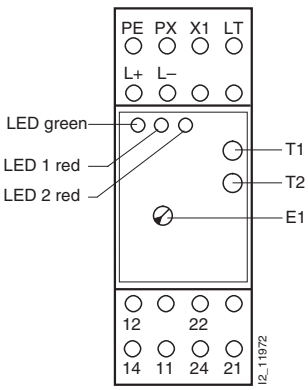
Front views

5TT3 470



LED green: status display (ON)
LED red: insulation fault (AL)
E1: alarm value adjuster (RAL)
T1: Test
T2: Reset

5TT3 471



LED grün: status display (ON)
LED 1 rot: insulation fault L– (RE–)
LED 2 rot: insulation fault L+ (RE+)
E1: alarm value adjuster (RAL)
T1: Test
T2: Reset

5TT3 470 for AC systems

While direct interference voltages do not damage the devices they often interfere with conditions in the measuring circuit. In a system being monitored, only one line insulation monitor should be connected. This must be taken into account if gateways are used.

System capacitances against the protective ground do not corrupt the insulation measurement as these are implemented with direct current. However, it may extend the response time in the event of an insulation fault, primarily in the case of the time constant RE times CE. The auxiliary power of the line insulation monitor can be taken from a separate system or from the one being monitored. In this case the voltage range of the auxiliary power input must be taken into account.

LEDs:

- Green LED lights up if actuating voltage U_c is applied.
- Red LED lights up in the event of an insulation fault.

5TT4 71 for direct voltage systems

The line insulation monitor can be installed in systems with higher leakage capacitance against PE. In the case of high-resistance alarm values, a transient alarm signal may occur when switching on the system being monitored due to an existing ground leakage capacitance .
For the following set values for R, these values for the CE capacitance are approx.:
R = 200 kΩ: CE > 0.8 µF
R = 50 kΩ: CE > 2.0 µF
R = 20 kΩ: CE > 4.5 µF
In these applications, you should work without an alarm storage.

Due to the measuring function with bridge circuit, the line insulation monitor does not respond in the event of a simultaneous, exactly symmetric ground fault of L+ and L-. However, exactly symmetric ground faults are highly unlikely in practice.

LEDs:

- Green LED lights up if actuating voltage U_c is applied
- Red LED 1 lights up for insulation fault L+ against PE
- Red LED 2 lights up for insulation fault L- against PE

5TT3 472 p.f. monitor

Overview

- For AC and three-phase loads, such as motors
- Adjustable power factor response value from 0 to 0.97
- Current range up to 8 A
- For motors up to approx. 5 A, phase-sequence independent
- Suitable for transformer connection
- LED display for operation and alarm
- Automatic resetting of alarm

Application

Monitoring of asynchronous motors for underload and no-load operation, e.g. for fan monitoring in the case of V-belt breakage, for monitoring filters in the event of filter blockages, for pump monitoring in the event of valve closure or dry runs, or for general power factor monitoring.

Function

The p.f. controller monitors the phase displacement between current and voltage. Because the phase displacement angle changes with the load of the motor, this measurement method is ideal for the monitoring of asynchronous motors for underloading and no-load operation, independent of size. However, in some cases, the p.f. barely changes if the load of the motor changes, e.g. in the case of relatively minor load changes on large-scale motors or single-phase split-pole motors or collector motors.

If the p.f. value set at the p.f. controller is fallen below for the duration of the set response delay, the output relay switches to the alarm state and the red LED lights up. If it exceeds the p.f. value, the output relay switches back without any significant delay.

Technical specifications

			5TT3 472
Rated control voltage U_c		3 V AC	400
Operating range × U_c	for AC supply		0.8 ... 1.1
Frequency range		Hz	45 ... 65
Rated power dissipation P_v		approx. VA	11
Rated impulse withstand voltage U_{imp}	against contacts	kV	< 4
Current measuring circuit			for AC systems
Current measuring range I_{meas}		A AC	0.4 ... 8
Short-time overload capability	for 2 s for 0.5 s	A A	20 40
Current transformer, Class 3 or better	secondary current	A	1 or 5
Setting range	adjustable	p.f.	0 ... 0.97
Response delay	adjustable	s	1 ... 100
Contact	µ-contact		1 CO contact
Rated operational voltage U_e		V AC	250
Rated operational current I_e	thermal current AC 15 NO contact AC 15 NC contact AC 13 at 24 V DC	A A A A	4 3 1 1
Short-circuit strength	fuse 4 A gL	A	4
Minimum contact load		V/mA	10/100
Terminals	+/- screw (Pozidrive)		2
Conductor cross sections	rigid flexible with sleeve	max. mm^2 min. mm^2	2 × 2.5 1 × 0.5
Permissible ambient temperature		°C	-20 ... +60
Degree of protection	acc. to EN 60529		IP20
Resistance to climate	acc. to EN 60068-1		20/060/04

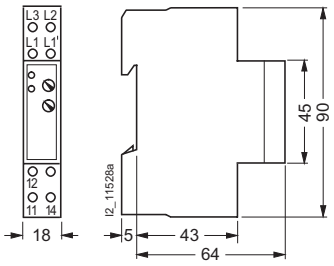
Selection and ordering data

	I_e	U_c	Measuring range	MW	Order No.	Weight 1 item	PS*/ P.unit
	A	V AC	A AC			kg	Items
P.f. monitor with transparent cap for monitoring the underloading of motors up to approx. 5 A AC through power factor measurement, power factor setting range from 0 to 0.97 with transparent cap							
Contact, 1 changeover	4	3 × 400	0.4 ... 8	1	**5TT3 472**	0.065	1

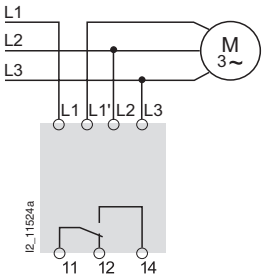
* You can order this quantity or a multiple thereof.

5TT3 472 p.f. monitor

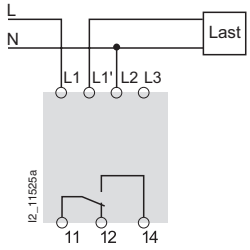
Dimensional drawings



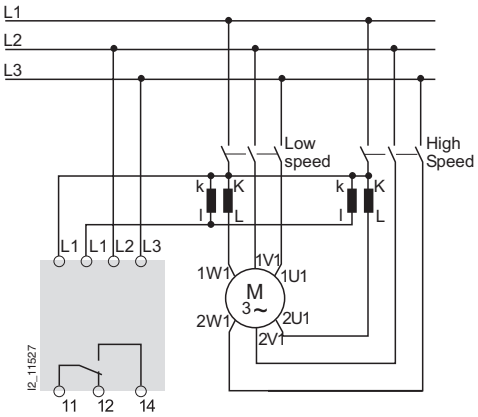
Schematics



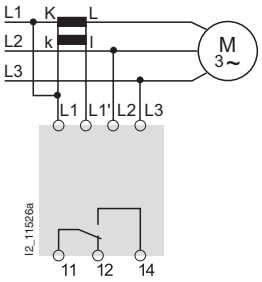
Connection of three-phase load



Connection of single-phase load



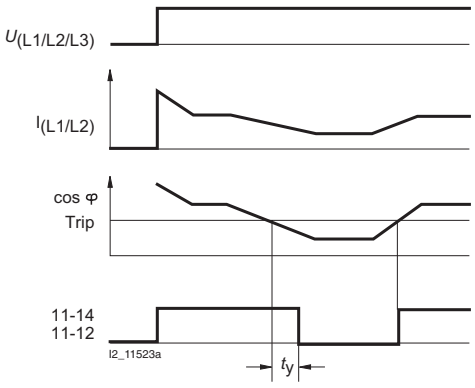
Connection of motors with separate windings



Connection of three-phase load with external current transformer. Whereby the winding sense of the current transformer must be taken into account.

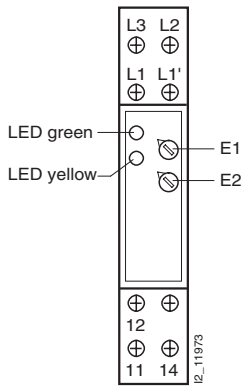
Further information

Function chart



If the p.f. value set at the p.f. controller is fallen below for the duration of the set response delay, the output relay switches to the alarm state. Contact 11-14 closes and the red LED lights up.

Front view



LED 1 green: status display (U)
LED 2 gelb: underloading indicator (cos φ alarm)
E1: response value
E2: response delay t_y

Overview

- 3 electrode connections for 1-step and 2-step level control
- All current products can be used as electrodes
- High immunity to interference of the measuring circuit isolated from the system
- Max. cable length to the electrodes: 1500 m
- Large setting range: 2 to 450 kΩ
  - this enables differentiation between foam and liquid
- Programmable for open-circuit principle (with bridge X2 COM) or closed-circuit principle (without bridge)
- Separately adjustable delay times for $t_{v\,min}$ and $t_{v\,max}$, 0.2 to 2 s

Application

Level monitoring and control of conductive liquids and powders, e.g. maximum and minimum levels, overflow and dry run protection. Monitoring and control of mixture ratio of conductive liquids. General resistance monitoring tasks, e.g. temperature limit detection with PTC.

LED displays:

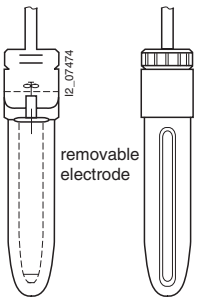
- Green LED: lights up when operational voltage is applied
- Yellow LED: lights up if MIN output relay is activated
- Red LED: lights up if MAX output relay is activated

Technical specifications

Data acc. to DIN VDE 0435-110, IEC 60255			5TT3 435
Rated control voltage U_c		V AC	230
Operating range × U_c			0.8 ... 1.1
Rated frequency		Hz	50/60
Setting range of the liquid level		kΩ	2 ... 450
Switching point hysteresis of set value	at 450 kΩ at 2 kΩ	% %	3 6
Voltage temperature influence	from set value	%	< 2
Max. cable length to the electrodes at 100 µF/km	set value kΩ 450 100 35 10 5	 M M M M M	 50 200 500 1500 3000
Electrode voltage, max.	AC	V	approx. 10
Electrode current, max.	AC	mA	approx. 1.5
Response delay	adjustable	s	0.2 ... 20
Off-delay	adjustable	s	0.2 ... 20
Rated operational voltage U_e		V	250
Rated operational current I_e		A	5
Test voltage	input/auxiliary circuit input/output circuit auxiliary/output circuit	kV kV kV	4 4 4
Terminals	+/- screw (Pozidrive)		2
Conductor cross-sections	rigid flexible with sleeve	max. mm^2 min. mm^2	2 × 2.5 1 × 0.5
Permissible ambient temperature		°C	-20 ... +60
Resistance to climate	acc. to DIN EN 60068-1		20/60/4

5TT3 435 level relays

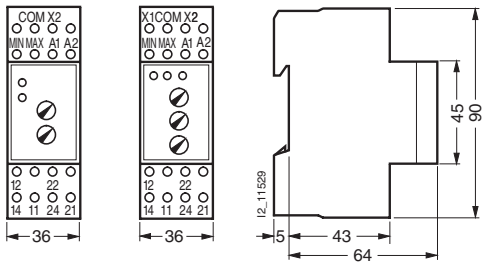
Selection and ordering data

		U_e	I_e	U_c	MW	Order No.	Weight 1 item	PS*/ P. unit
		V AC	A	V AC			kg	Items
	**Level relay with transparent cap**	230	4	230	2	**5TT3 435**	0.162	1
	**Submersible electrodes** • 1-pole, made of stainless steel • Temperature range 0 to +90 °C • suitable for pure water in open containers with terminal connection					**5TG8 223**	0.100	1

Dimensional drawings

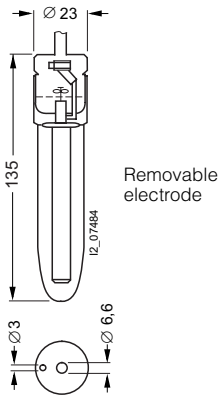
5TT3 43 level relays

5TT3 430 5TT3 435



5TG8 223 submersible electrode

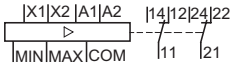
5TG8 223



* You can order this quantity or a multiple thereof.

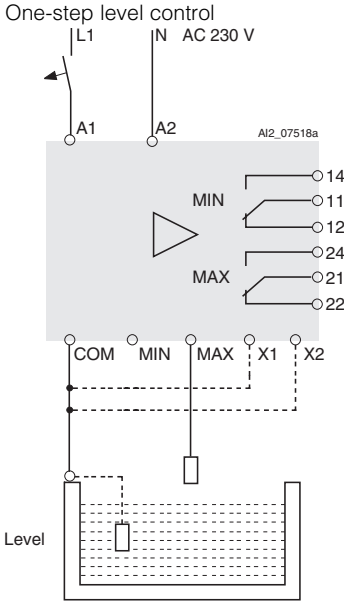
Schematics

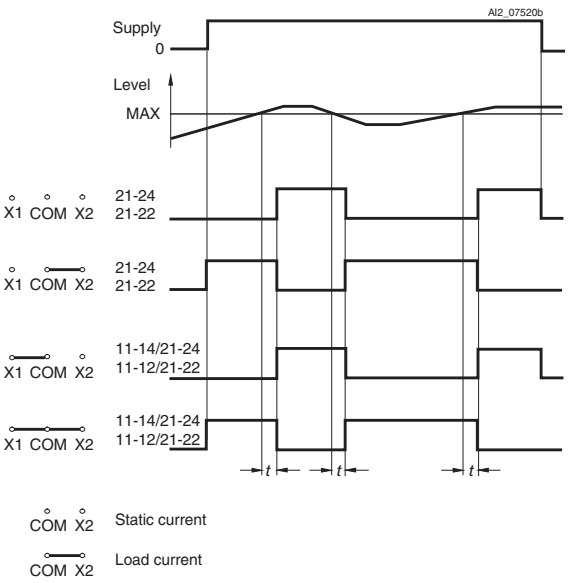
Circuit diagram



Switching example 5TT3 435

One-step level control

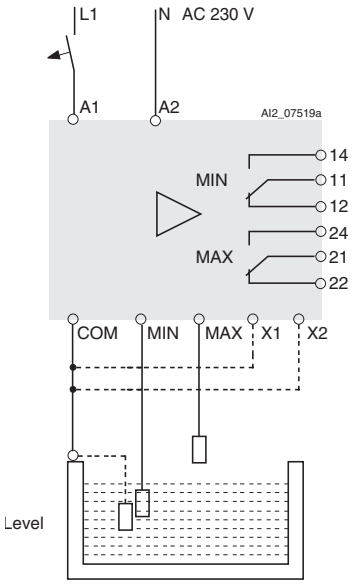


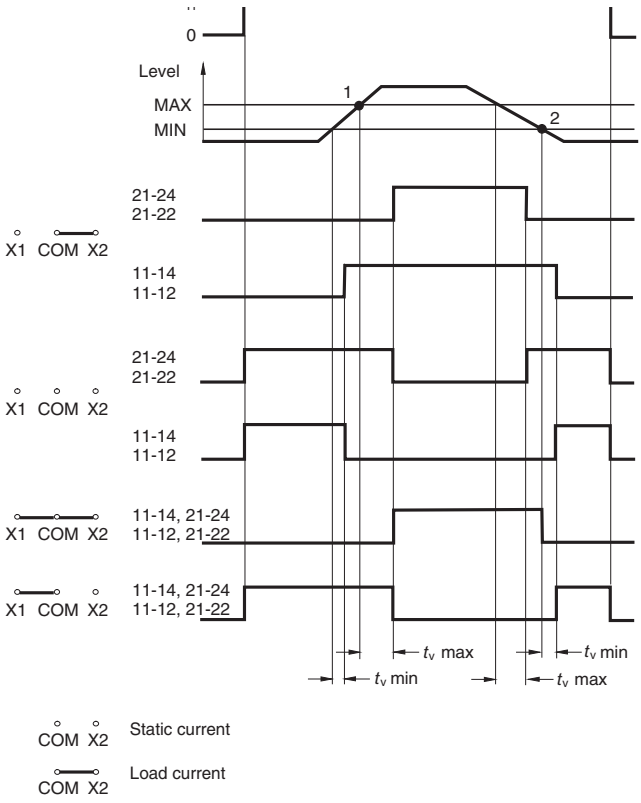


The one-step level control is particularly suitable for dry run or overrun protection with free inflow/outflow.
The COM reference electrode and the MAX electrode are required.
Without the jumper X1-COM only relay 21-22-24 switches.
With the jumper X1-COM both relays switch together.

$t = t_{v\ max}$ adjustable from 0.2 s to 20 s

Two-step level control





The 2-step level control keeps the liquid level between a minimum and a maximum level. Three electrodes are required: MIN, MAX and COM.

Without the jumper X1-COM switching is as follows:

- If the max. level is fallen below/exceeded, only relay 21-22-24 switches.
- If the min. level is fallen below/exceeded, only relay 11-12-14 switches.

With the jumper X1-COM both relays switch together if the max. level is exceed or the min. level is fallen below.

$t_{v\ max}$ and $t_{v\ min}$ adjustable from 0.2 s to 20 s

5TT3 43 thermistor motor protection relays

Overview

- Detects
  - temperature limits being exceeded
  - wire breaks in sensor circuits
- 1 input for 1 to 6 thermistors
- With 2 LEDs green/yellow for ready-to-run and fault
- Response value: 3.2 to 3.8 kΩ
- Release value: 1.5 to 1.8 kΩ
- Max. cable length of sensor supply cable NYM 2 × 1.5 is 100 m
- Remote reset: over A1/A2 (NC contact) or over X1/X2 (NO contact)

Application

For the prevention of thermal motor overloads, e.g. due to high switching frequency, single-phasing, disabled cooling or excessive ambient temperatures.

LED displays:

- green LED: lights up when operational voltage is applied
- red LED: lights up in the event of excess temperatures or an interruption in the sensor circuit

Technical specifications

Data acc. to DIN VDE 0435-110, IEC 60255			**5TT3 431 5TT3 432**
Rated control voltage U_c		V AC	230
Operating range × U_c			0.9 ... 1.1
Rated frequency		Hz	50/60
Response value		kΩ	3.2 ... 3.8
Release value		kΩ	1.5 ... 1.8
Rated operational voltage U_e		V AC	250
Rated operational current I_e		A	5
Minimum contact load		V/mA	10/100
Rated insulation voltage U_i	between coil/contact	kV	4
Contact	μ-contact (AC-11)	A	3
Electrical isolation	creepage and clearances actuator/contact	 mm	 4
Rated impulse withstand voltage U_{imp}	actuator/contact	kV	> 2.5
Terminals	+/- screw (Pozidrive)		1
Conductor cross sections	rigid flexible with sleeve	max. mm^2 min. mm^2	2 × 2.5 1 × 0.5
Permissible ambient temperature		°C	-20 ... +60
Resistance to climate	acc. to DIN EN 60068-1		20/60/4

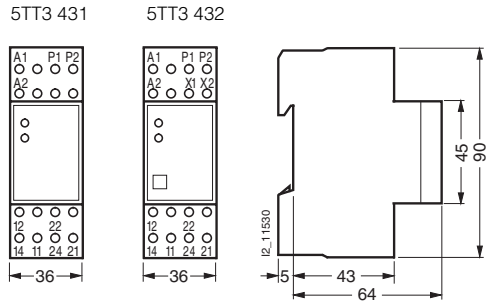
Selection and ordering data

		U_e	I_e	U_c	MW	Order No.	Weight 1 item	PS*/ P. unit
		V AC	A	V AC			kg	Items
 5TT3 431	**Thermistor motor protection relays with transparent cap**							
		230	4	230	2	**5TT3 431**	0.160	1
	with fault storage, reset pushbutton and remote reset	230	4	230	2	**5TT3 432**	0.160	1

*** You can order this quantity or a multiple thereof.**

Dimensional drawings

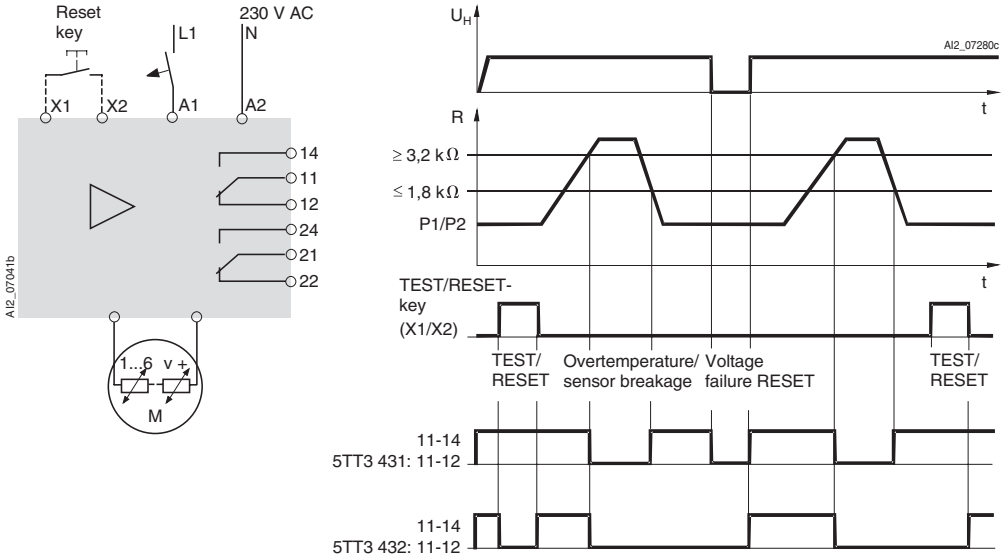
5TT3 43 Thermistor motor protection relays



Schematics

Circuit diagrams

Switching examples 5TT3 431, 5TT3 432



If one of the thermistors (possible for up to 6) reaches the response temperature, the device switches.

5TT3 431 (without terminals X1/X2 and without RESET pushbutton) switches back on after cooling and after the value falls below that permanently set for the hysteresis. To switch on before this time, briefly disconnect the power supply.

5TT3 432 stores the fault and remains switched off until the RESET pushbutton is pressed.

Notes