

Relays

Timer Relays

Monitoring Relays

Motor Protection Relays



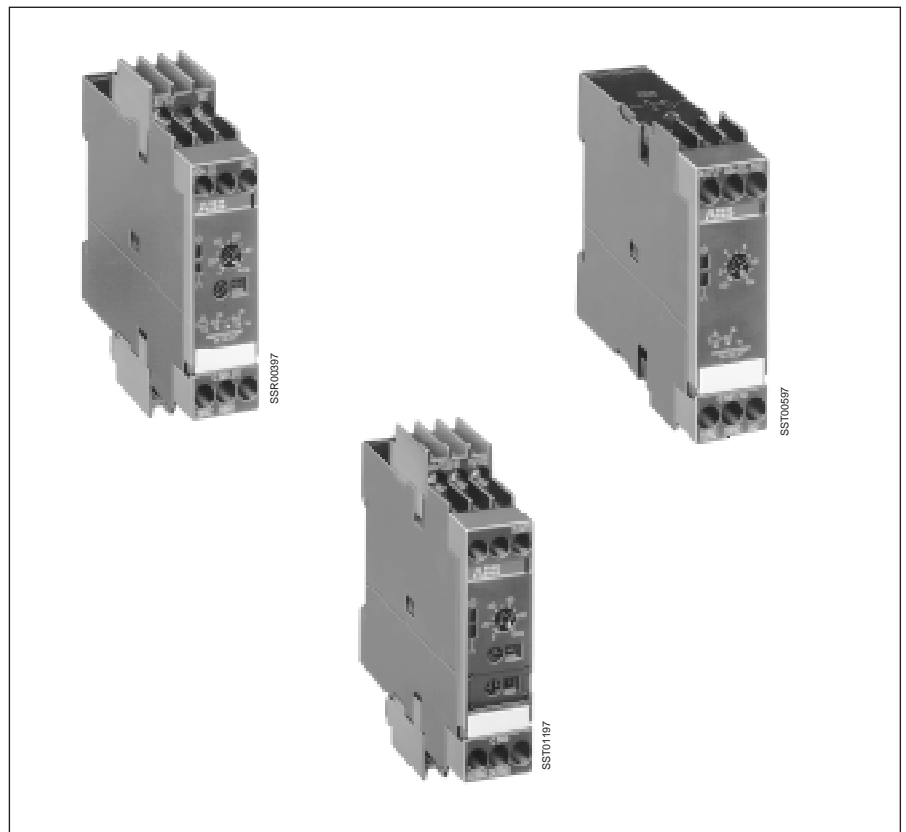
Relays

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Electronic time relays



Standards and regulations

The time relays comply with:

- IEC 721-3-3 "Ambient conditions"
- IEC 1812-1DIN VDE 0435, Part 201
"Electrical relays, Time Relays"
- IEC 1000 "Electromagnetic Compatibility"
- IEC 947-5-1; DIN BDE 0660, Part 200
"Low-Voltage Switchgear Devices"

Scope of application

Time relays are used for all time-delayed switching operations in control, starting, protective and regulating circuits. They guarantee a high repeat accuracy of operating times, once set.

Customer benefits are:

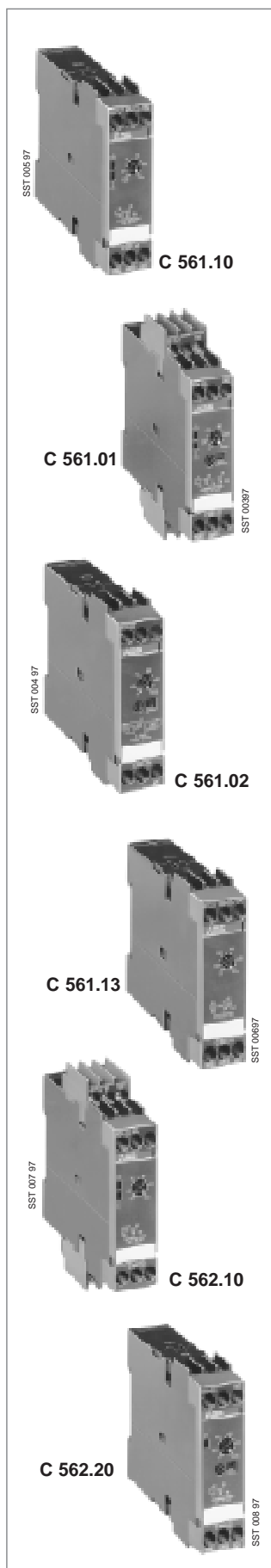
- industrial design
- high accuracy
- high reliability
- easy handling

Housing design

All time relays are suitable for snap-on mounting on 35 mm top-hat rails to DIN EN 50 022 or screw mounting.

Electronic time relays, Series C 56x

Selection, technical data, ordering details



Time range <i>t</i> with rotary switch, can be set to	Rated control supply voltage		Order code	Price	Weight per piece kg	Packing unit piece
	AC 50/60 Hz V	DC V				

C 561.10 time relay, ON-delayed, 1 time range, 1 changeover contact, with 2 LEDs

0.5 - 10 s	24/100 - 127	24	1SAR 310 011 R 0001		0.100	1
	24/200 - 240	24	1SAR 310 011 R 0002		0.100	1
1.5 - 30 s	24/100 - 127	24	1SAR 310 012 R 0001		0.100	1
	24/200 - 240	24	1SAR 310 012 R 0002		0.100	1
5 - 100 s	24/100 - 127	24	1SAR 310 013 R 0001		0.100	1
	24/200 - 240	24	1SAR 310 013 R 0002		0.100	1

C 561.01 time relay, ON-delayed, 15 time ranges, 2 changeover contacts, with 2 LEDs

0.05 - 1 s	24/100 - 127	24	1SAR 310 020 R 0001		0.110	1
	24/200 - 240	24	1SAR 310 020 R 0002		0.110	1
0.15 - 3 s						
0.5 - 10 s						
1.5 - 30 s						
0.05 - 1 min						
5 - 100 s						
0.15 - 3 min						
0.5 - 10 min						
1.5 - 30 min						
0.05 - 1 h						
5 - 100 min						
0.15 - 3 h						
0.5 - 10 h						
1.5 - 30 h						
1 - 100 h						

C 561.02 time relay, ON-delayed, 2-wire version, 4 time ranges

0.05 - 1 s	24 - 66	24 - 66	1SAR 370 006 R 0004		0.100	1
0.2 - 4 s	90 - 240	90 - 240	1SAR 370 006 R 0005		0.100	1
1.5 - 30 s						
12 - 256 s						

C 561.13 time relay, star-delta function, dead interval on reversing 50 ms, 1 time range, 1 NO delayed, 1 NO undelayed

1 - 20 s	24/100 - 127	24	1SAR 360 014 R 0001		0.110	1
	24/200 - 240	24	1SAR 360 014 R 0002		0.110	1
3 - 60 s	24/100 - 127	24	1SAR 360 015 R 0001		0.110	1
	24/200 - 240	24	1SAR 360 015 R 0002		0.110	1

C 562.10 time relay, OFF-delayed, with auxiliary voltage, 1 time range, 1 changeover contact, with 2 LEDs

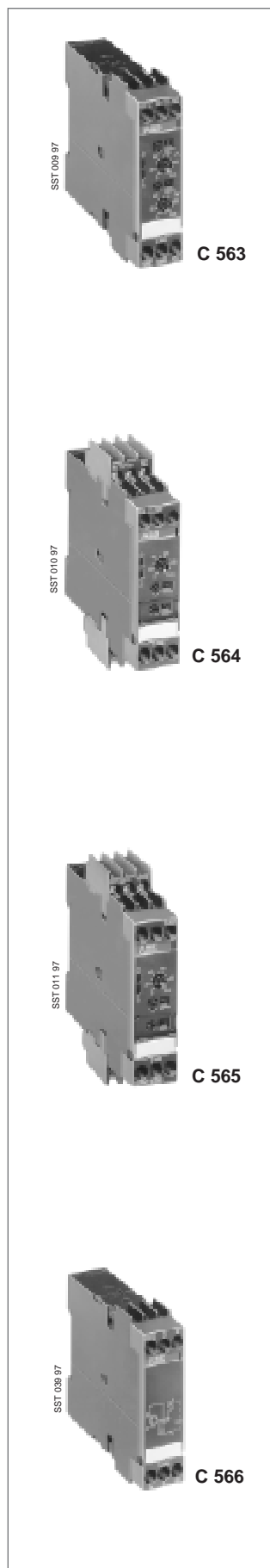
0.5 - 10 s	24/100 - 127	24	1SAR 320 011 R 0001		0.130	1
	24/200 - 240	24	1SAR 320 011 R 0002		0.130	1
1.5 - 30 s	24/100 - 127	24	1SAR 320 012 R 0001		0.130	1
	24/200 - 240	24	1SAR 320 012 R 0002		0.130	1
5 - 100 s	24/100 - 127	24	1SAR 320 013 R 0001		0.130	1
	24/200 - 240	24	1SAR 320 013 R 0002		0.130	1

C 562.20 time relay, OFF-delayed, without auxiliary voltage, 1 changeover contact, 7 time ranges, with LED

0.05 - 1 s	24	24	1SAR 340 017 R 0006		0.130	1
0.15 - 3 s	100 - 127	100 - 127	1SAR 340 017 R 0007		0.130	1
0.3 - 6 s	200 - 240	200 - 240	1SAR 340 017 R 0008		0.130	1
0.5 - 10 s						
1.5 - 30 s						
3 - 60 s						
5 - 100 s						

Electronic time relays, Series C 56x

Selection, technical data, ordering details



Time range <i>t</i> with rotary switch, can be set to	Rated control supply voltage		Order code	Price	Weight per piece kg	Packing unit piece
	AC 50/60 Hz V	DC V				

C 563, clock generator, 15 time ranges, 1 changeover contact, with 2 LEDs

0.05 - 1 s	24/100 - 127	24	1SAR 350 010 R 0001		0.110	1
0.15 - 3 s	24/200 - 240	24	1SAR 350 010 R 0002		0.110	1
0.5 - 10 s						
1.5 - 30 s						
0.05 - 1 min						
5 - 100 s						
0.15 - 3 min						
0.5 - 10 min						
1.5 - 30 min						
0.05 - 1 h						
5 - 100 min						
0.15 - 3 h						
0.5 - 10 h						
1.5 - 30 h						
1 - 100 h						

C 564, Multi-function time relay, 1 time range, with 2 LEDs, 1 changeover contact, 8 functions, dual voltage

0.05 - 1 s						
0.15 - 3 s						
0.5 - 10 s	24/100 - 127	24	1SAR 330 010 R 0001		0.140	1
1.5 - 30 s	24/200 - 240	24	1SAR 330 010 R 0002		0.140	1
0.05 - 1 min	24 - 240		1SAR 330 010 R 0000		0.140	1
5 - 100 s						
0.15 - 3 min						
0.5 - 10 min						

C 565, Multi-function time relay, 1 time range, with 2 LEDs, 2 changeover contact, 16 functions, dual voltage

1.5 - 30 min						
0.05 - 1 h						
5 - 100 min	24/100 - 127	24	1SAR 330 020 R 0001		0.150	1
0.15 - 3 h	24/200 - 240	24	1SAR 330 020 R 0002		0.150	1
0.5 - 10 h	400 - 440	24	1SAR 330 020 R 0009		0.150	1
1.5 - 30 h	24 - 240	24 - 240	1SAR 330 020 R 0000		0.150	1
1 - 100 h						

C 565-S, Multi-function time relay, 1 time range, with 2 LEDs, 2 changeover contact, positively driven, 16 functions, dual voltage

	24 - 240	24 - 240	1SAR330 020 R 0000		0.150	1
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C 566, time relay, OFF-delayed for DC coils

Delay dependent on coil power	200 - 240		1SAR 380 000 R 0008		0.200	1
	100 - 127		1SAR 380 000 R 0007		0.200	1

C 560.10, cover cap sealable

for protecting against unauthorised readjustment			1SAR 390 000 R1000			5 sets
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C 560.20, plug-in tab for screw mounting

			1SAR 390 000 R2000			5 sets
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C 560.30, set of labels for multi-function relay C 564, full set with 8 functions

			1SAR 390 000 R3000		0.020	5 sets
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C 560.40, set of labels for multi-function relay C 565, full set with 16 functions

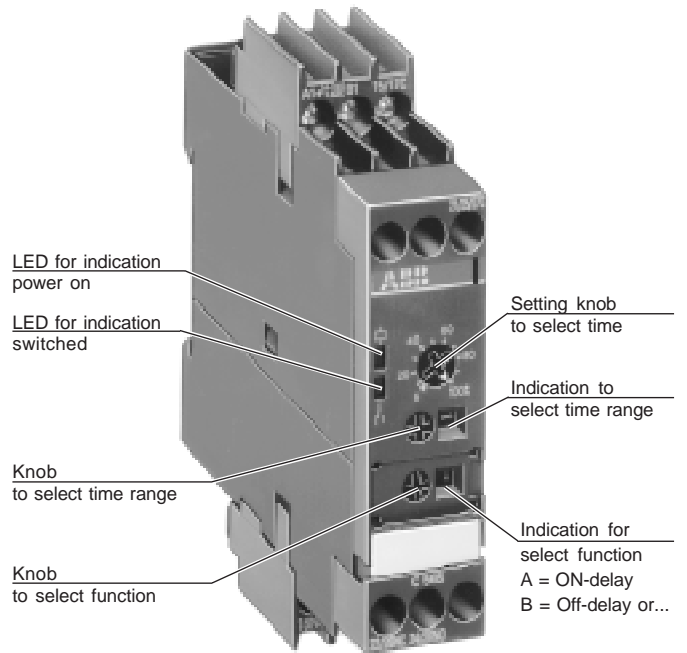
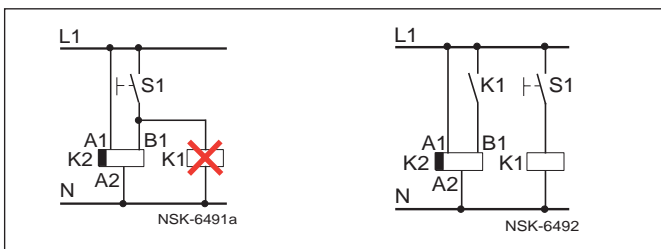
			1SAR 390 000 R4000		0.020	5 sets
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Electronic time relays, Series C 56x

Function tables, device wiring diagrams

Project planning information

- Changes to the time range and function take effect only if they are made when de-energised.
Do not activate Start input B1 or B3 until supply voltage is applied.
- Same potential applied to A1 and B1 or A3 and B3.
- Same potential applied to A1 and B1 or A3 and B3.
In the case of dual-voltage versions, connect only on voltage range in each case.
- In the case of AC, it is not permitted to control loads in parallel with the Start input (see adjacent sketched circuit diagrams).

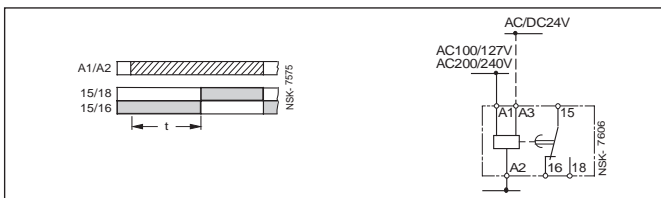


Functions

- Time relay energised
- Contact element closed
- Contact element open

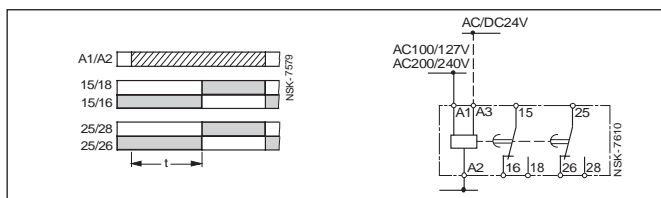
C 561.10

ON-delayed with 1 changeover contact and 2 LEDs



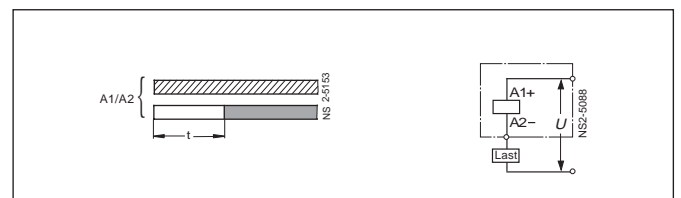
C 561.01

ON-delayed with 2 changeover contacts and 2 LEDs



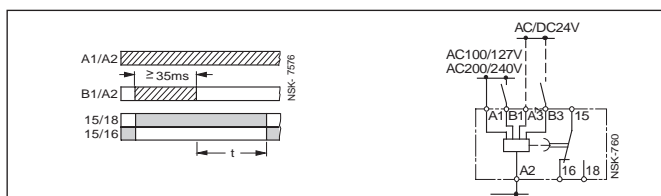
C 561.02

ON-delayed, 1 NO delayed, semiconductor



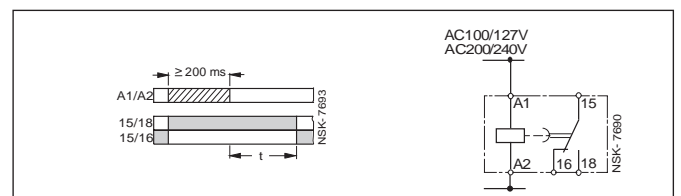
C 562.10

OFF-delayed, 1 NO with 2 LEDs



C 562.20

OFF-delay 1 changeover contact and LED

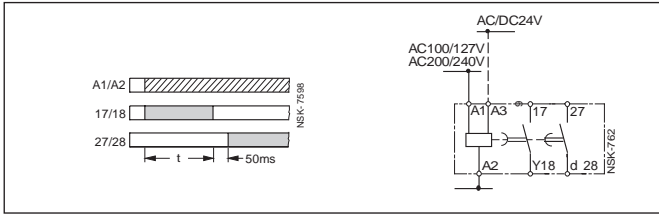


Electronic time relays, Series C 56x

Function tables, device wiring diagrams

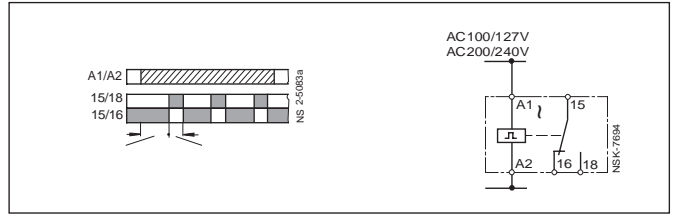
Star-delta time relay C 561.13

1 NO delayed, 1 NO undelayed



Clock generator C 563

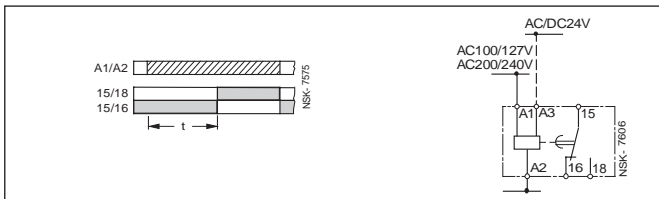
1 changeover contact with 2 LEDs



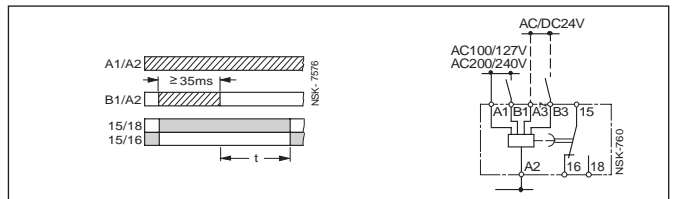
Multi-function relay C 564

1 changeover contact, 8 functions

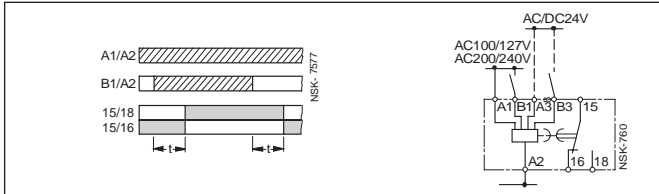
A ON-delayed



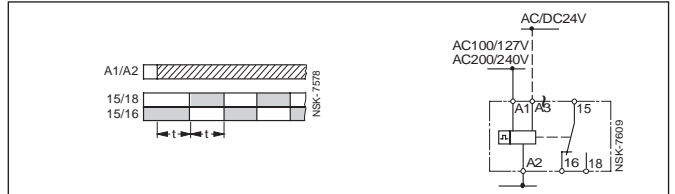
B OFF-delayed with auxiliary switches



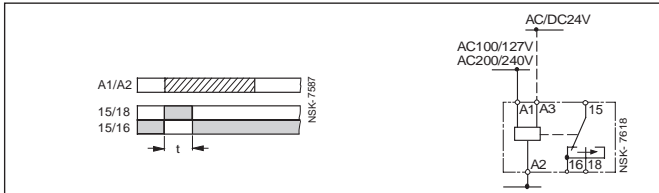
C ON and OFF-delayed with auxiliary voltage ($t_{an} = t_{ab}$)



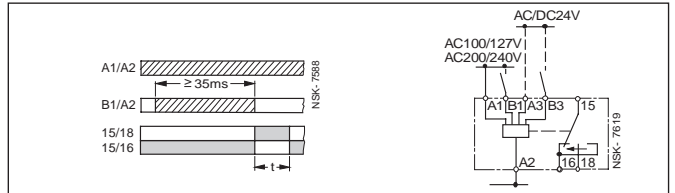
D Flashing, start with pause (idle/operate 1:1)



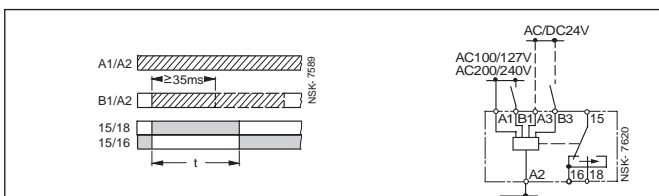
E Fleeting NO-contact



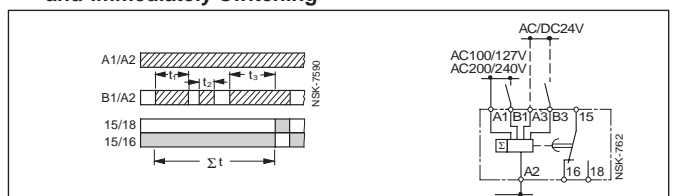
F Fleeting NC-contact with auxiliary voltage



G Pulse-shaping with auxiliary voltage (generation of a pulse at the output independent)



H Additive ON-delayed with auxiliary voltage and immediately switching

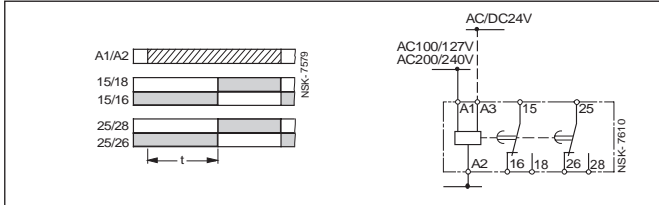


Electronic time relays, Series C 56x

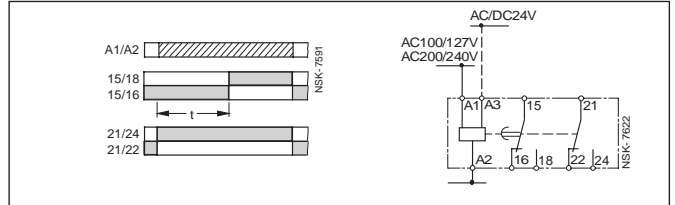
Function tables, device wiring diagrams

Multi-function relay C 565, 2 changeover contacts, 8 functions

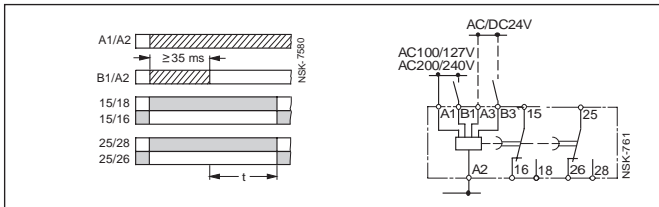
A ON-delayed



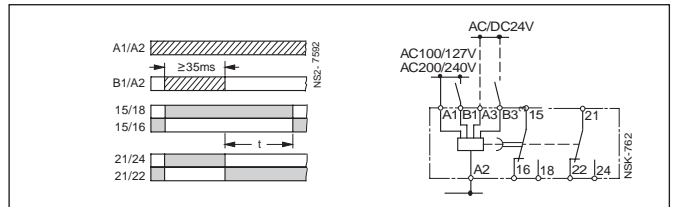
A. ON-delayed and immediately switching



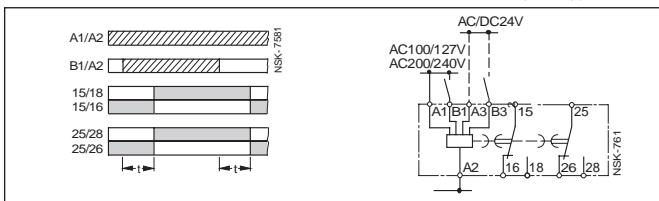
B OFF-delayed with auxiliary voltage



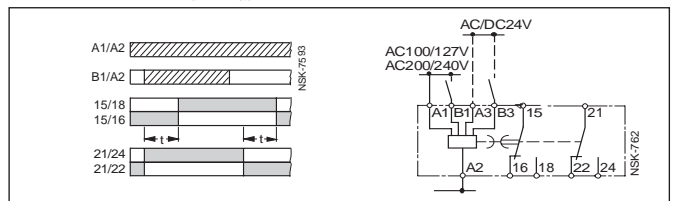
B. OFF-delayed with auxiliary voltage and immediately switching



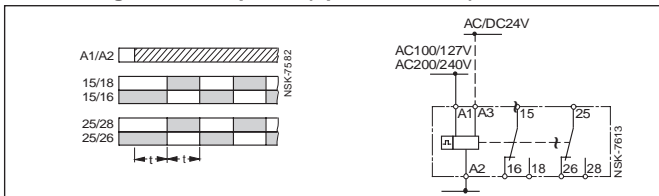
C ON and OFF-delayed with auxiliary voltage ($t = t_{an} = t_{ab}$)



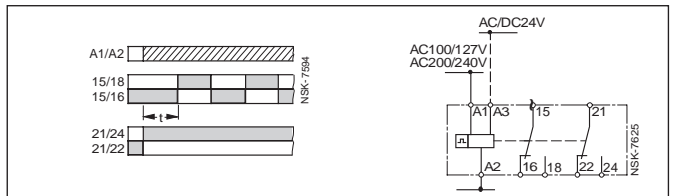
C. ON and OFF-delayed with auxiliary voltage and immediately switching ($t = t_{an} = t_{ab}$)



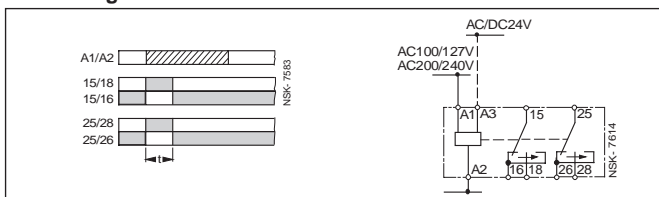
D Flashing, start with pause (operate/idle 1:1)



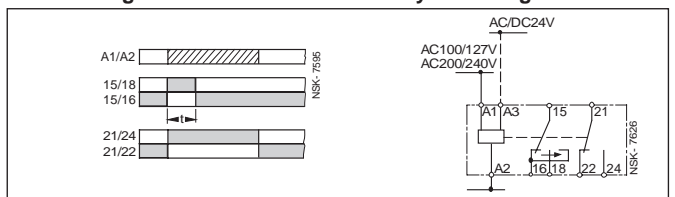
D. Flashing, start with pause (operate/idle 1:1) and immediately switching



E Fleeting NO contact



E. Fleeting NO contact and immediately switching

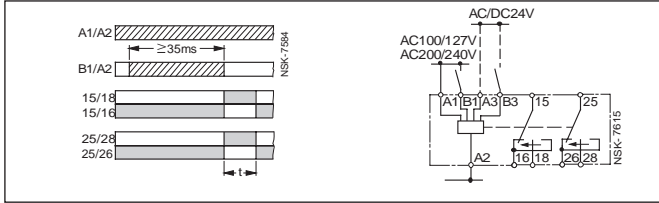


Electronic time relays, Series C 56x

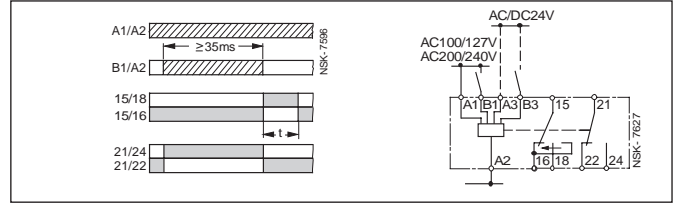
Function tables, device wiring diagrams

Multi-function relay C 565, 2 changeover contacts, 8 functions

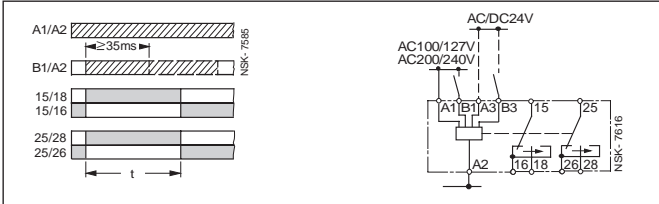
F Fleeting NC contact with auxiliary voltage



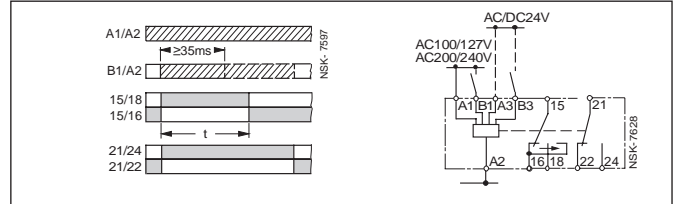
F. Fleeting NC contact with auxiliary voltage and immediately switching



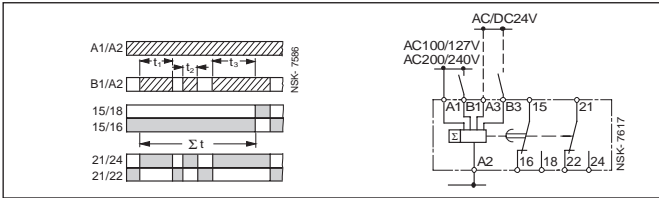
G Pulse-shaping with auxiliary voltage (generation of a pulse at the output independent of the excitation time)



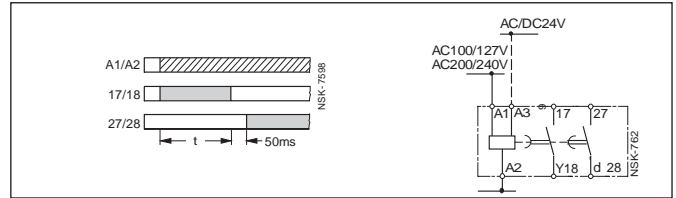
G. Pulse-shaping with auxiliary voltage and immediately switching (generation of a pulse at the output independent of the excitation time)



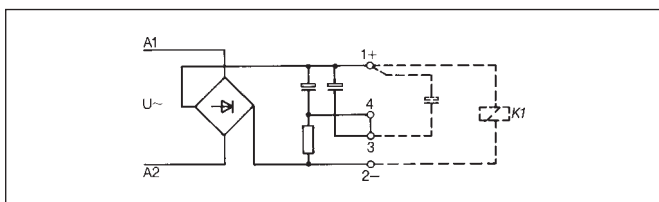
H Additive ON-delayed with auxiliary voltage and immediately switching



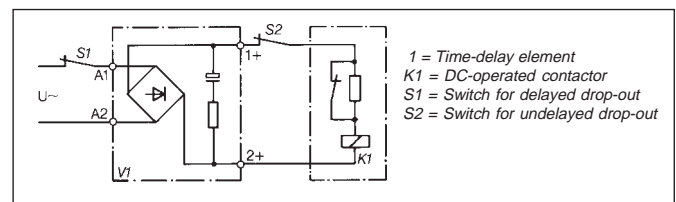
Y ⚠ Star-delta function



Time-delay element C 566



Wiring diagram of the DC-operated contactor with contactless time-delay element



Electronic time relays, Series C 56x

Technical data

Technical data to IEC 61812-1/DIN VDE 0435, Part 20021

Time relay		C 562.10 C 564 C 565	C 561.10 C 561.01 C 563	C 562.20	C 561.13	C 561.02	
Mechanical service life	operations	30 · 10 ⁶				100 · 10 ⁶	
Rated insulated voltage (Pollution degree 3)	AC V	300, 500 bei 1SAR 330 020 R 0009					
Overvoltage category III in compliance with DIN VDE 0110							
Permissible ambient temperature	during operation	°C – 25 to + 60					
	storage	°C – 40 to + 80					
Operating range of excitation ¹⁾		0.85 to 1.1 x U _s with AC; 0.8 to 1.25 x U _s with DC 0.95 to 1.05times rated frequency					
Rated power	W	2	2	2	2	1	
at AC 230 V, 50 Hz	VA	6	6	2 ²⁾	6	1	
Rated operating currents I _e	AC-15 at AC 230 V, 50 Hz	A 3 ⁵⁾				0.01 up to 0.6	
Output relay	AC-140; DC-13	-					
	DC-13 at DC 24 V	A 1					
	DC-13 at DC 48 V	A 0.45					
	DC-13 at DC 60 V	A 0.35					
	DC-13 at DC 110 V	A 0.2					
	DC-13 at DC 230 V	A 0.1					
Fusing DIAZED ³⁾ Utilisation category gL/gG,	A	4					
Switching frequency							
when loaded with I _e , AC 230 V	1/h	2500				5000	
when loaded with contactors B6, B7, AC 230 V	1/h	5000				5000	
Recovery time	ms	150 ⁶⁾				50	
Minimum ON period	ms	35 ⁷⁾	–	200 ⁴⁾	–	–	
Residual current	mA					≤ 5	
Voltage drop in conductive state	V					≤ 3.5	
Short-time withstand capability	A					10 (up to 10 ms)	
Setting tolerance referred to full scale value		typically ±5%					
Repeat accuracy		≤ ±1% over the entire time range					
Enclosure		IP 20 terminals					
to DIN EN 60 529		IP 20 covers					
Conductor connector	single-core	mm ²	1 x (0.5 – 4)				
	flexible with wire end ferrule	mm ²	2 x (0.5 – 2.5)				
		mm ²	1 x (0.5 – 2.5)				
	single-core or stranded	AWG	2 x (0.5 – 1.5)				
			2 x (20 – 14)				
Terminal screws for normal crew-driver size 3 and Pozidrive 2		M 3.5					
Permissible normal position		any					
Resistance to shock semi-sinusoidal to IEC 60068-2-27	g/ms	15/11					
Vibro-stability to IEC 60068-2-6	Hz/mm	10-55 / 0.35					
EMV-tests		EN 50081-1					
by basic specification		EN 50082-2					

¹⁾ Unless otherwise specified

²⁾ Maximum peak inrush current 1 A/100 ms

³⁾ Without any welding as per ICE 60947-5-1
















⁴⁾ Observe minimum excitation time for faultless function

⁵⁾ For C565 – S: open I_e = 1A

⁶⁾ For C564 / C 565 with wide-range voltage power pack, voltage-dependent 0 to 250 ms.

⁷⁾ Min. ON period for C565, 1 SAR 330 020 R 0000 150 ms until instantaneous contact switches.

Approvals and certificates

Device type	Approvals							Quality marks		Ships' classification societies						
Test mark																
Abbreviation	SEV	DEMKO	NEMKO	SEMKO	Inspect	CSA	UL	ÖVE	PTB	BV	GL	LRS	DNV	PRS	RINa	Reg.
Validity	Switzerl.	Denmark	Norway	Sweden	Finland	Canada	USA	Austria	Germany	France	Germany	Gr. Britain	Norway	Poland	Italy	Russia

Validity

C 560		○	○	○	○	■	■										
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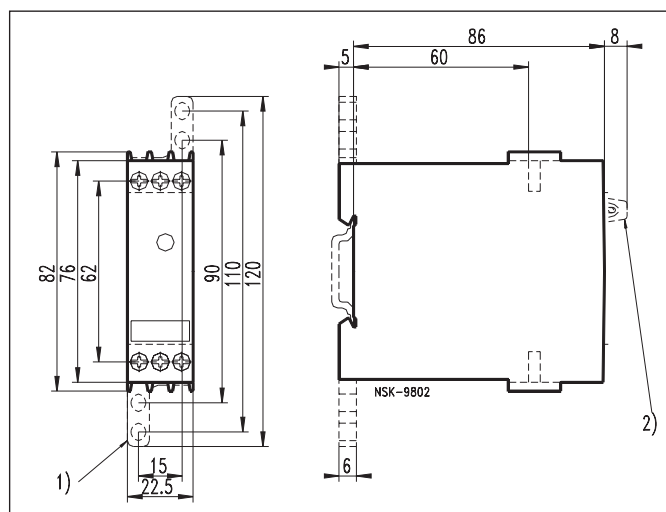
Explanation of symbols:

○ No general mandatory testing, except special cases.

■ Normal version approved. Rating plates bear the test mark if mandatory.

Electronic time relays, Series C 56x

Dimension diagrams



- 1) Plug-in tab for screw mounting
- 2) Sealable cover plate
- 3) Identification label (in the case of C 564, C 565)

Time relay

**1 changeover contact without auxiliary voltage,
two-wire version, clock generator**

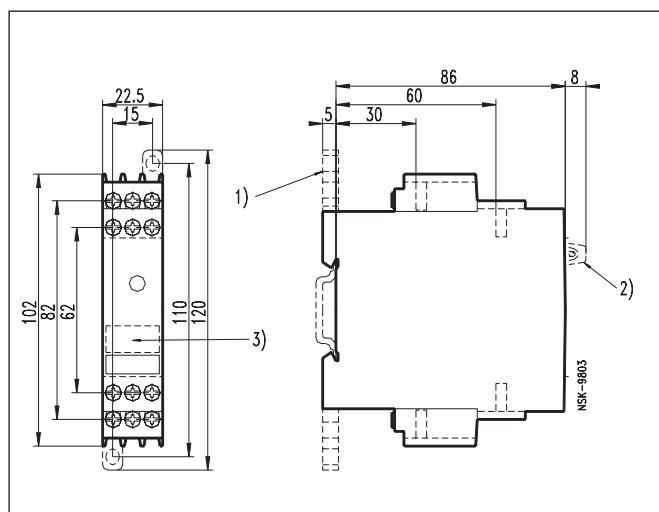
Type **C 561.10**
C 561.02
C 561.13
C 562.20
C 563

Quality-tested for safe use

The output relays feature a long electrical service life - even in the case of contactor loading. The interference-immune and indestructible electronic circuitry ensures reliable operation of the time relays, Series C 560, even next to contactor coils without protective circuits.

Time relays, Series C 560, economical and safe even in the future

The new Series C 560 provides a range of time relays covering a broad span of functions and performance - and with the small number of variants also provides the user with efficiency, allowing a substantial reduction in ordering and storage effort.



Time relay

**1 changeover contact with auxiliary voltage,
2 changeover contacts**

Type **C 561.01**
C 562.10
C 564
C 565

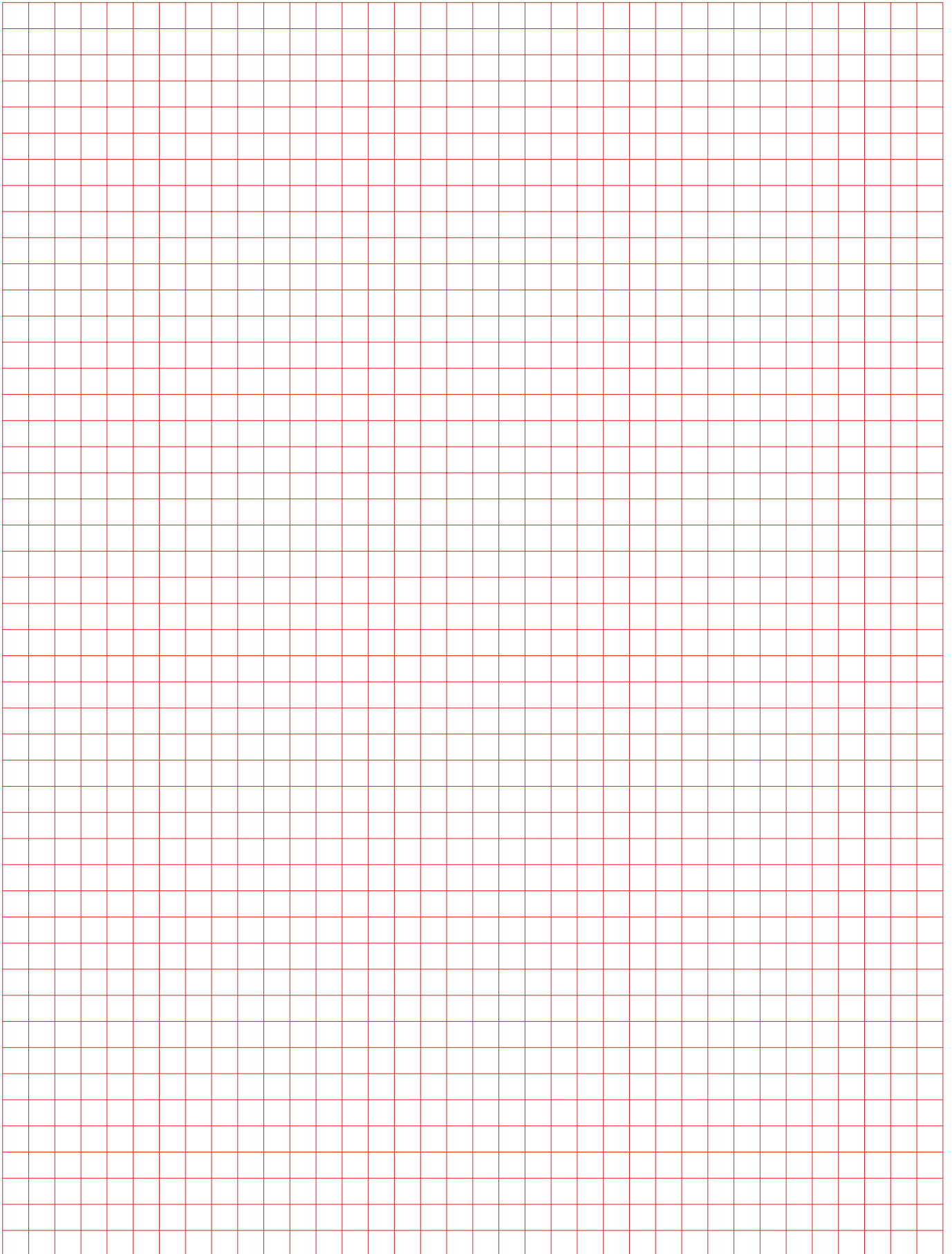
Standards and regulations

The time relays of Series C 560 comply with:

- IEC 1812-1 "Electronic Time Relays for Industrial Applications"
- DIN VDE 0435, Part 201 "Electrical Relays, Switching Relays"
- IEC 947-5-1, DIN VDE 0660, Part 220 "Low-Voltage Switchgear Devices"
- IEC 1000-4 "Electromagnetic Compatibility"
- IEC 721-3 "Ambient Conditions"

Certified to ISO 9001

Notes





Monitoring relays



Standards and regulations

The monitoring relays comply with:

- IEC 721-3-3 "Ambient conditions"
- IEC 1812-1DIN VDE 0435, Part 2021 "Electrical relays"
- IEC 1000 "Electromagnetic Compatibility"
- IEC 947-5-1; DIN BDE 0660, Part 200 "Low-Voltage Switchgear Devices"

Scope of application

Monitoring relays are used in industries and plants, also in building technologies, distributions and computing systems.

They provide for higher safety in operation, monitoring voltage, currents, phase sequences, motor parameters, liquid levels, insulation between power and earth.

The relays control important parameter for operations and give warning and/or alarm signal for switching off or on.

Parameter and limits - for example undervoltage or overvoltage - can be adjust.

Customer benefits are:

- industrial design
- high accuracy
- high reliability
- easy handling

Housing design

The monitoring relays are suitable for snap-on mounting on 35 mm top-hat rails to DIN EN 50 022.

Compact electronic monitoring relays

Type C 55x / C58x

Neither overload nor underload ...

... are particularly good for machines and installations in industrial applications. An unsteady power supply may lead to machine failure and, thus, expensive downtimes. Consequently, electrical parameters such as voltage, current, phases, power factor ($\cos \varphi$) and filling levels of conductive fluids should be monitored carefully and professionally.

The electronic monitoring relays ...

... of Series C 55x from ABB are simply versatile in use. This extensive range offers various relays for detection and monitoring of electrical parameters such as current, voltage, phase imbalance, phase failure and phase sequence in single-phase or three-phase power systems and filling levels of conductive fluids. Thus, relays C 550 to C 552 make it just as easy to protect installations and machines against overvoltage and undervoltage as they do to monitor currents in AC or DC power systems. Relays C 556 monitor overvoltage and undervoltage in 3-phase power systems with and without neutral conductor whilst units C 554 and C 557 monitor phase failure, phase sequence and phase imbalance. Relay C 559 for power monitoring ($\cos \varphi$) is used for control tasks on machines and to protect the machines against underload or

overload. Level monitor C 555 detects fluid levels of conductive fluids and can be converted to detection of falling or rising levels. Status LEDs indicate the circuit states of the units. Signalling is performed by one or two changeover contacts as an output protective circuit.

All C 55x monitoring relays ...

... can be mounted quickly and in space-saving manner. With their overall width of 17.5, 22.5 or 45 mm, they offer performance and reliability whilst requiring minimum space. The ergonomic design of the operating controls allows easy and precise setting and the design and coloration of the monitoring units of Series C 55x match those of the entire range of ABB switchgear devices. The relays are mounted either on a 35 mm DIN rail by snapping them on or with screws on a mounting plate. It suffices to slide the retaining springs a little on the underside of the unit (not on C 550). It goes without saying that all units of the C 55x Series are particularly rugged and designed for use in rough industrial atmospheres. The UL and CSA test marks permit worldwide use and it goes without saying that all relays bear the CE mark.

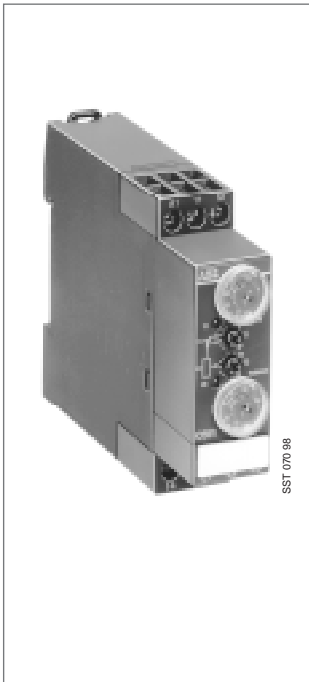
Selection table, monitoring relays

Type	Function	Remarks	Width / mm
C 551.01 C 551.01	Current monitor, single-phase Current monitor, single-phase	AC/DC 2-500 mA AC/DC 0.1-10 A Measuring frequency: 40 - 500 Hz and DC	22.5 22.5
C 552.01 C 552.02	Voltage monitor, single-phase Voltage monitor, single-phase	AC/DC voltage 0.2 - 60 V AC/DC voltage 10 - 600 V Measuring frequency: 40 - 500 Hz and DC	22.5 22.5
C 553	Voltage monitor, single-phase 2 limit values	AC/DC voltage 20-80 V AC/DC voltage 65-260 V Measuring frequency: 50/60 Hz and DC	22.5 22.5
C 554	Phase monitor, 3-phase	Phase failure, phase sequence	22.5
C 555	Level monitor	for conductive fluids Supply or discharge monitoring	22.5
C 556.01	Voltage monitor, 3-phase	Three-phase power systems with PE wire	45
C 556.02	Voltage monitor, 3-phase	Three-phase power systems without PE wire	45
C 557	Phase monitor, 3-phase	Phase sequence, phase failure, undervoltage	45
C 558.01 C 558.02 C 558.03	Insulation and earth fault monitor	Monitoring the insulation resistance between electrically isolated power systems and earth	45 100 100
C 559	Cos-Phi monitor	Monitoring the power factor cosine Phi	45
C 580	Speed monitor	Monitoring the motor speed for undershooting	45
C 581	Safe zero-speed monitor	Safe detection of motor standstill	45

Current monitor Type C 551

Technical data

Ordering details



Relay for current monitoring, single-phase

- Monitoring AC and DC for overcurrent or undercurrent
- 1 yellow LED for indication of the relay state
- 1 green LED for indication of the supply voltage applied
- Relay output, 1 changeover contact

Ordering details

Type	Measuring range I_e	Rated control supply voltage U_s	Order code	Price / piece	Weight / piece kg	Packing unit piece
	AC A	AC 50/60 Hz V	DC V			
C 551.01	0.002 - 0.5 (3 ranges)		24 V	1SAR 411 010 R 0001		1
		24 V		1SAR 411 010 R 0002		1
		48 V		1SAR 411 010 R 0003		1
		120 V		1SAR 411 010 R 0004		1
		230 V		1SAR 411 010 R 0005		1
C 551.02	0.1 - 10 (3 ranges)		24 V	1SAR 412 010 R 0001		1
		24 V		1SAR 412 010 R 0002		1
		48 V		1SAR 412 010 R 0003		1
		120 V		1SAR 412 010 R 0004		1
		230 V		1SAR 412 010 R 0005		1

Basic mode of operation

Current monitoring without latching

As soon as the value of the alternating current or direct current to be monitored reaches the threshold value set on the front panel, the output relay drops out after expiry of the set time T1. The relay picks up immediately again when the current has reached the hysteresis value again.

Current monitoring with latching

If the set limit value is reached, the output relay drops out after expiry of the set time T1 and remains latched in this position even if the measuring current once again assumes a permitted value.

Function overcurrent (OVER) and undercurrent (UNDER)

Owing to the ON delay T2, current peaks (function OVER) resp. current fades (function UNDER) which may occur on make do not lead to a change in the relay state. The delay time T1 prevents a disturbing, constant switch-on and switch-off of the relay if the measured value is near to the set threshold value.

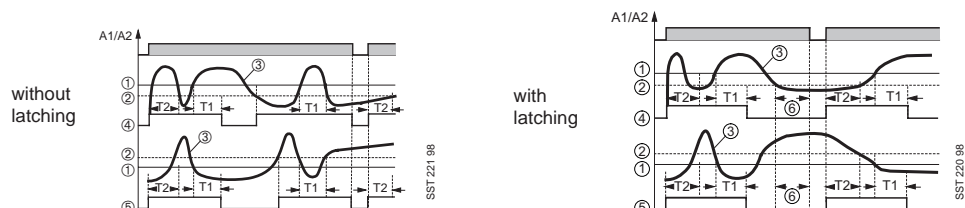
Device wiring diagram, see Page 30
Dimensions, see Page 32

- ① Threshold value
- ② Hysteresis
- ③ Monitored current
- ④ Output relay, function OVER
- ⑤ Output relay, function UNDER
- ⑥ Latching

Technical data

Type	C 551.01	C 551.02						
Rated control supply voltage U_s	V	See Selection data (electrical isolation by means of transformer does not apply in the case of DC)						
Voltage tolerance	0.85 ... 1.15 x U_s							
Maximum power consumption	VA	3						
Frequency of the measured signal	Hz	40 ... 500 and DC						
Threshold value	adjustable	10 ... 100 % of the measuring range						
Hysteresis	adjustable	5 ... 50 % of the set threshold value						
Setting accuracy ¹⁾	± 10 % referred to full scale value							
Repeat accuracy	in the case of constant parameters	± 0.1 %						
Deviations	in the case of voltage fluctuations in the case of temper. fluctuations	± 0.1 % / V ± 0.02 % / °C						
Delay time	T2 ON delay	s	1 ... 20 ± 30 %					
	T1 on reaching the threshold value	s	0.1 ... 3 ± 20 %					
Measuring ranges	Inputs	E1-M	E2-M	E3-M	E1-M	E2-M	E3-M	
	Sensitivity	A	0.002 ... 0.02	0.01 ... 0.1	0.05 ... 0.5	0.1 ... 1	0.5 ... 5	1 ... 10
	Input resistance	Ω	5	1	0.2	0.1	0.02	0.01
	Overcurrent resist., sustained	A	0.04	0.2	1	2	10	14
	Overcurrent resist. < 1 s	A	1	5	8	17	20	50
Function setting	Overcurrent or undercurrent with or without latching	Slide switch Slide switch						
Load rating of the output relay	A	max. 8						
Ambient temperature	operation	°C - 20 ... + 60						
	storage	°C - 30 ... + 70						
Conductor connection	single-core	mm ² 2 x (0.5 ... 2.5)						
	flexible with wire end ferrule	mm ² 1 x (0.5 ... 1.5)						
Enclosure	IP 20 terminals, IP 50 housing							

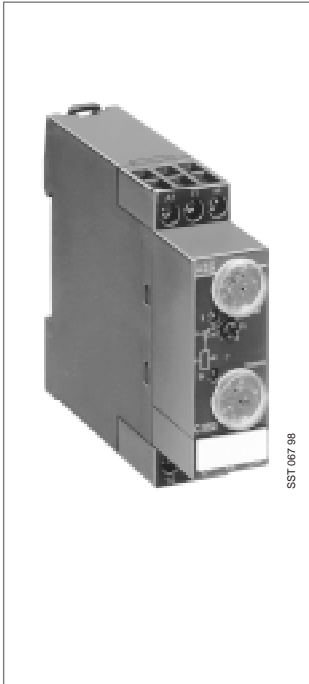
¹⁾ In the case of sinusoidal currents. Measurement principle: Arithmetic averaging



Voltage monitor Type C 552

Technical data

Ordering details



Relay for voltage monitoring, single-phase

- Monitoring for overvoltage or undervoltage
- with or without latching
- 1 yellow LED for indication of the relay state; blinks during the operating time
- 1 green LED for indication of the control voltage applied
- Relay output, 1 changeover contact

Ordering details

Type	Measuring range U_e AC V	Rated control supply voltage U_s AC 50/60 Hz V	DC V	Order code	Price / piece	Weight / piece kg	Packing unit piece
C 552.01	0.2 - 60		24 V	1SAR 421 010 R 0001		0.120	1
			24 V	1SAR 421 010 R 0002		0.120	1
			120 V	1SAR 421 010 R 0004		0.120	1
			230 V	1SAR 421 010 R 0005		0.120	1
C 552.02	10 - 600		24 V	1SAR 422 010 R 0001		0.120	1
			24 V	1SAR 422 010 R 0002		0.120	1
			120 V	1SAR 422 010 R 0004		0.120	1
			230 V	1SAR 422 010 R 0005		0.120	1

Basic mode of operation

Voltage monitoring without latching

As soon as the measuring-circuit voltage reaches the set threshold value, the output relay changes its circuit state after expiry of the set time T1. It returns immediately to the original state when the measuring-circuit voltage reaches the set hysteresis value.

Voltage monitoring with latching

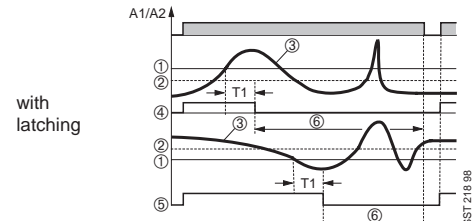
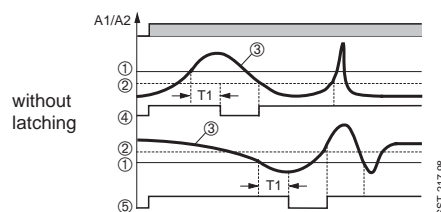
If the set threshold value is reached, the output relay changes its circuit state after expiry of the set time T1 and remains latched in this position even if the measuring-circuit voltage once again assumes a permitted value.

Technical data

Type	C 552.01	C 552.02		
Rated control supply voltage U_s	V	See Selection data (electrical isolation by means of transformer does not apply in the case of 24 V DC)		
Voltage tolerance	0.85 ... 1.15 x U_s			
Maximum power consumption	VA	3		
Frequency of the measured signal	Hz	40 ... 500 and DC		
Threshold value		Adjustable from 1 to 100 % of the measuring range		
Hysteresis		Adjustable from 5 to 50 % of the set threshold value		
Setting accuracy		± 10 % referred to full scale value		
Delay time	on reaching the threshold value	s	adjustable 0.1 ... 3	
Measuring ranges	Inputs	E1-M E2-M E3-M	E1-M E2-M E3-M	
	Sensitivity	V	0.2 ... 2 1 ... 10 6 ... 60	10 ... 100 30 ... 300 60 ... 600
	Input resistance	kΩ	2 kΩ 10 kΩ 60 kΩ	100 300 600
	Overvoltage resistance	V		200 350 650
Function setting	Overvoltage or undervoltage with or without latching		Slide switch Slide switch	
Load rating of the output relay	Rated operating current I_n /AC-15, 120 V	A	max. 8	
Ambient temperature	operation	°C	- 20 ... + 60	
	storage	°C	- 30 ... + 70	
Conductor connection	single-core flexible with wire end ferrule	mm ² mm ²	2 x (0.5 ... 2.5) 1 x (0.5 ... 1.5)	
Enclosure			IP 20 terminals, IP 50 housing	

Device wiring diagram, see Page 30
Dimensions, see Page 32

- ① Threshold value
- ② Hysteresis
- ③ Monitored voltage
- ④ Output relay, function OVER
- ⑤ Output relay, function UNDER
- ⑥ Latching



Voltage monitor with 2 limit values Type C 553

Technical data

Ordering details



Relay for voltage monitoring, single-phase

- Monitoring for overvoltage and undervoltage
- 1 yellow LED for indication of the relay state
- 1 green LED for indication of the control voltage applied
- Relay output, 1 changeover contact

Ordering details

Type	Measuring range = Rated control supply voltage U_e V	Order code	Price / piece	Weight / piece kg	Packing unit piece
C 553	AC/DC 20-80	1SAR 425 010 R 0008		0.150	1
	AC/DC 65-260	1SAR 425 010 R 0009		0.150	1

Basic mode of operation

Relay C 553 monitors a voltage corresponding to its own control supply voltage. As soon as the monitored voltage value leaves the set range, the output relay drops out after the set time has elapsed.

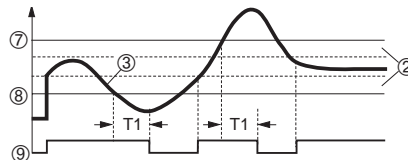
Technical data

Rated control supply voltage U_s	V	See evaluation data (with reverse voltage protection)
Voltage tolerance		See evaluation data
Max. power consumption	VA	3.5
Frequency of the measured signal/power system	Hz	50/60 and DC
Threshold value		Absolute scale within the measuring range
Hysteresis		Fixed 5 % of the set threshold value
Setting accuracy		± 10 % referred to full scale value
Delay time	on reaching the threshold value	s adjustable 0.1 ... 3
Measuring ranges	Inputs	A1-A2
	Sensitivity	V
	Input resistance	k Ω
	Overvoltage strength	V
		See selection data, upper value of the rated control supply voltage
Load rating of the output relay	Rated operating current $I_{/AC-15, 120 V}$	A max. 8
Ambient temperature	operation	$^{\circ}\text{C}$ - 20 ... + 60
	storage	$^{\circ}\text{C}$ - 30 ... + 70
Conductor-connection	single-core	mm ² 2 x (0.5 ... 2.5)
	flexible with wire end ferrule	mm ² 1 x (0.5 ... 1.5)
Enclosure		IP 20 terminals, IP 50 housing

Device wire diagram, see Page 30

Dimensions, see Page 32

- ② Hysteresis
- ⑤ Monitored voltage
- ⑦ Upper threshold value
- ⑧ Lower threshold value
- ⑨ Output relay



SST 219 98

Phase monitor Type C 554

Technical data

Ordering details



Relay for phase monitoring, three-phase

- Monitoring phase failures and phase sequence
- 1 yellow LED for indication of the relay state (OK state)
- Relay output, 2 changeover contacts

Ordering details

Type	Measuring range U_e AC 50/60 Hz V	Rated control supply voltage U_s AC 50/60 Hz V	Order code	Price / piece	Weight / piece kg	Packing unit piece
C 554	3 x 200-460	3 x 200-460	1SAR 430 010 R 0010		0.120	1

Basic mode of operation

Relays for phase monitoring monitor the phase sequence and failure of one of the three phases. No settings are required during operation. If the phase sequence is correct and none of the three phases has failed, the output relay picks up after the delay time T_1 and the LED lights. In the event of a phase failure or fault, the output relay drops out after the delay time T_2 has elapsed and the LED goes out.

If a phase sequence error occurs on switch-on of the voltage, the relay does not pick up.

Note:

Relay C 554 is not protected against reverse voltage. If there is a risk of energy recovery from a motor in the event of phase failure, relay C 557 with monitoring of phase asymmetry can be used.

Technical data

Rated control supply voltage U_s	V	3 x 230-400, the monitored power system simultaneously serves to power the relay
Voltage tolerance	V	3 x 200 ... 460
Power consumption	at 200 V at 400 V at 460 V	VA VA VA 5 20 25
Frequency of the measured power system	Hz	50/60
Delay time	T_1 with correct phase sequence T_2 in the case of phase failure	ms ms max. 200 approx. 300
Load rating of the output relay		
Making/breaking capacity AC DC	VA W	max. 2000 max. 80
Switched current AC/DC	A	max. 8
Switched voltage AC/DC	V	max. 250
Disruptive strength in accordance with IEC 255-5		2.5 kV/1 min
Electrical service life	operations	10^5 at maximum making/breaking capacity
Mechanical service life	operations	2×10^5
Ambient temperature	operation storage	$^{\circ}\text{C}$ $^{\circ}\text{C}$ - 20 ... + 60 - 30 ... + 70
Conductor-connection	single-core flexible with wire end ferrule	mm^2 mm^2 2 x (0.5 ... 2.5) 1 x (0.5 ... 1.5)
Enclosure		IP 20 terminals, IP 50 housing

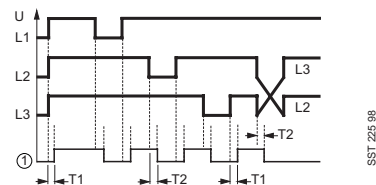
Device wiring diagram, see Page 30

Dimensions, see Page 32

① Output relay

T_1 : Delay on pick-up 200 ms

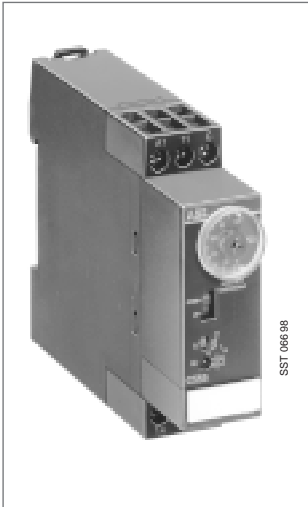
T_2 : Delay on drop-out, max. 300 ms



Level monitor for conductive fluids

Type C 555

Technical data, ordering details



Relay for level monitoring of conductive fluids

- Selectable supply or discharge monitoring
- 1 yellow LED for indication of the relay state
- 1 green LED for indication of the control supply voltage applied
- Relay output, 1 changeover contact

Ordering details

Type	Measuring range U_e V	Rated control supply voltage U_s AC 50/60 Hz V	Order code	Price / piece	Weight / piece kg	Packing unit piece
C 555		24 V AC	1SAR 440 010 R 0002		0.140	1
		48 V AC	1SAR 440 010 R 0003		0.140	1
		120 V AC	1SAR 440 010 R 0004		0.140	1
		230 V AC	1SAR 440 010 R 0005		0.140	1

Basic mode of operation

The basic mode of operation is based on measurement of the impedance of the fluid between two submersible probes. If the measured value is less than the threshold value set on the front panel, the actual relay changes its circuit state. In order to preclude the effects of electrolysis phenomena, the probes operate with AC.

Regulating two levels

The output relay changes its circuit state as soon as the fluid level reaches the maximum probe whilst the minimum probe is immersed. It returns to the original circuit state as soon as the minimum probe is no longer in contact with the fluid.

Technical data

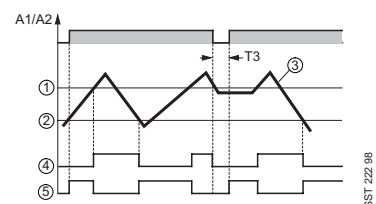
Rated control supply voltage U_s	V	See evaluation data
Voltage tolerance		0.85 ... 1.15 x U_s
Emergency failure stored energy time	ms	≤ 500
Max. power consumption	VA	3
Function setting	supply or discharge monitoring	Slide switch OVER/UNDER
Sensitivity	adjustable	kΩ 5 ... 100
Measuring accuracy	at maximum sensitivity	0 ... + 30%
Electrode voltage	max. (50/60 Hz)	V 24
Electrode current	max. (50/60 Hz)	mA 1
Cable capacitance	with special cable ¹⁾	nF 10
Delay time	upper level, terminal Max-M	ms 300
	lower level, terminal Min-M	ms 500
Electrical isolation	by means of transformer (4 kV, 8 mm creepage distance)	Class II in accordance with DIN VDE 0551
Insulation voltage	of the contacts and the electrodes with respect to the power supply	V 2500
Load rating of the output relay	A	max. 8
Ambient temperature	operation	°C - 20 ... + 60
	storage	°C - 30 ... + 70
Conductor-connection	single-core	mm ² 2 x (0.5 ... 2.5)
	flexible with wire end ferrule	mm ² 1 x (0.5 ... 1.5)
Enclosure		IP 20 terminals, IP 50 housing

Device wiring diagram, see Page 30
Dimensions, see Page 32

1) The special cable (max. 100 m) does not need to be shielded but we do not advise laying this cable in parallel with power supply cables. A shielded line may also be used, whereby the shield must be connected to terminal M.

- ① Maximum level
- ② Minimum level
- ③ Monitored level
- ④ Output relay, function OVER
- ⑤ Output relay, function UNDER

T3 The supply voltage must be interrupted for at least 0.5 s in order to reset the device.



Voltage monitor between phases and neutral conductor in three-phase power systems, Type C 556.01

Technical data, ordering details



Relay for voltage monitoring in three-phase power systems with neutral conductor

- Measures its own supply voltage
- Relay for monitoring overvoltages and undervoltages
- Lower and upper threshold value separately settable
- Detection of phase failures
- Does not respond to incorrect phase sequence
- Indication of overvoltage, undervoltage and relay status via 3 LEDs.
- Delay if the threshold value is overshoot or undershoot can be set on the front panel between 0.1 and 10 s.

2 output relays:

- 1 changeover contact 8 A: Overvoltage
- 1 changeover contact 8 A: Undervoltage

Overall width: 45 mm

Ordering details

Type	Supply voltage U_c V	Order code	Price / piece	Weight / piece kg	Packing unit piece
C 556.01	400 V AC	1SAR 450 010 R 0006		0.300	1

Basic mode of operation

The output relay picks up as soon as the values of the three star voltages of the phases with respect to the neutral conductor lie between the lower and upper threshold value. The threshold values are set separately via two potentiometers on the device front panel.

If the value of one voltage is outside of this range, the corresponding output relay drops out after a delay time T1 or T2 which can be set on the front panel has elapsed. A fixed hysteresis of 3 % prevents continuous switch-on and switch-off of the output relay if the measuring-circuit voltage is near to a set threshold value.

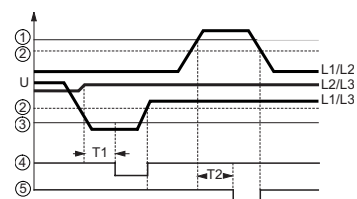
The phase sequence and phase asymmetry are not monitored. Device C 556.01 also responds to failure of the neutral conductor.

Technical data

Lower threshold value	80-98% U_n
Upper threshold value	102-120% U_n
Electrical isolation	by means of transformer
Power system monitoring	3 x 400 V AC
Frequency of the monitored power system	50/60 Hz
Hysteresis	fixed, 4 % of the set threshold value
Indicating accuracy	$\pm 10\%$ of the scale value
Repeat accuracy in the case of constant parameters	$\pm 0.5\%$
Delay on transgression of the threshold values	0.1 s-10 s, 0 + 50%
Output relay (in accordance with AC-1, resistive load)	2 AgCdO changeover contacts, 8 A AC

Device wiring diagram, see Page 31
Dimensions; see Page 32

- ① Threshold value U_{max}
- ② Hysteresis
- ③ Threshold value U_{min}
- ④ Output relay U_{min}
- ⑤ Output relay U_{max}



S5T 229 98

Voltage monitor for three-phase power systems Type C 556.02

Technical data, ordering details



Relay for voltage monitoring in three-phase power systems with neutral conductor

- Measures its own supply voltage
 - Relay for monitoring overvoltages and undervoltages
 - Lower and upper threshold value separately settable
 - Detection of phase failures
 - Does not respond to incorrect phase sequence
 - Indication of overvoltage, undervoltage and status via 3 LEDs.
- Delay if the threshold value is overshoot or undershoot can be set on the front panel between 0.1 and 10 s.
- 2 output relays:**
- 1 changeover contact 8 A: Overvoltage
 - 1 changeover contact 8 A: Undervoltage
 - Overall width: 45 mm

Ordering details

Type	Supply voltage U_c V	Order code	Price / piece	Weight / piece kg	Packing unit piece
C 556.02	400 V AC	1SAR 451 010 R 0006		0.300	1

Basic mode of operation

The output relay picks up as soon as the values of the three phase-to-phase voltages lie between the lower and upper threshold value. The threshold values are set separately via two potentiometers on the device front panel.

If the value of one voltage is outside of this range, the corresponding output relay drops out after a delay time T_1 or T_2 which can be set on the front panel has elapsed. A fixed hysteresis of 3 % prevents continuous switch-on and switch-off of the output relay if the measuring-circuit voltage is near to a set threshold value.

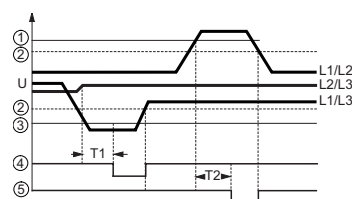
The phase sequence and phase asymmetry are not monitored.

Technical data

Lower threshold value	80 - 98% U_n
Upper threshold value	102 - 120% U_n
Electrical isolation	by means of transformer
Power system monitoring	3 x 400 V AC + N
Frequency of the monitored power system	50/60 Hz
Hysteresis	fixed, 4 % of the set threshold value
Indicating accuracy	$\pm 10\%$ of the scale value
Repeat accuracy in the case of constant parameters	$\pm 0.5\%$
Delay on transgression of the threshold values	0.1 s-10 s, 0 + 50%
Output relay (in accordance with AC-1, resistive load)	2 AgCdO changeover contacts, 8 A AC

Device wiring diagram, see Page 31
Dimensions, see Page 32

- ① Threshold value U_{max}
- ② Hysteresis
- ③ Threshold value U_{min}
- ④ Output relay U_{min}
- ⑤ Output relay U_{max}



SST 229 98

Phase monitor relay Type C 557

Technical data

Ordering details



Relay for monitoring phase sequence, phase failure and asymmetry

- Monitoring of: phase failure, failure of at least one phase, undervoltage
- Monitors its own supply voltage
- Asymmetry adjustable via potentiometer
- Delay in the event of fault can be set between 0.2 and 10 s
- Relay output, 2 changeover contacts
- 1 green LED for indication of the supply voltage applied
- 1 yellow LED for indication of the relay state

Ordering details

Type	Supply voltage U_c V	Order code	Price / piece	Weight / piece kg	Packing unit piece
C 557	230 V AC	1SAR 431 010 R 0005		0.350	1
C 557	400 V AC	1SAR 431 010 R 0006		0.350	1

Basic mode of operation

In a three-phase power system, the phase monitor relay simultaneously monitors the phase sequence, phase loss with a maximum phase energy recovery of 70 % of the voltage set on the front panel via a potentiometer and a symmetrical drop of the voltage of the three phases below 15 % of the preset value.

If the phase sequence of the 3 phases is correct, the output relay operates, indicated by a green LED.

The output relay drops out after a delay time T which can be set on the front panel between 0.2 and 10 s (and the LED goes out) if one of the following faults occurs:

- Reversal of the direction of rotation
- Failure of one or more phases
- Voltage drop.

Note:

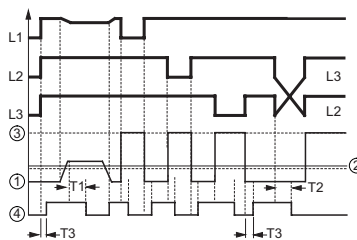
Delay T does not occur in the event of failure of L1 and L2 but only in the event of failure of L3, phase reversal or voltage drop. It is used to prevent chattering of the output relays in the case of a transitional situation as occurs, in particular, when starting motors.

Device wiring diagram, see Page 31
Dimensions, see Page 32

Technical data

Supply voltage	Own power supply - terminals L1 + L2	
Operating range	0.7 to 1.2 x Un	
Frequency	50/60 Hz	
Power consumption	max. 6 VA	
Insensitivity to brief power failures	10 ms	
Response time	500 ms	
Insulation voltage	Overvoltage category III, pollution severity 2 in accordance with IEC 664-1, VDE 0110; 4 kV/2	
Input circuit	Resistance of the measurement input Phase energy recovery Undervoltage detection (symmetrical drop-out) Indicating accuracy of the threshold value	1 kh x UN max. 70 % of the set threshold value -15 % of the threshold value ± 10 %
Output relay	Making/breaking capacity Maximum switched current Minimum switched current Maximum switched voltage	2 changeover contacts AgCdO 2000 VA AC 80 W 8 A AC 100 mA AC 250 V AC
Time delay if fault occurs		0.2 - 10 s (0 to +50 %)
Ambient temperatures	operation storage	-20 to +60 °C -30 to +70 °C

- ① Asymmetry 0 %
 - ② Threshold of the asymmetrical factor
 - ③ Asymmetry 100 %
 - ④ Output relay (yellow LED)
- T1: Time delay in the case of errors
T2: Returning time
T3: Operate delay



cos ϕ monitor, Motor load monitor relay Type C 559

Technical data. ordering details



Relay for monitoring the power factor (cosine ϕ)

- Monitoring motor overload and underload
- Measurement of the phase shift between current and voltage (cos ϕ)
- Independent setting of the min. and max. threshold value between 0 and 0.99
- ON delay can be set on the front panel between 0.2 and 20 s
- Delay in the event of fault between 0.3 and 3 s
- 2 changeover contact outputs 8 A
- Overall width: 45 mm
- Directly for motor up to max. 10A, via current transformer for higher motor currents
- Single-phase motors can be connected to the C 559 cos. ϕ monitor.

Ordering details

Type	Supply voltage U_c V	Order code	Price / piece	Weight / piece kg	Packing unit piece
C 559	230 V AC	1SAR 460 010 R 0005		0.300	1
C 559	400 V AC	1SAR 460 010 R 0006		0.300	1

Technical data

Hysteresis	15 % at start of scale 3 % at end of scale
Indicating accuracy	$\leq \pm 15\%$ of scale value
Output relay (in accordance with AC-1, resistive load)	2 AgCdO changeover contacts max. 8 A AC

Device wiring diagram, see Page 31

Dimensions, see Page 32

Speed Monitor Type C 580

Technical data

Ordering details



Relay C580 for monitoring speed levels, stillstand, transport failures

- 1 LED for power indication
- 1 LED for switching
- 1 change over contact

Ordering details

Type	Supply voltage U_c V	Order code	Price / piece	Weight / piece kg	Packing unit peice
C 580	24 V AC	1SAR 480 010 R 0002		0.255	1
	120 V AC	1SAR 480 010 R 0004		0.255	1
	230 V AC	1SAR 480 010 R 0005		0.255	1
	24 V DC	1SAR 480 010 R 0001		0.255	1

Princip of Function

This relay monitors stillstand and under speed levels.

By system start, a monitoring delay time from 0.3 ... 30 sec is adjustable. For this delay time the measuring signals are locked. The relay doesn't act.

For more than 30 sec the external contact „S2“ is to be closed and can be opened if the start has finished. In this way the customer can state a flexible delay time.

Customer can adjust a time between 2 measured pulses.

If the time tolerance is out of the adjusted range – the relay will switch by underlimit not by over limit. If the speed level comes in the normal range again the relay will go back in normal position.

By using a measuring voltage, max. 30 V the relay will give also a contact by under limit.

Measuring inputs are:

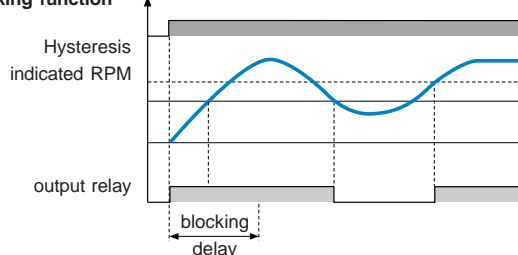
- Pulse signal of 3-contact
- Namur pulse signal
- Potential free contact
- Voltage signal

Device wiring diagram, see Page 31
Dimensions, see Page 32

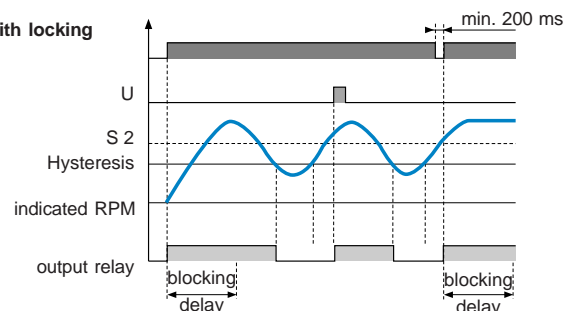
Technical data

Power supply	24 DC, 24 V, 120, 230 VAC, 50/60 Hz
Tolerance of voltage	± 15 %
Power consumption	3.5 VA AC / 1W DC
Allowed voltage break	10 ms
Input	Sensor 24 V PNP (max. 50 mA) Namur-sensor 8.2 V at 1 kOhm Potential free contact Voltage 0 - 30 V
1-signal	4.5 - 30 V
0-signal	0 - 1 V
Switching frequency	200 Hz
Min. pulse length	5 ms
Pulse-Pause	5 ms : 5ms
Delay times	0.1 - 10 sec.
Hysteresis	5 %
Accuracy for indication	10 % of full scale
Repeat accuracy	± 15 %
Rest time	Min. 200 ms / 100 ms for S2
Start delay	0.3 - 30 sec.
Output	1 change over contact
Min. load	100 mA
Max. AC load	8 A, 100 V, 2000 VA
Max. DC load	8 A, 100 V, 80 W
Max. switching frequency	360 switches per h
Electrical life time	AC12: 100000 switches AC15: 6000 switches at cos phi = 0.3 DC13: 6000 switches L/R=300 ms
Operating temperature	-20 ... +60 °C
Storage temperature	-30 ... +70 °C

without locking function



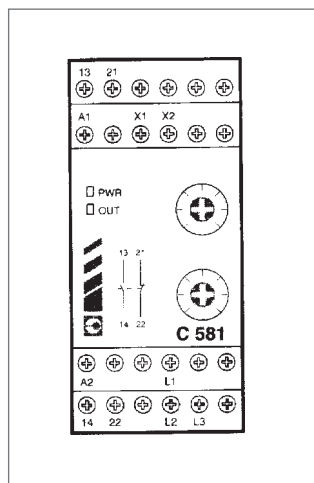
with locking



Zero speed monitor Type C 581

Technical data

Ordering details



Relay C581 for monitoring stillstand of 1- or 3-phase motors

- 1 LED for power indication
- 1 LED for switching
- 1 NO, 1 NC safety signal outputs, positively driven
- Safety category 4

Ordering details

Type	Supply voltage U_c V	Order code	Price / piece	Weight / piece kg	Packing unit piece
C 581	24 V AC/DC	1SAR 481 030 R 0011		0.410	1

Princip of Function

This relay monitors stillstands depending on rest voltages in the power line.

Normally the motor gets a power supply voltage of about 400 V or more. By stillstand the motor voltage gets to „0“. If there is a small moving the motor will have a rest voltage. This rest voltage is to be measured.

By stillstand in a tolerance range the relay give a contact- necessary for machine stops where people are only allowed to open the door if the motor doesn't move and must be in an absolutely stop position. This device has safety category 4.

Inputs:

Voltages for measuring signals, redundant:

Chanel 1: 20 mV ... 500 mV

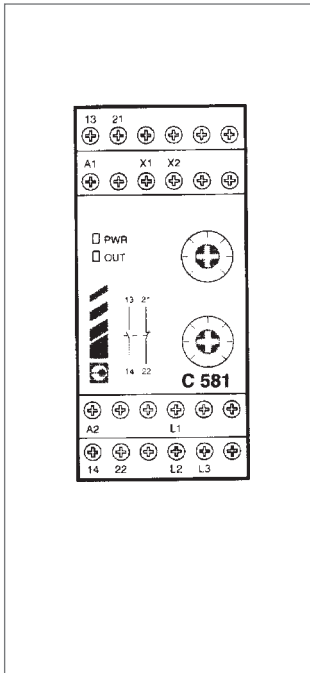
Chanel 2: 20 mV ... 500 mV

Technical data

Power supply	24 V DC, rest max. 10 %, 24 V AC, 50/60 Hz
Tolerance of voltage	± 15 %
Power consumption	1.6 VA AC / 2 W DC
Allowed voltage break	10 ms
Input	Chanel 1: 20 ... 500 mV ± 15% Chanel 2: 20 ... 500 mV ± 15%
Difference of synchronisation	< 3 sec.
Hysteresis	40 %
Accuracy for indication	10 % of full scale
Repeat accuracy	± 0.5 %
Output	1 NO and 1 NC potential free
Max. AC load	6.8 A, 1500 VA
Max. switching voltage	440 V AC
Electrical life time	100000 switches at 1500 VA
Operating temperature	-20 ... +50 °C
Storage temperature	-30 ... +70 °C

Zero speed monitor Type C 581

Technical data



Self-test

When starting on via the A1-- the following testing sequence is carried out:

The relay outputs (terminals 13-14 and 21-22) pick up for 1.5 sec. and then drop out for 1.5 sec. If no fault is detected, they then pick up again.

The following checks take place:

- Maloperation of the output contacts (terminals 13-14 and 21-22),
- Failure of one of the phases L1, ~ or L3,
- Validity of the feedback loop (X1 ->(2),
- Failure of an internal component

Safety function

If an electric motor turns without being fed a current it behaves like a generator and produces a voltage at the terminals of its windings. This so-called retentive voltage depends on the following conditions: speed, motor properties, residual magnetism and inertia of the mechanical

component. The zero-speed monitor C 581 measures this voltage and allows an opening of the doors or guards only after the motor is at a standstill.

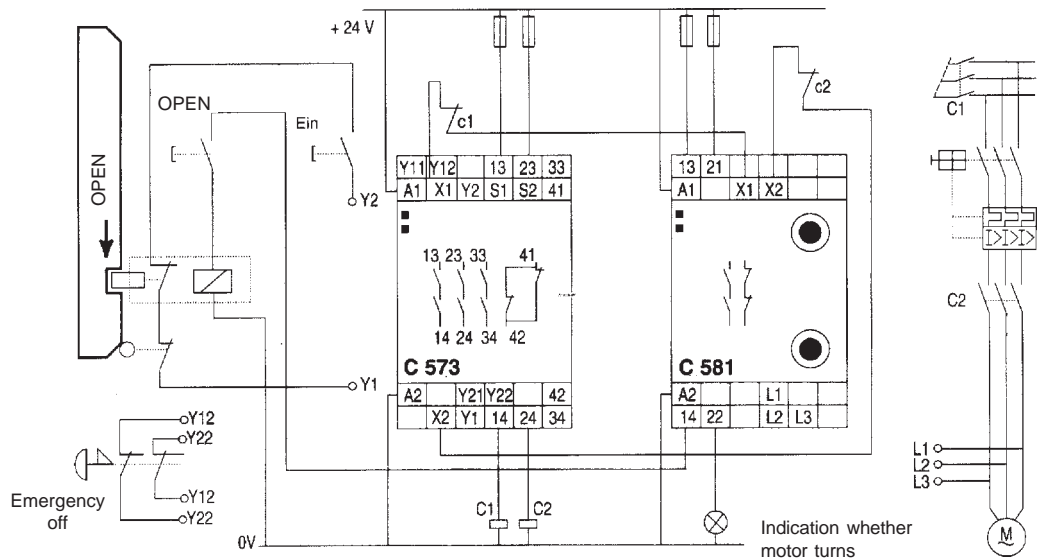
Setting

The individual channels are set separately with the help of 2 potentiometers on the front of the C 581. In this way any asymmetries in the windings or the retentive voltages can be compensated. The settings between 20 and 500 mV can be done in such a way that the threshold is equal to a low speed or zero speed and does not impose a risk to the operator.

Control elements

The zero-speed monitor C 581 has a NO safety contact (13-14) and a NC safety contact (21-22). Within the lines of the switching capacity of the safety contacts (1500 VA) one or more switching elements can be connected.

Examples for application

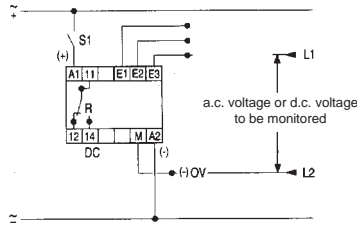
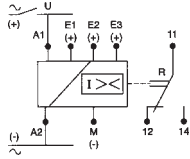


Monitoring relays C 55x

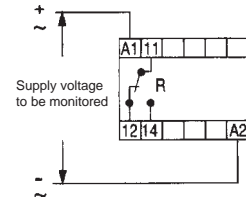
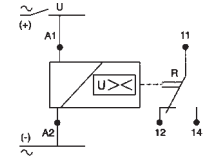
Wiring diagrams

Connection diagrams

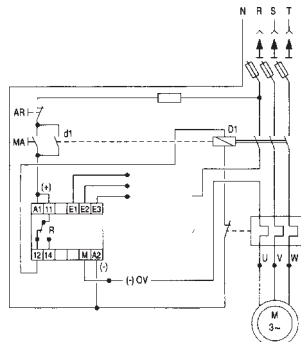
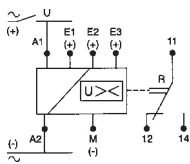
Voltage monitor C 551.01 / C 551.02



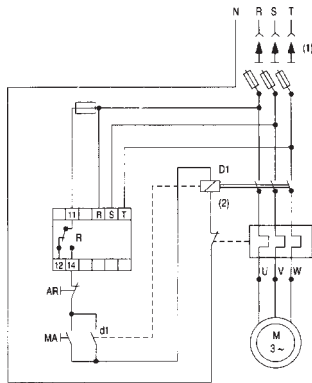
Voltage monitor C 553



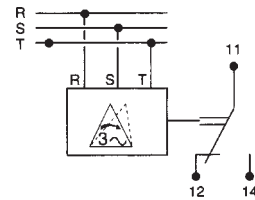
C 552.01 / C 552.02



Phase monitor C 554



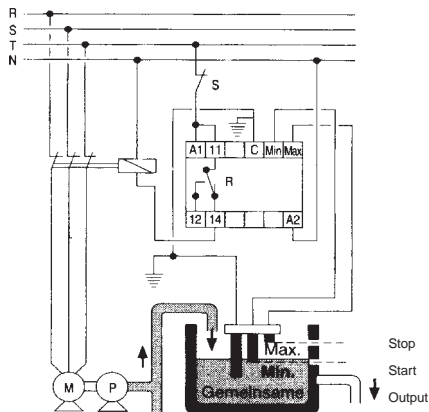
- (1) Disconnector
- (2) Contactor



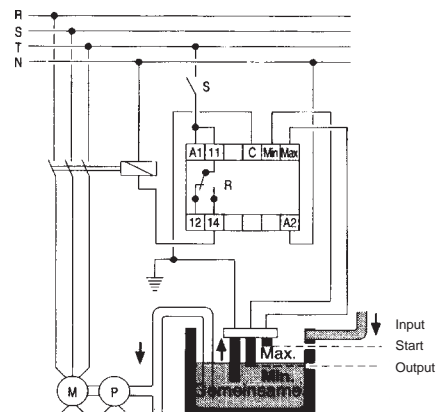
Terminal assignment

Terminals L1 – L2 – L3: three-phase power system to be monitored
11 – 12 – 14: output relays

Level monitor C 555



Filling level monitoring Up



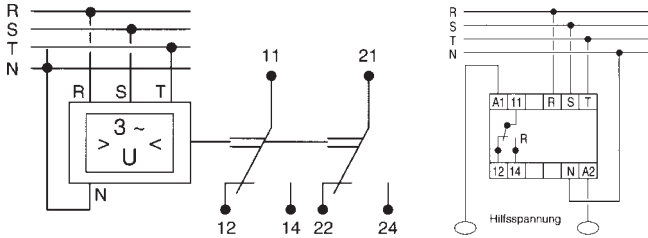
Pump-off monitoring Down

Monitoring relays C 55x, C580

Wiring diagrams

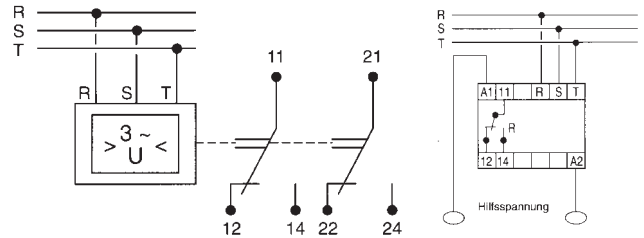
Connection diagrams

Voltage monitor three-phase with N C 556.01



Terminals L1 – L2 – L3 - N: three-phase power system to be monitored
 11 – 12 – 14: output relays (R1), lower threshold
 21 – 22 – 24: output relays (R2), upper threshold

Voltage monitor three-phase without N C 556.02

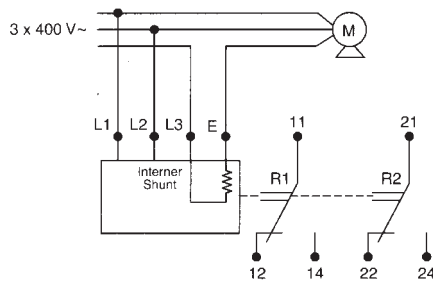


Terminal assignment

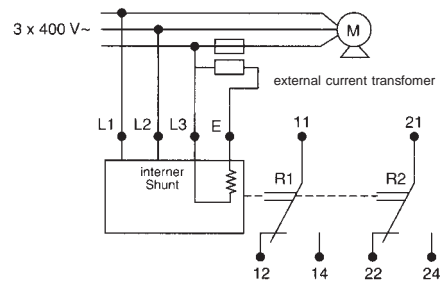
Terminals L1 – L2 – L3: three-phase power system to be monitored
 11 – 12 – 14: output relays (R1), lower threshold
 21 – 22 – 24: output relays (R2), upper threshold

Cos- Phi- monitor C 559

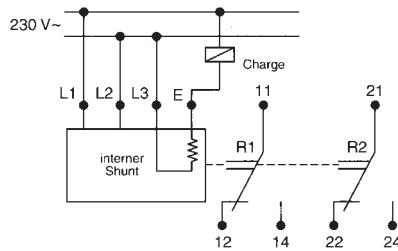
Operating in a three-phase power system, $I < 10\text{ A}$ -



Operating in a three-phase power system, $I < 10\text{ A}$ -



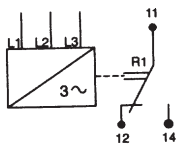
Operating in a single-phase power system, 230 V -



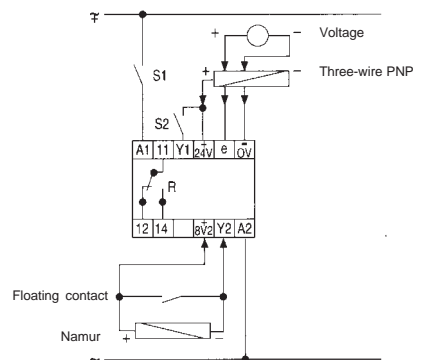
Terminal assignment

L1 – L2 – L3: power system to be monitored
 E: output current measurement
 11 – 12 – 14: output relays (R1), lower threshold
 21 – 22 – 24: output relays (R2), upper threshold

Phase monitor relay with Assymmetric C 557



Speed monitor C 580



Terminal assignment

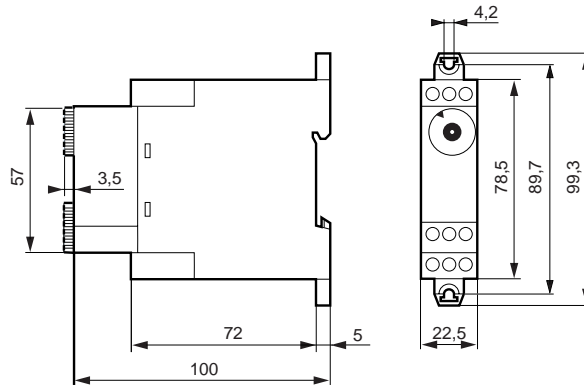
A1 – A2: voltage supply
 11 – 12 – 14: output relays (R)
 +24 V – E – 0 V: three-wire sensor PNP
 E – 0 V: voltage input
 +8 V 2 – Y2: contact input / NAMUR sensor

Electronic Monitor relay

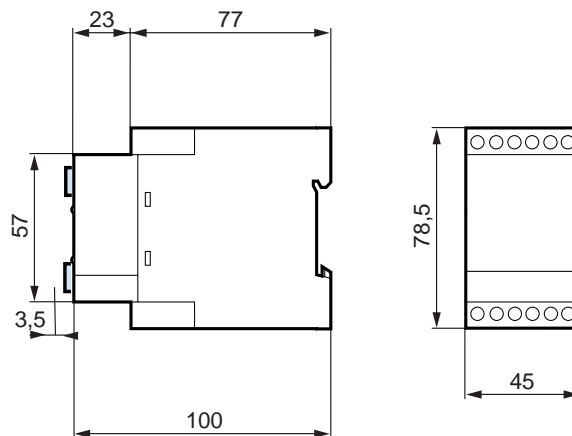
Dimension diagrams

C 551, C 552, C 553 C 554, C 555

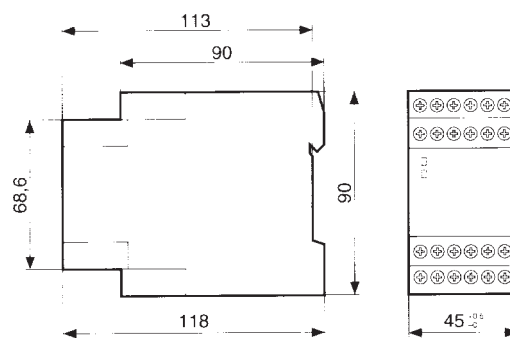
Dimensions in mm



C 556.01, C 556.02, C 557, C 559, C 580



C 558



Insulation monitoring device and Earth-leakage monitor Type C 558.01

Technical data, ordering details



Insulation monitoring device for IT AC systems with DC components and for IT DC systems

Application in modern control voltage systems

- Industrial control systems
- Automotive industry
- Machine control systems
- Control systems in power plants and power supply companies
- Computer systems
- mobile generators
- Elevator controls
- Lighting and battery systems

Ordering details

Type	Supply voltage U_c V	Order code	Price / piece	Weight / piece kg	Packing unit piece
C 558.01	230 V AC	1SAR 470 020 R 0005		0.350	1
C 558.01	90-132 V AC	1SAR 470 020 R 0004		0.350	1

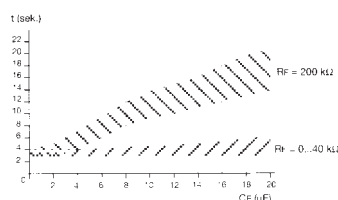
Product description

Modern control voltage systems frequently contain DC components and high system leakage capacitances due to interference suppression arrangements.

These circumstances must be taken into account when selecting the insulation monitoring device.

The C558.01 guarantees reliable insulation monitoring of modern systems. Pure AC systems, pure DC systems as well as AC/DC systems can be monitored.

Measuring time



C_E = System leakage capacitance

R_F = Insulation fault

t = Measuring time

Fault indications

Indication	Alarm LED		Alarm relay
	+	-	
AC fault	x	x	x
DC fault L+	x		x
DC fault L-		x	x
Interruption $\frac{1}{2}$ /KE resp. L1/L2	o	o	x

o = flashing

x = continuous indication

Device characteristics

- Insulation monitoring of IT AC, DC and AC/DC systems
- Voltage range up to AC 300 V and DC 290 V
- automatic adaptation to the given system conditions
- Connection monitoring
- adjustable response value 1 ... 200 k Ω
- Power On and alarm LED with fault localization
- combined test and reset button
- two change-over contacts
- N/O or N/C operation, selectable
- fault memory, selectable

Response value and measuring circuit

Type	Response value R_{an}	Response time ¹⁾	Measuring voltage	Measur. current	Internal resistance ²⁾	System voltage
C 558.01	10-200 k Ω	5 s	13 V	0.11mA	120/94 k Ω	DC and AC 0 - 300 V 15 - 400 Hz 0 - 300 V

¹⁾ Response times at 1 μ F system leakage capacitance.

²⁾ DC internal resistance/Impedance

Measuring principle

The C 558.01 operates with a variant of a pulse measuring principle. This measuring principle ensures reliable monitoring of modern control voltage systems. The frequency range of the system to be monitored may extend from 15 ... 400 Hz.

Standards

The C 558.01 complies with the standards DIN 57413 T8 / VDE 0413 T8, IEC 61557-8, EN 61557-8 and ASTM F1669M-96.

When installing the device, the safety instructions supplied with the equipment must be observed!

Certifications



Wiring diagrams and dimensions diagrams see page 37

Insulation monitoring device and Earth-leakage monitor Type C 558.02

Technical data, ordering details



Insulation monitoring device for IT AC systems

Application in classical power supply systems

- AC and 3 AC systems without DC components
- Motor drives without converters
- Building installation practice
- Simple machine drives
- Generating sets, mobile generators
- Power supply for public events
- Lighting systems
- Air cooling and air-conditioning systems

Ordering details

Type	Supply voltage U_c V	Order code	Price / piece	Weight / piece kg	Packing unit piece
C 558.02	230 V AC	1SAR 471 020 R 0005		0.350	1
C 558.02	90-132 V AC	1SAR 471 020 R 0004		0.350	1

Accessories (external k Ω -Measuring instruments)

C 558.10		1SAR 477 000 R 0100		0.200	1
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Product description

The classical power supply system is a pure AC system. It neither contains converters nor DC components.

The system leakage capacitance is relatively low, i.e. it usually is below 1 μ F, sometimes slightly above this value.

The C558.02 can be used to monitor these systems, up to 690 V.

For setting the response value, you can choose from two response ranges, either 1 ... 20 kW or 10 ... 200 kW.

Setting the adjustment range

Changing the setting range from x1k Ω to x10k Ω , automatically changes the indication of the k Ω values on the LED bar graph indicator:

Setting range x1 k Ω

Meter scale point x1 k Ω

Setting range x10 k Ω

The meter scale point has to be multiplied by 10 k Ω

Device characteristics

- Insulation monitoring device of AC and 3 AC systems up to 690 V
- adjustable response value 1 h ... 200 k Ω
- Power ON and alarm LED's with fault localization
- combined test and reset button
- Connection monitoring
- Alarm relay with two change-over contacts
- N/O / N/C operation, selectable
- Fault memory, selectable
- LED indicator
- Sealable housing
- Connectable to an external meter

Response delay

Type	*) Response time in the range of 10...200 k Ω	*) Response time in the range of 1...20 k Ω	Max. system leakage capacitance
C 558.02	< 1 sec.	< 3 sec.	20 μ F

*) Response times acc. to IEC 61557-8 at $R_f=0,5xR_{an}$ and at 1 μ F system leakage capacitance.

Measuring principle

Superimposed DC voltage with reversing stage.

Standards

The C 558.02 complies with the standards DIN 57413 Bl.2 / VDE 0413 T2, IEC 61557-8, EN 61557-8 and ASTM F1207-89.

When installing the device, the safety instructions supplied with the equipment must be observed!

Certifications



Wiring diagrams and dimensions diagrams see page 37

Insulation monitoring device and Earth-leakage monitor Type C 558.03

Technical data, ordering details



Insulation monitoring device

C558.03 monitors the insulation resistance of an unearthed a.c. voltage or d.c. voltage system

Application in modern control voltage systems

- Industrial control systems
- Automation systems
- Machine control systems
- Control systems for power stations and utility companies
- Computer networks
- Mobile generators
- Lift control systems
- Lighting systems

Ordering details

Type	Supply Voltage U_c V	Order code	Price / piece	Weight / piece kg	Packing Unit piece
C 558.03	230 V AC	1SAR 472 020 R 0005		0.350	1
C 558.03	90-132 V AC	1SAR 472 020 R 0004		0.350	1

Accessories (external kΩ-Measuring instruments)

C 558.10		1SAR 477 000 R 0100	185,00	0.200	1
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Product description

The C 558.03 monitors the insulation resistance of IT systems (unearthed systems) up to AC 690 V or DC 400 V. It can be universally used in a.c., d.c. or non-uniform power systems.

Interference suppression and capacitances of up to 20 µF to earth which are caused by lengthy supply lines have no influence on the measurement.

The integrated AMP measuring method ensures the reliable insulation monitoring even in power systems with fixed frequency converters (output and input frequency are static).

Device characteristics

- Insulation monitoring of IT-AC, DC and AC/DC systems
- Connection monitoring
- Alarm or system fault indication selectable
- AMP measuring method (EP logon)
- Automatic adaptation to the power system
- Infinitely adjustable response value 2 to 50 or 20 to 500 kΩ
- Power-on LED, alarm LED and kΩ running point LED display
- Combined test and reset key
- 2 pilot relays with 1 changeover contact each
- Open-circuit/N/C operation, selectable
- Fault memory, selectable
- Running point LED display
- Sealable housing VDE 0106 T 101
- Environmental conditions comply with EN 50155

Response delay

Type	*) Response time in the range of 10...200 kΩ	*) Response time in the range of 1...20 kΩ	Max. system leakage capacitance
C 558.03	< 1 sec.	< 3 sec.	20 µF

*) Response times acc. to IEC 61557-8 at $R_F=0,5xR_{an}$ and at 1 µF system leakage capacitance.

Fault indications

Indication	Alarm LEDs		Alarm relay
	+	-	
AC fault	x	x	x
DC (L+)	x		x
DC (L-)		x	x
Interruption L1/L2 resp. KE	o	o	x

o = flashing
x = continuous indication

Measuring principle

Superimposed DC voltage with reversing stage.

Standards

The C 558.03 complies with the standards DIN 57413 BI.2 / VDE 0413 T2, IEC 61557-8, EN 61557-8 and ASTM F1207-89.

When installing the device, the safety instructions supplied with the equipment must be observed!

Certifications



Wiring diagrams and dimensions diagrams see page 37

Insulation monitoring in IT-systems

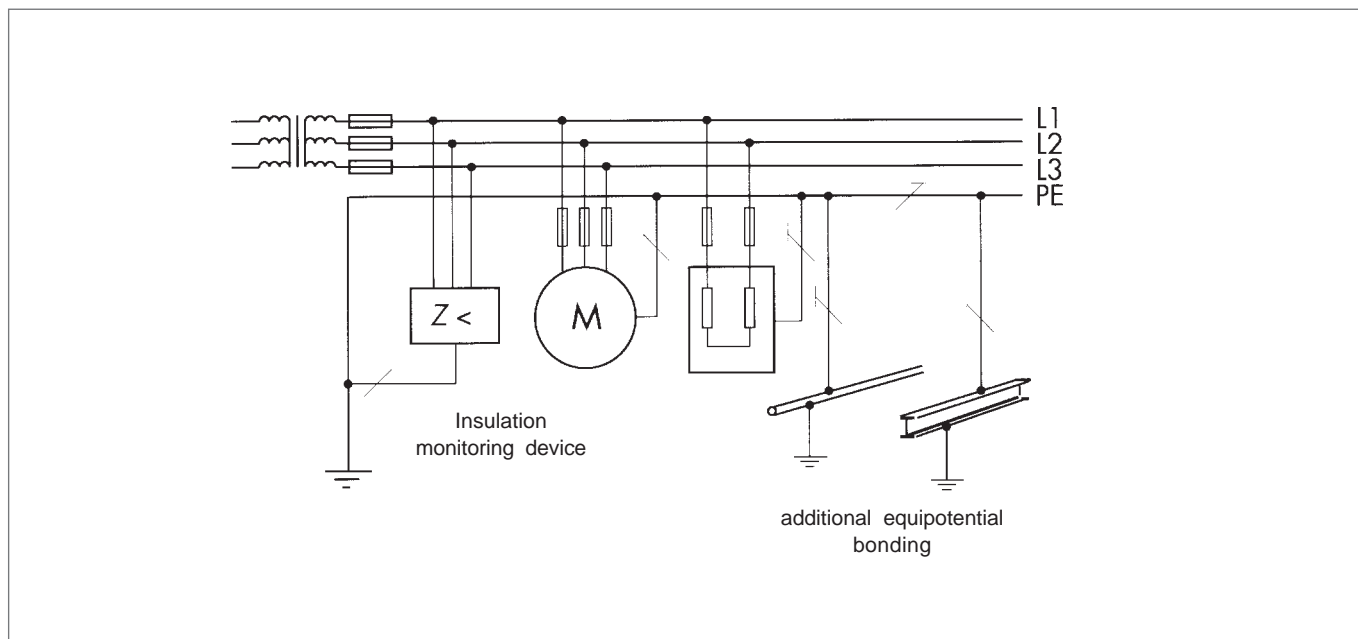
Insulation monitoring device / Earth-leakage monitor C 558.01, C 558.02, C 558.03

The IT system with additional equipotential bonding and insulation monitoring equipment

The IT system is supplied either from an isolation transformer or an independent voltage source, such as a battery or a generator. The peculiarity is that no active conductor is directly connected to earth in this system. The advantage of this is that only a small fault current can flow in the event of an insulation fault. This current is essentially caused by the system leakage capacitance. The upstream fuse does not respond, thus maintaining the voltage supply - and therefore operation - even in case of a phase-to-earth fault.

The high reliability of an IT system is guaranteed thanks to continuous insulation monitoring. The insulation monitoring device recognises insulation faults as they develop, and reports that a value has fallen below the minimum immediately, before an unforeseen interruption of operation is caused by a second insulation fault.

The following illustration shows the typical arrangement of an IT system.



Insulation monitoring in IT-systems

Electrical safety for people and machine

Insulation resistance is a very important factor when the protective goals are being considered.

Without adequate insulation resistance

- protection against direct contact is not guaranteed
- protective arrangements against overcurrent or fault currents will frequently trip out and interrupt operation
- short-circuit and earth fault currents may cause fires and destroy parts of the plant
- high costs are incurred due to interruptions of operation, damage and losses

Electrical

- static overvoltage
- transient overvoltage
- frequency changes
- lightning
- overload
- voltage form

Environmental

- climate
- moisture, temperature
- chemical influences
- pollution, dust, oil
- aggressive exhaust air, fumes
- ageing

Mechanical

- shock, impact
- flaw, bend
- vibrations
- penetration of foreign bodies, such as nails

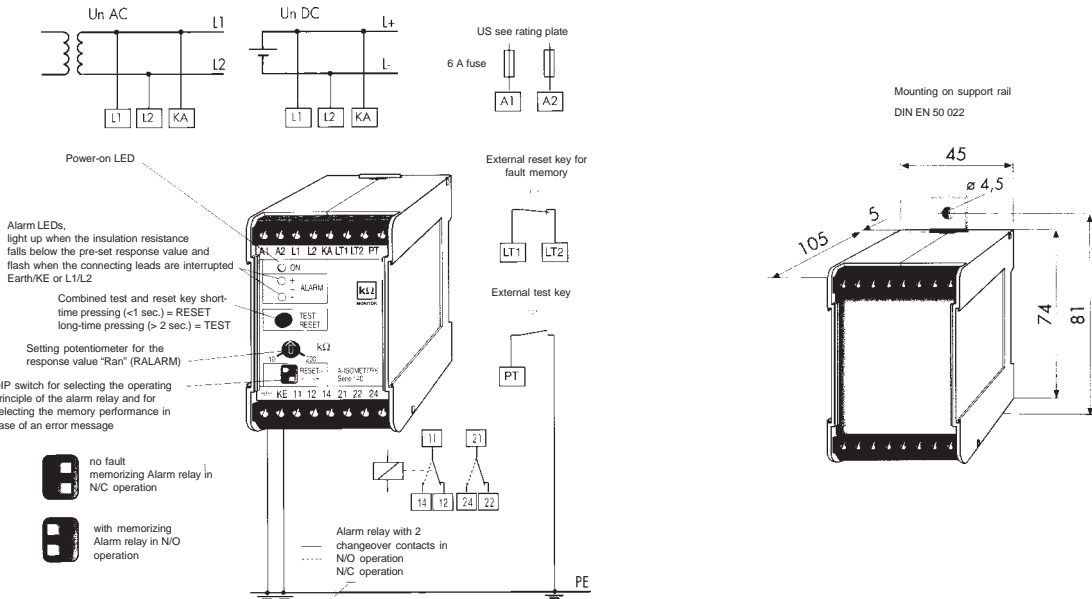
Other effects

- animals (such as biting by rodents)
- plants
- incorrect connections

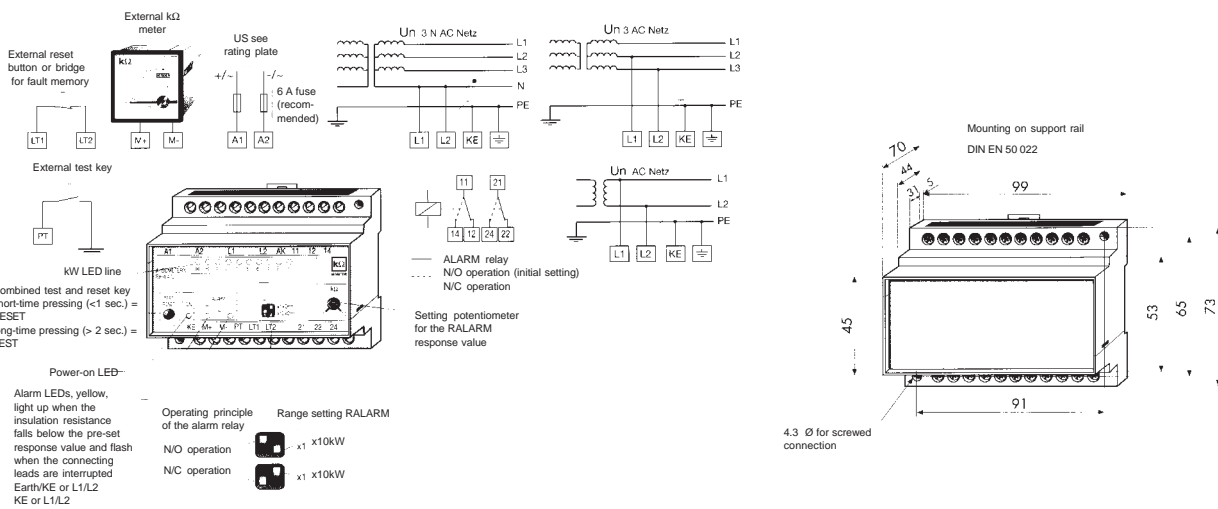
Insulation monitoring device and Earth-leakage monitor C 558.x

Wiring diagrams, dimension diagrams

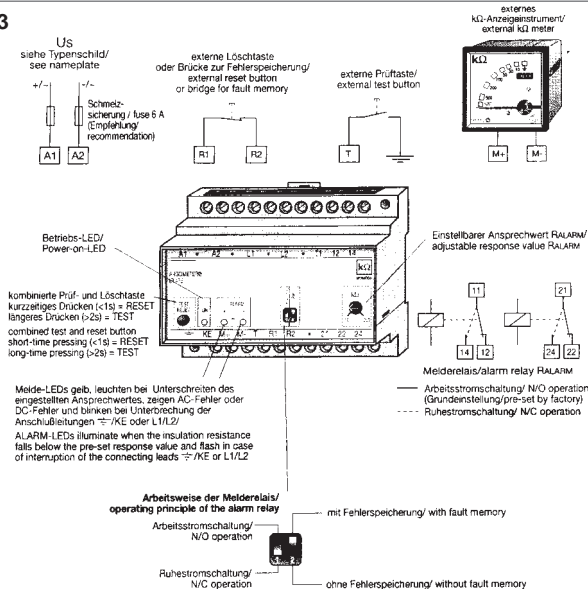
C 558.01



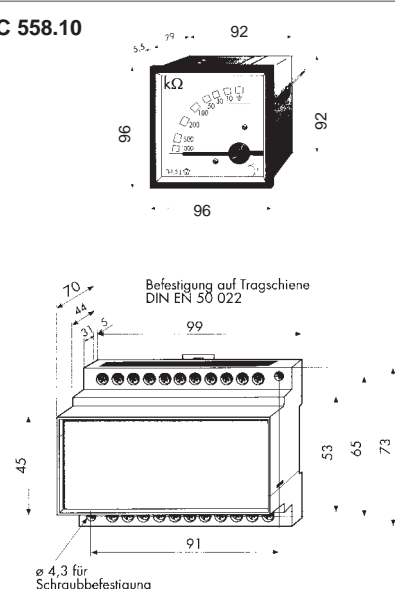
C 558.02



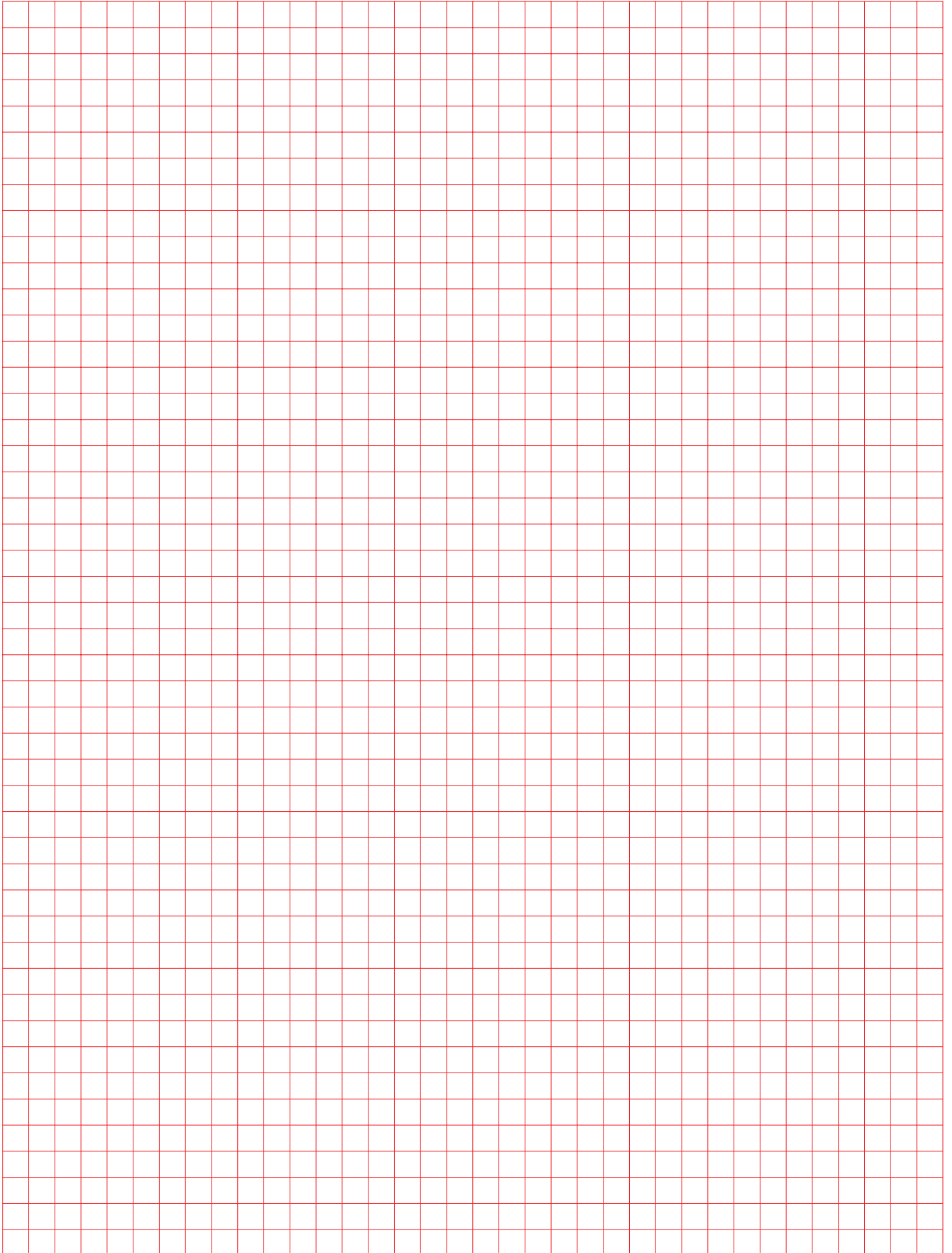
C 558.03



C 558.10



Notes





Thermistor machine protection Custorapid®

Protect your valuable equipment against thermal overload.

The thermistor machine protection units
Custorapid® are thermal protection units.

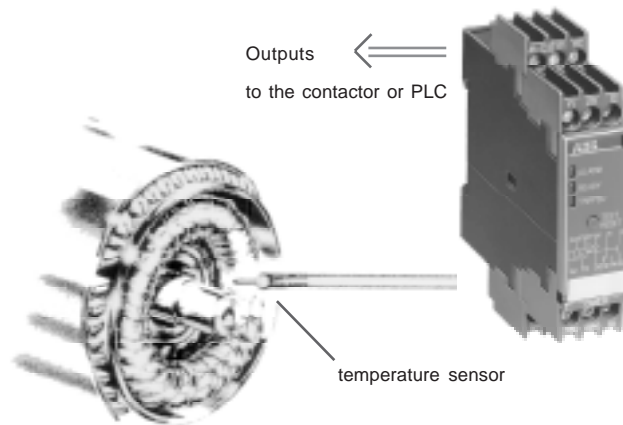
They protect the following from overheating
in conjunction with PTC thermistors

- Electrical drives
- Oils
- Air
- Bearings of machinery
- Heating systems etc.

The most frequent application relates to
motors of conventional design.
On such motors, the winding temperature is
monitored directly.

This is carried out with full utilisation of the
motor output and independently of operating
conditions.

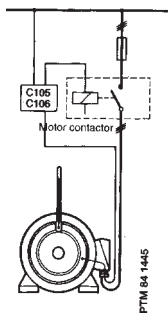
- Heavy starting
- Braking operation
- Mains failure
- Excessively high ambient temperature
- Undervoltage or overvoltage
- High switching frequencies
- Inadequate cooling
- Intermittent operation



Thermistor machine protection Custorapid®

The devices have the following protection and warning capabilities:

- Monitoring of temperature
- Monitoring for wire breakage to PTC-sensor
- Sensor short circuit detection



Functions

The Custorapid® thermistor machine protection compensates from ABB monitor the temperature of a motor directly inside the winding and are therefore ideal as a protection against overheating. The motor temperature is measured by so called PTC thermistor temperature sensors, that normally have already been embedded inside the motor windings by the motor manufacturer. The thermistor machine protection device Custorapid® can easily be connected with the motor via cable. There is no need for further adjustment.

Advantages

- High precision in temperature measurement through PTC temperature sensors in the motor
- ABB Thermistor machine protection Custorapid® can be installed directly in the switch-box
- Incorporated possibility for the integration of process automation through the functions hand/automatic reset
- Robust by design
- Highly reliable
- Simple handling for planing, project-design and installation

ABB offer PTC sensors for different temperatures limits: 70 ... 170 °C

If the temperature of the motor grows over the sensor limit, the relay will switch. After cooling down the relay will switch again and can start the motor.

Thermistor machine protection Custorapid®

for monitoring electrical drives, gas temperatures,
liquid temperatures and storage temperatures



ABB 04 1473 R

Control unit
C 105-1



ABB 04 1622 R

Control unit
C 106-1



SST 025 99

Control unit
C 505.01



SST 022 99

Control unit
C 505.22



SST 020 99

Control unit
C 506.03

Thermistor machine protection Custorapid® type C 105 / C 106

of shockproof design for use in plant with high mechanical loading
e.g. traction, marine applications - overall width 36 mm

Ordering details

Type	Connection voltage U_c V	Order code	Price per piece	Weight per piece kg	Pack. unit piece
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Control unit type C 105, with 1 changeover contact, screw connection

C 105-1- 24	24V AC/DC	GHC 105 0105 R 0005		0.200	1/5
C 105-1- 127	110 ... 127V AC	GHC 105 0105 R 0001		0.200	1/5
C 105-1- 250	200 ... 250V AC	GHC 105 0105 R 0002		0.200	1/5
C 105-1- 440	380 ... 440V AC	GHC 105 0105 R 0004		0.200	1/5

Control unit type C 106, with 1 changeover contact, screw connection

C 106-1- 24	24V AC/DC	GHC 106 0006 R 0005		0.200	1/5
C 106-1- 127	110 ... 127V AC	GHC 106 0006 R 0001		0.200	1/5
C 106-1- 250	200 ... 250V AC	GHC 106 0006 R 0002		0.200	1/5
C 106-1- 440	380 ... 440V AC	GHC 106 0006 R 0004		0.200	1/5

Thermistor machine protection Custorapid® type C505 / C506

- All certifications for worldwide use (UL, CSA, GL, LRS, CE)
- Can also be used with explosion-proof motors (PTB certification)
- Ultra-modern production technology, latest design
- Combined voltage: 110-120V AC and 220-240V AC in one unit (C506.03, C506.02)
- Wide-span voltage power supply unit 24-240V AC/DC (C505.02, C506.12, C506.15, C506.22, C506.62)

Type	Connection voltage U_c V	Order code	Price per piece	Weight per piece kg	Pack. unit piece
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Compact control unit C 505.01

Auto-reset, 1 ch. contact (root bridged with A1) 1 fault LED (TRIPPED), overall width: 22.5 mm

C 505.01 -24	24V DC	1SAR 600 001 R 0005		0.120	1
C 505.01 -110	110-120V AC	1SAR 600 001 R 0001		0.150	1
C 505.01 -230	220-240V AC	1SAR 600 001 R 0002		0.150	1

Control unit C 505.02 (replaces C 105.02)

Auto-reset, 1 NO + 1 NC, 1 LED to indicate operating voltage (READY), 1 fault LED (TRIPPED), overall width: 22.5mm

C 505.02 -24	24V DC	1SAR 600 011 R 0005		0.120	1
C 505.02 -110	110-120V AC	1SAR 600 011 R 0001		0.150	1
C 505.02 -230	220-240V AC	1SAR 600 011 R 0002		0.150	1
C 505.02 -W	24-240V AC/DC	1SAR 600 011 R 0010		0.150	1

Control unit C 506.03, (replaces C106.03)

Manual reset or reset by disconnecting power, 1 NO + 1 NC. Attention: Type K-2-S: 2 NO
1 LED for indication of operating voltage (READY), 1 fault LED (TRIPPED), overall width: 22.5 mm.

C 505.03 -24	24V DC	1SAR 600 011 R 0005		0.120	1
C 506.03 -K	110-120V/220-240V AC	1SAR 600 111 R 0006		0.150	1
C 506.03 -K-2 S	110-120V/220-240V AC	1SAR 600 120 R 0006		0.150	1

Control unit C 506.02, (replaces C106.02)

Manual/auto/remote reset, non-volatile fault storage, 1 NO + 1 NC
1 LED for indication of operating voltage (READY), 1 fault LED (TRIPPED), overall width: 22.5 mm.

C 506.02 -24	24V DC	1SAR 600 211 R 0005		0.120	1
C 506.02 -K	110-120V / 220-240V AC	1SAR 600 211 R 0006		0.150	1

Control unit C 506.12, (replaces C106.12 and C106.13)

Manual/auto/remote reset, 2 changeover contacts, non-volatile fault storage, 1 LED for indication of operating voltage (READY), 1 fault LED (TRIPPED), sensor short-circuit detection, dynamic discontinuity detection, overall width: 22.5 mm.

Thermistor machine protection Custorapid®

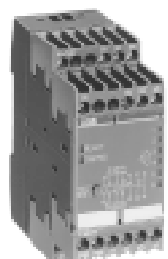
for monitoring electrical drives, gas temperatures,
liquid temperatures and storage temperatures



Control unit
C 506.12



Control unit
C 506.22



Control unit
C 506.62



Temperature sensor
C 011

Ordering details

Designation	Connection voltage U_c V	Order code	Price per piece	Weight per piece kg	Pack. unit piece
C506.12 –24	24V DC	1SAR 600 302 R 0005		0.120	1
C506.12 –W	24-240V AC/DC	1SAR 600 302 R 0010		0.150	1

Control unit C 506.15

Manual/auto/remote reset, 2 changeover contacts, non-volatile fault storage, 1 LED for indication of operating voltage (READY), 1 fault LED (TRIPPED), sensor short-circuit detection, bistable output relay (retains its switching state even if the power supply is interrupted). For applications in chemistry and process technology, overall width: 22.5mm.

C506.15 –W	24-240V AC/DC	1SAR 600 402 R 0010		0.150	1
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Control unit C 506.22, warning and shut-off

Manual/auto/remote reset, 1 NO + 1 changeover contact, two measuring circuits. If 1st switching threshold is exceeded, a warning signal (1 NO) is issued. If 2nd switching threshold is exceeded, motor is switched off (1 ch. contact). Non-volatile fault storage, 1 LED for warning indication (ALARM), 1 LED to indicate op. voltage (READY), 1 fault LED (TRIPPED), overall width: 22.5 mm.

C 506.22 –W	24-240V AC/DC	1SAR 600 511 R 0010		0.150	1
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Control unit C 506.62 for multi-motor protection

Manual/auto/remote reset, 1 NO + 1 NC, monitoring of max. 6 motors, centralised fault indication, non-volatile fault storage, 1 LED for indication of operating voltage (READY), 1 fault LED (TRIPPED). One LED for each measuring circuit (1-6) indicates in the event of a fault which motor caused the shut-off. Overall width: 45 mm

C506.62 –W	24-240V AC/DC	1SAR 600 612 R 0010		0.250	1
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Accessories

Push-in link for screw fastening C 560.20

Mounting of control units C 505 / C 506 without top-hat rail on mounting panel with 1 set (2 pieces) of push-in links

1SAR 390 000 R 2000		5 sets
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① C = Combined voltage 110 / 230 V, AC

② W = Wide-span voltage 24 - 240 V, AC/DC

PTC thermistor temperature sensors, ordering details

Type	Rated temperature °C	Colour coding	Order code	Price per pack. unit	Weight kg	Pack. unit piece
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Temperature sensor Type C 011, normal version to DIN 44081

C 011- 70	70	white-brown	GHC 011 0003 R 0001		0.002	3
C 011- 80	80	white-white	GHC 011 0003 R 0002		0.002	3
C 011- 90	90	green-green	GHC 011 0003 R 0003		0.002	3
C 011-100	100	red-red	GHC 011 0003 R 0004		0.002	3
C 011-110	110	brown-brown	GHC 011 0003 R 0005		0.002	3
C 011-120	120	grey-grey	GHC 011 0003 R 0006		0.002	3
C 011-130	130	blue-blue	GHC 011 0003 R 0007		0.002	3
C 011-140	140	white-blue	GHC 011 0003 R 0011		0.002	3
C 011-150	150	black-black	GHC 011 0003 R 0008		0.002	3
C 011-160	160	blue-red	GHC 011 0003 R 0009		0.002	3
C 011-170	170	white-green	GHC 011 0003 R 0010		0.002	3

Triple temperature sensor Type C 013

C 0113-150	150	black-black	GHC 011 0033 R 0008		0.006	1
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Further reading

For application limits and test methods see "Instructions for Installation – Testing – Operation" of the thermistor machine protection Custorapid® with PTC thermistor temperature sensors.

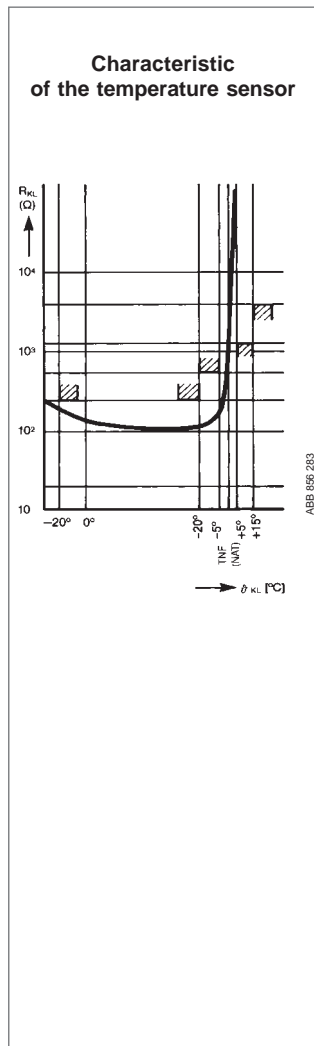
Thermistor machine protection Custorapid®

General information

Mode of operation

The thermistor machine protection control units Custorapid® C505 and C506 operate according to the closed-circuit principle and therefore self-monitor even against discontinuity in the connection voltage. A short-term voltage drop of less than 200 ms (100 ms in the case of wide-span voltage units) does not cause a change in state of the output contacts. Control units C506.12 and C506.15 are additionally equipped with short-circuit detection in the sensor circuit. In the

event of a short circuit in the sensor circuit (resistance in sensor circuit < 20 Ω) the device is tripped. This equipment state is indicated by flickering of the TRIPPED LED. Control units C506.12 are also equipped with dynamic discontinuity detection (flashing of the TRIPPED LED). The control units have electrical isolation between the control circuit and sensor circuit (24V DC versions have no electrical isolation).



The PTC thermistor temperature sensors (temperature-dependent with positive temperature coefficient) must be selected by the manufacturer of the motors depending on:

- the motor insulation class to IEC Publication 34-11
- the motor utilisation category
- the special characteristics of the motor, such as conductor cross-sections of the windings, permissible overload factor etc.
- special conditions prescribed by the user, such as permissible ambient temperature, risks resulting from locked rotor, extent of permitted overloading etc.

One temperature sensor must be embedded in each phase of the winding. In the case of three-phase squirrel cage motors for instance, three sensors are embedded in the stator winding. For pole-changing motors with one winding (Dahlander connection), 3 sensors are also sufficient. However, pole-changing motors with two windings require 6 sensors.

If a preliminary winding is required before the motor is switched off, separate sensors for a correspondingly lower temperature must be embedded in the winding. They are connected to a second control unit.

The sensors are suitable for embedding in motor windings with rated operating voltages of up to 660 V AC. Conductor length: 500 mm per sensor.

A 14 V DV varistor can be connected in parallel to protect the sensors from overvoltages. Because of their characteristics, the control units can be used with thermistor sensors of other manufacturers to DIN 44 081 and DIN 44 082.

Technical data

Characteristics	Sensor type C 011
Cold state resistance	50 ... 150 Ω at 25° C
Warm state resistance	
± 5 to 6 K of rated temperature, TNF (NAT)	10 000 Ω
Thermal time constant sensor open ¹⁾	2.5 ... 3.5 s
Short circuit current density	max. 50 A/mm ²
Max. permitted voltage at sensor terminals	max. 2.5 V
Permitted ambient temperature	
• short-term	+ 275° C
• continuous	+ 175° C

¹⁾ Not embedded in windings.

PTC thermistor temperature sensors type C 011 in conjunction with the thermistor machine protection Custorapid® Type C 105 (PTB Report No. on request) are suitable for the protection of EEx e motors.

Test/reset button

The tripped device can be reset with the blue button (only on C506.xx), provided the sensor circuit(s) have cooled down again (< 1500 Ω). In addition, the test function can be invoked and tripping simulated in the non-tripped state by depressing the button > 2 s.

Remote reset

With a floating NO contact at terminals Y1 and Y2 (not on C505.xx and C506.03) the tripped device can be reset provided the sensor circuit(s) have cooled down again (< 1500 Ω).

Auto reset

Devices C505.01 and C505.02 reset themselves automatically when the sensor circuit has cooled down. This function can be realized in devices with remote reset by means of an external jumper between terminals Y1 and Y2.

Short-circuit detection:

Control units C506.12 and C506.15 constantly check the sensor-circuit resistor for short circuit. Sensor circuit resistances < 20 Ω cause the device to trip. The TRIPPED LED flickers.

Non-volatile storage

Control units C506.02, C506.12, C506.15, C506.22 and C506.62 store the device state (tripped / not tripped) in an EEPROM. In the event of mains failure, this state is retained and is restored on resumption of power supply. On the C506.15 with bistable output relay, the position of the output contacts is also retained on interruption of supply.

Dynamic discontinuity monitoring

Control unit C506.12 with dynamic discontinuity monitoring evaluates the rise time of the sensor circuit resistance. If the sensor circuit resistance rises within 200 ms from 3600 Ω to 12 kΩ, the device does not just trip, but also indicates the discontinuity by flashing of the TRIPPED LED.

Thermistor machine protection Custorapid®

Technical data

Indication of state by LEDs

READY LED (not on C505.01)	Green	Off On	Device not ready for operation, internal device fault Device ready for operation
TRIPPED LED	Red	Off On Flashing Flickering	Device in non-tripped state: normal operation Device in tripped state: excess temperature Device in tripped state: sensor discontinuity Device in tripped state: sensor short circuit
ALARM-LED (only on C506.22)	Yellow	Off On	Alarm temperature not reached, alarm output not active Alarm temperature reached, alarm output active

Control circuit

Connection voltage U_C :	Tolerance range:
24 V DC	$0.85 \times U_C$ to $1.2 \times U_C$ (20.4 V to 28.8 V)
110 - 120 V AC	$0.85 \times U_C$ to $1.1 \times U_C$ (93.5 V to 132 V)
220 - 240 V AC	$0.85 \times U_C$ to $1.1 \times U_C$ (187 V to 264 V)
24 - 240 V AC/DC	$0.85 \times U_C$ to $1.1 \times U_C$ (20.4 V to 264 V)
Rated frequency:	50 Hz / 60 Hz
Rated insulation voltage U_i :	300V
Rated impulse strength U_{imp} :	6 kV (C506.12 in wide-span voltage version) 4kV (other units)
Overtoltage category:	III
Pollution degree:	3 (housing), 2 (PCB)

Sensor circuit

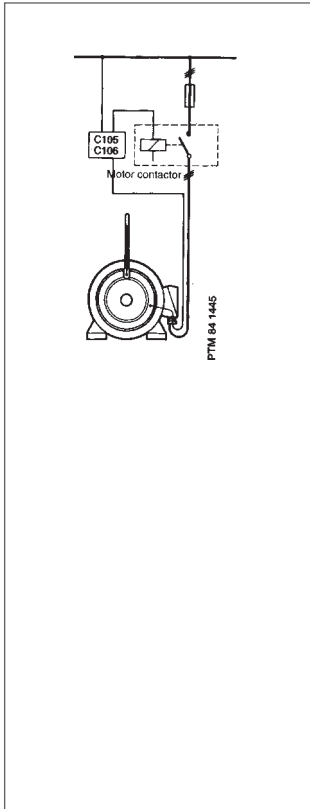
Max. number of sensors:	6		
Cumulative cold resistance R_F :	- 1500 Ω		
Switch-off resistance R_{Foff} :	3.4 to 38 k Ω		
Switch-on resistance R_{Fon} :	1.5 to 1.65 k Ω		
Sensor circuit power consumption at R_F - 1.5 k Ω	< 5 mW		
Current with short-circuited sensor circuit:	- 1.2 mA		
Sensor circuit voltage at R_F = 4 k Ω	- 4.3 V		
Sensor circuit voltage on detection sensor rupture:	- 30 V		
Short-circuit detection R_{FKS} (C506.12 and C506.15):	< 20 Ω		
Conductor lengths:	Cross-section	Control units without short-circuit detection	Control units with short-circuit detection
	2.5 mm ²	2 x 2800 m	2 x 250 m
	1.5 mm ²	2 x 1500 m	2 x 150 m
	0.5 mm ²	2 x 500 m	2 x 50 m

Auxiliary circuit output contacts

Continuous thermal current I_{th} :	5 A
Utilisation category:	
AC-15	3 A / 240 V
AC-14	3 A / 240 V
DC-13	0.1 A / 240 V, 1 A / 24 V
Short-circuit protection:	Diazed 6 A gL/gG
Rated insulation voltage U_i :	300 V
Rated impulse strength U_{imp} :	6 kV (C506.12 in wide-span voltage version) 4 kV (other units)
Overtoltage category:	III
Pollution degree:	3 (housing), 2 (PCB)

Thermistor machine protection Custorapid®

PTB, Approvals



Notes

- ⚠ In the case of tripping devices with DC operation, electrical isolation must be ensured by means of a battery network or a safety isolating transformer according to DIN VDE 0551.
- ⚠ If tripping devices with AUTO RESET are used in EEx e applications, it must be ensured by the control wiring that the machine being monitored does not restart independently.
- ⚠ In the case of tripping devices without short-circuit detection, the sensor circuit resistance must be measured with a suitable measuring device on initial startup. In the case of resistances < 50 Ω the sensor circuit must be checked for short circuit.
- ⚠ If using device C505.01 (no READY LED) or C506.15 (no change of switching state of output relay if control voltage fails) to protect EEx e motors, separate monitoring of the control voltage is recommended.

Thermistor machine protection Custorapid® for EEx e motors

Control units type C 505 and C 506 are suitable for direct temperature monitoring of EEx e motors in accordance with VDE 0165/9.83 in conjunction with PTC thermistor temperature sensors to DIN 44081 and DIN 44082.

The units bear the test mark of the "German National Standards Laboratory" in Braunschweig – PTB Notification 91 (1981), page 122 –.



Control units with the adjacent test mark are interchangeable.

If machines are equipped with PTC thermistor temperature sensors to DIN 44 081 or DIN 44 082, the control units with test mark may also be used in place of control units stipulated in the PTB test certificates in each case. The PTB test certificate for protective devices C 505.01, C 505.02, C 506.02, C 506.03, C 506.12, C 506.15, C 506.22 and C 506.62 is available.

Approvals and certificates

Device type	Approvals							Quality marks			Ships' classification societies					
Test mark																
Abbreviation	SEV	DEMKO	NEMKO	SEMKO	Inspect	CSA	UL	ÖVE	PTB	BV	GL	LRS	DNV	PRS	RINa	Reg.
Validity	Switzerl.	Demnmark	Norway	Sweden	Finland	Canada	USA	Austria	Germany	France	Germany	Gr. Britain	Norway	Poland	Italy	Russia

Thermistor machine protection Custorapid® and PTC thermistor temperature sensor

C 505.01																	
C 505.02					○	■	■	■	■		■	■					
C 506.02					○	■	■	■	■		■	■					
C 506.03					○	■	■	■	■		■	■					
C 506.12					○	■	■	■	■		■	■					
C 506.15					○	■	■	■	■		■	■					
C 506.22					○	■	■	■	■		■	■					
C 506.62					○	■	■	■	■		■	■					
C 011	■	■			○	● (1)		● (2)			■	■		■			

Explanation of symbols:

- Normal version approved: rating plates bear the test mark if mandatory
- Special design approved
- No general mandatory test with the exception of special cases

- (1) 300 V AC voltage max.
- (2) Special routine test

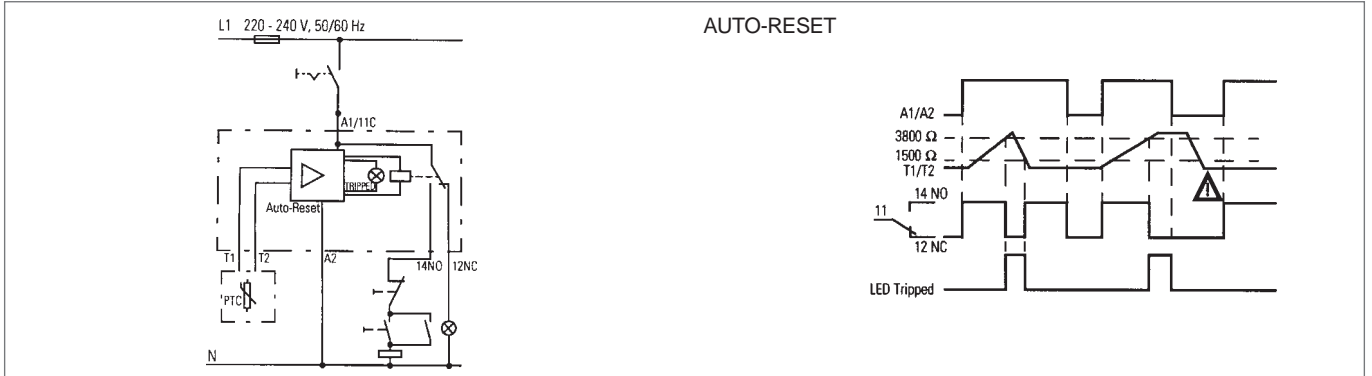
Thermistor machine protection Custorapid® Type C 505 / C 506

Connection examples, function diagrams

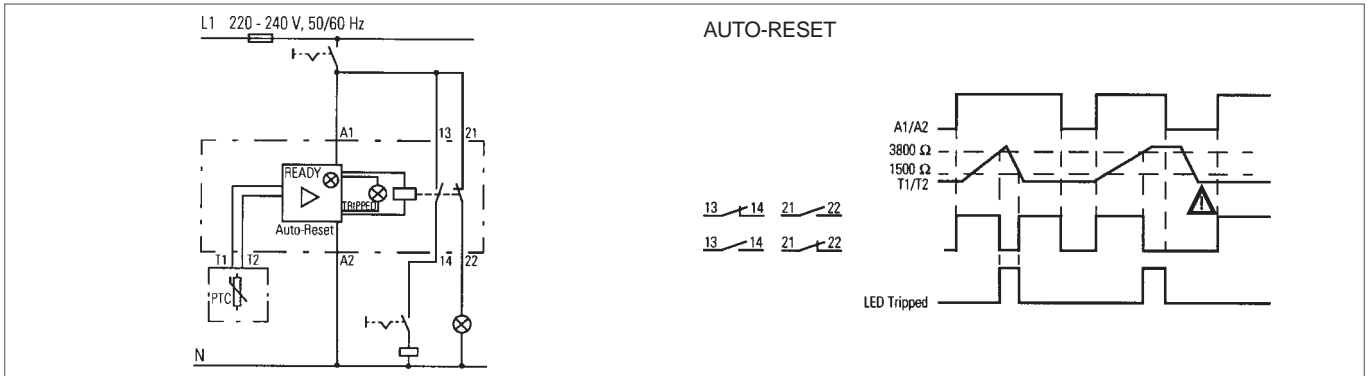
Connection examples

Function diagrams

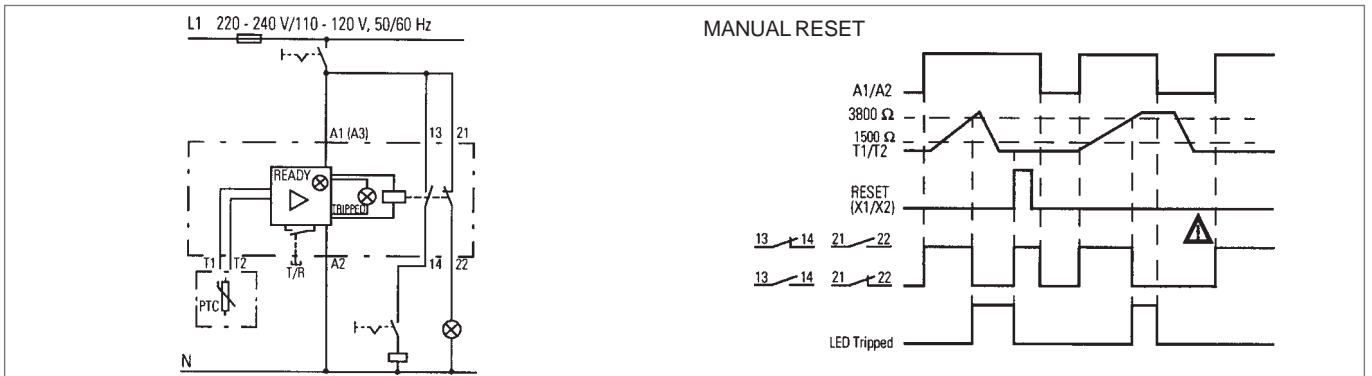
C 505.01



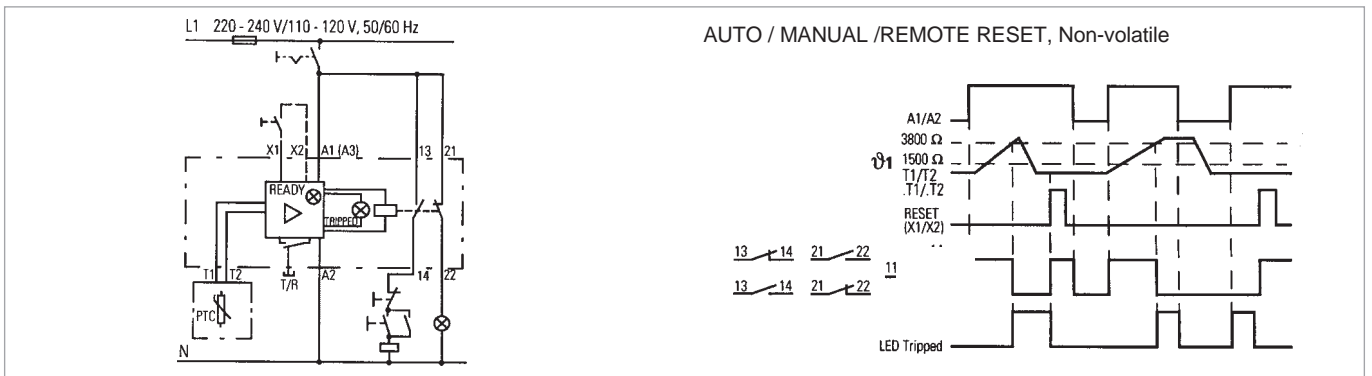
C 505.02



C 506.03



C 506.02



Thermistor machine protection Custorapid®

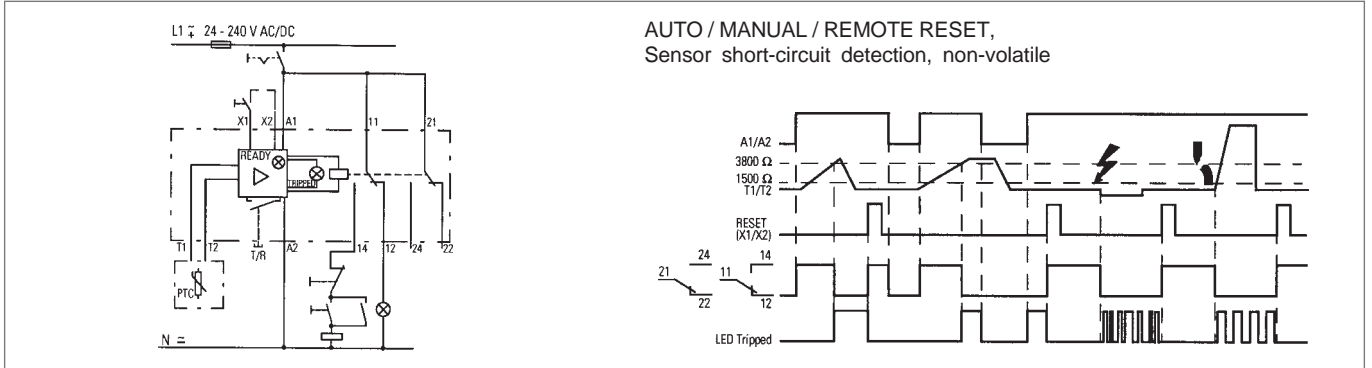
Type C 505 / C 506

Connection examples, function diagrams

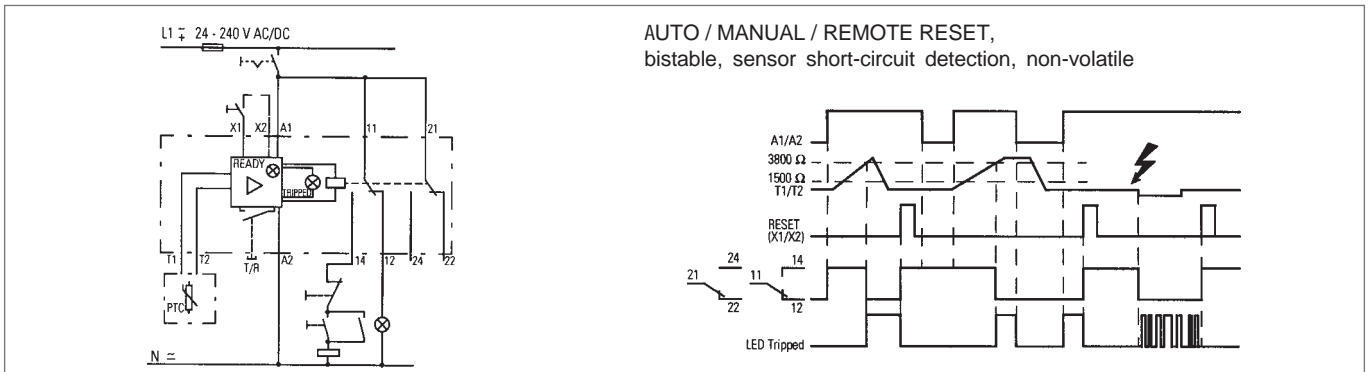
Connection examples

Function diagrams

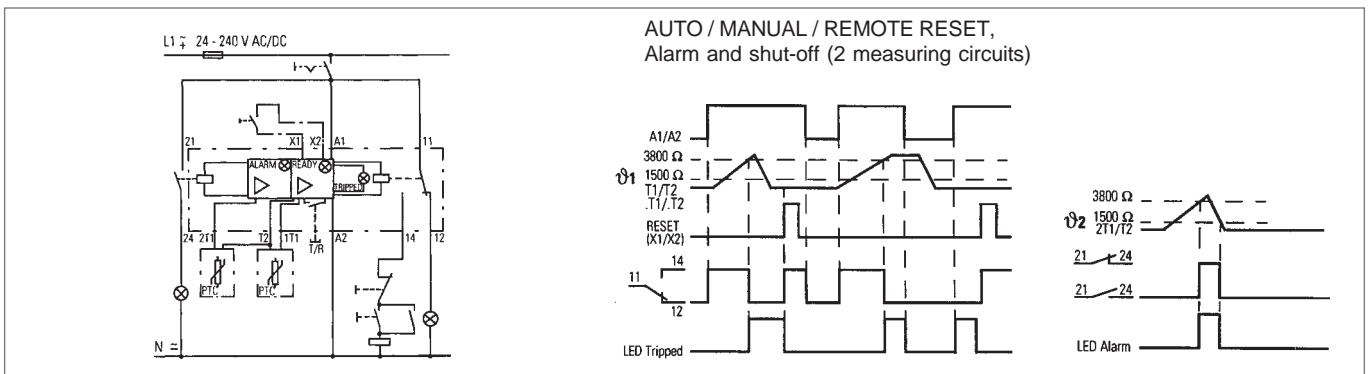
C 506.12



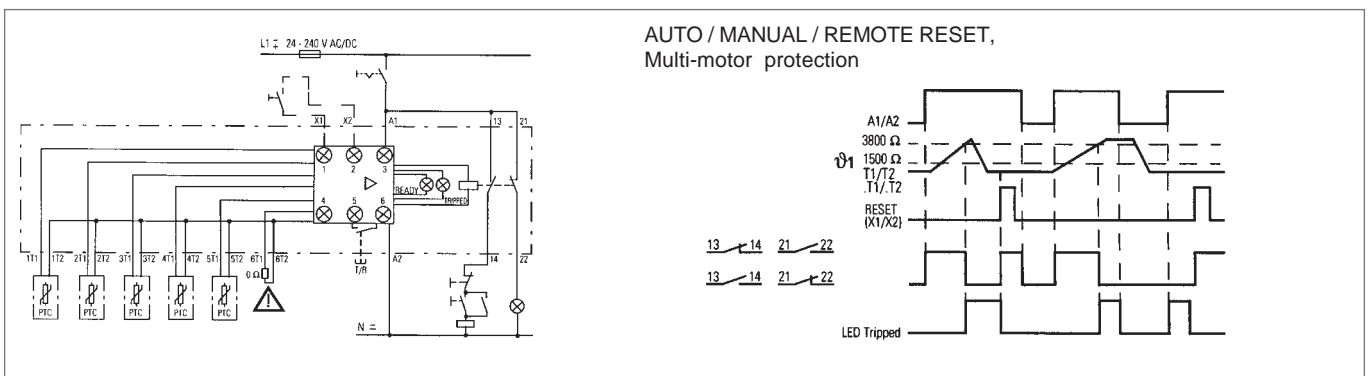
C 506.15



C 506.22



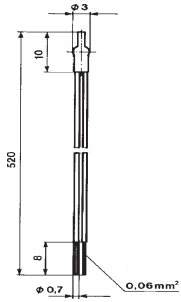
C 506.62



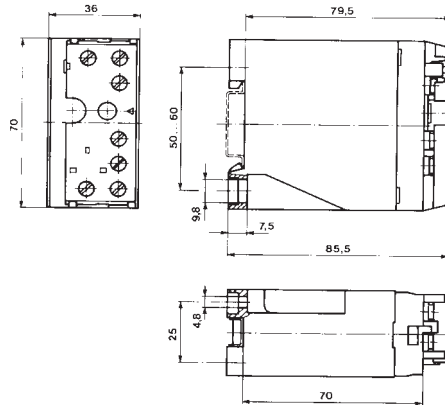
Thermistor machine protection Custorapid®

Dimension diagrams

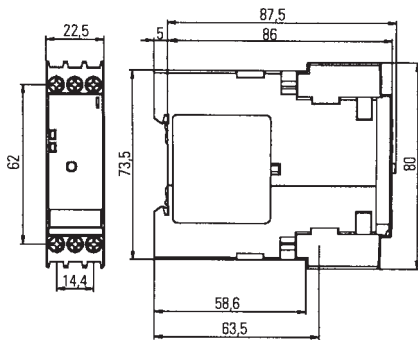
Dimensions in mm



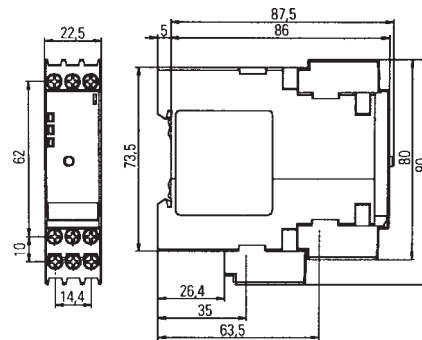
Temperature sensor
type C 011



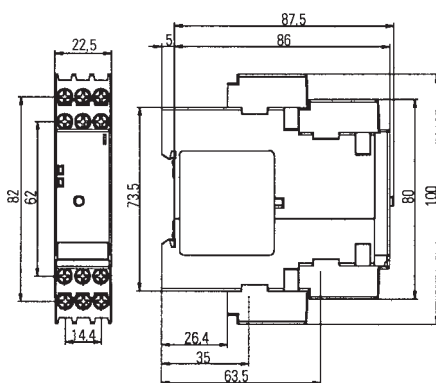
Thermistor machine protection Custorapid®
Control units type C 105 / C 106
in shockproof version



C 505.01

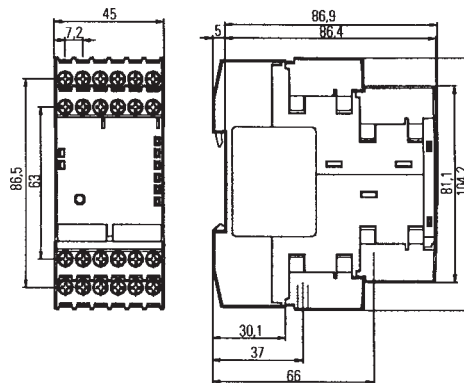


C 505.02



C 506.02
C 506.12
C 506.22

C 506.03
C 506.15



C 506.62



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