

Installation and operating instructions

DCTR A and DCTR B NK residual current monitors

These installation and operating instructions describe the installation and commissioning of the DCTR type A and type B residual current monitors. They are intended for use by electrically skilled persons. Electrical laypersons must not install and connect devices of this type due to the considerable potential dangers. The instructions must be kept so that they can be referred to at a later stage.

Scope of delivery

operating instructions, drilling templates, ten-pin terminal strip, device

Warning notes

1. Devices with visible damage must not be installed or used.
2. Residual current monitors of this type are not suitable as additional protection through switch-off in combination with a circuit-breaker, for example, as per VDE 0100 Part 410 (residual current protection).
3. Type A devices are not suitable for detecting frequencies \neq 50–60 Hz and direct current.
4. There is no difference between operation-related leakage currents and residual currents.

Intended use

The compact residual current monitors from the DCTR range as per DIN EN 62020 are used to detect and report residual currents in electrical installations, especially those in TN-S, TN-CS and TT networks. Use in IT networks is possible, but may be limited by installation regulations. DCTR A devices are designed for use in AC networks where no residual currents \neq 50–60 Hz can occur. They detect type A residual currents. By contrast, DCTR B NK devices are AC-DC sensitive and detect type B residual currents from DC to 100 kHz. They also meet the requirement for increased preventative fire safety in the detection of type B+ residual currents. DCTR B devices are suitable for monitoring both AC and DC networks.

According to VDE 0100 Part 420, residual current monitors may be used in connection with a circuit-breaker for installation switch-off in order to prevent electrical fires caused by insulation faults, insofar as residual current circuit-breakers are rejected for technical reasons.

The devices are designed for installation in power distributors in dry indoor conditions. The devices are mounted on stable surfaces or a mounting plate using the supplied screw points.

The following information must be observed to ensure correct operation.

Technical properties

For correct function, the DCTR devices require the following:

- a) There must be a supply voltage of 24 V DC.
- b) The active conductors to be monitored must be fed through the inner hole of the sensor. The protective conductor must not be fed through this point. Alternatively to b), the protective conductor can be monitored; it would then be the only conductor to be fed through the inner hole of the transformer.

Residual current is reported via an integrated relay when the response threshold of 50% of the rated residual current has been exceeded. The contacts of the relay can activate an external acoustic or visual signal. If the installation regulations allow, the relay can also effect the switch-off of a circuit-breaker. Furthermore, the integrated 4–20 mA standardised interface can be used to output and monitor the instantaneous residual current via conventional output devices of various types with 4–20 mA interface(s). Both output options can be used at the same time or individually.

Additionally, an LED integrated in the arc of the housing illuminates green when the relay response threshold is detected and red when it is exceeded.

The test key, which can be accessed from outside, generates a test residual current that allows for a real function test to be conducted. It is also possible to connect an external test key with an NO contact in parallel to the terminal strip if the transformer is not mounted to accessible parts of an installation.

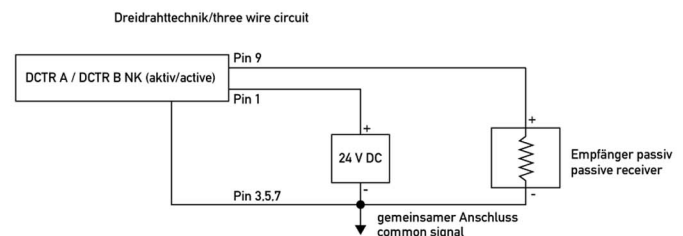
The relevant rated current of the device does not reflect the load current actually permitted, which can be up to six times this value. The reason for this is that the physical effects of a high load current generate what are known as "symmetry errors" which can affect the accuracy of the response threshold and interface. With a rated current that is six times higher, the relay would be quick to trip even without residual current and the interface would signal approx. 10 mA. Specifying a much lower rated current should ensure that there are no false alarms when a motor starts up, for example.

4–20 mA interface design

Leaked and residual currents are detected within a range from 0–300 mA and output on the integrated 4–20 mA interface proportionally to a large extent.

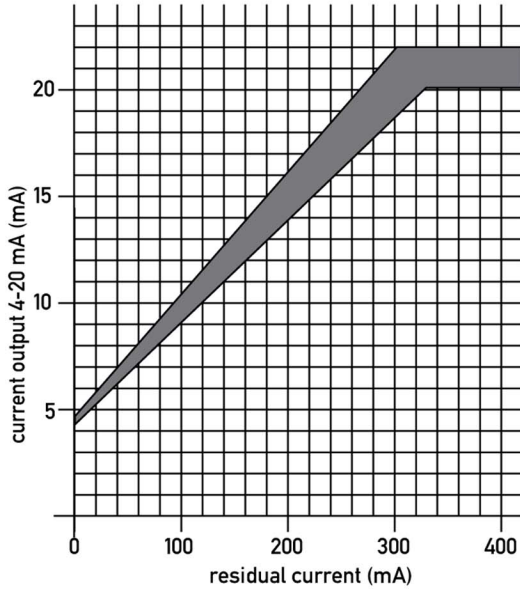
Current output	Residual current I Δ n
< 4 mA	device/interface fault
4 mA	0 mA
20 mA	300 mA

The short-circuit-proof interface is implemented in a three-wire circuit, whereby 0 V is the common signal for both the 24 V supply voltage and the 4–20 mA interface simultaneously.

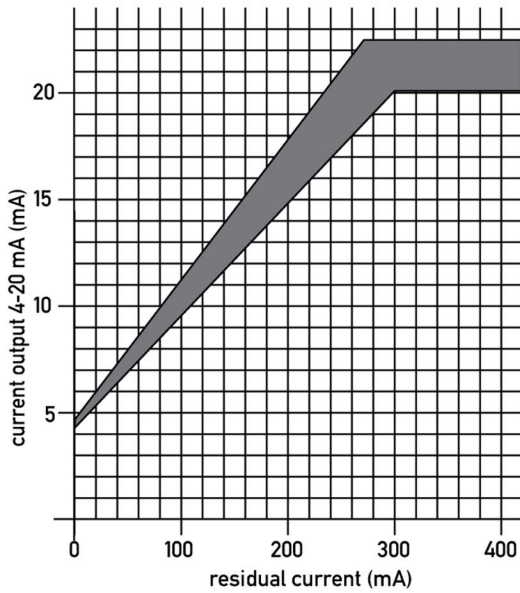


Linearity of the 4–20 mA interface

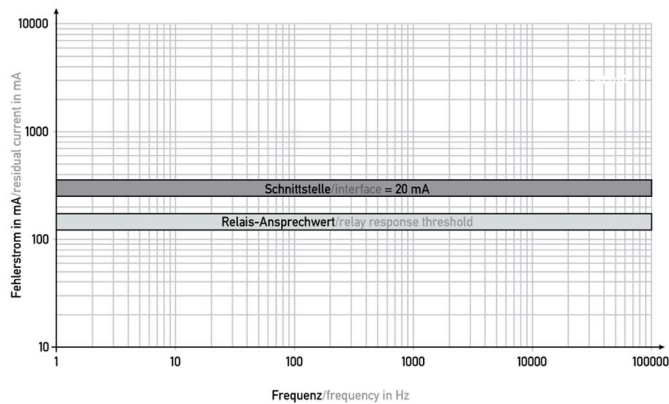
Linearity of the 4–20 mA interface (AC)



Linearity of the 4–20 mA interface (DC)



Tolerance bandwidth of the detection frequency response related to 20 mA on the interface and relay output



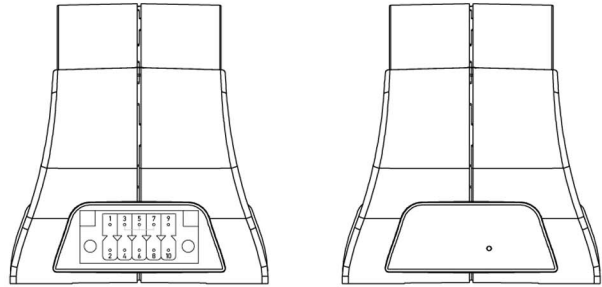
Relay response times

A response delay for the relay ensures that the relay switches after the interface reaches this response threshold. A residual current that may lead to the installation being switched off is therefore shown first on the interface, allowing the event to be logged.

Mounting and installation

The accuracy of the evaluation that is being carried out depends on the conductors being fed through the inner hole. The conductors must be as close to the centre as possible.

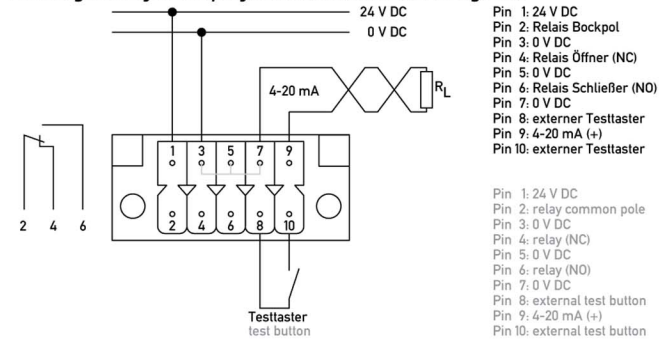
Wiring diagram



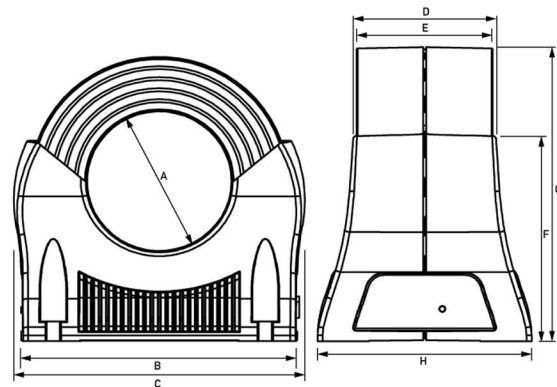
▲ ten-pin female connector

▲ test key

Pin assignment for ten-pin female connector (de-energised)



Dimensional drawings



▲ **DCTR**

Design	Dimensions in mm							
	A	B	C	D	E	F	G	H
DCTR 35 A	35	85	92	36	33	75	98	71
DCTR 70 A	70	120	127	36	33	88	129	71
DCTR 35 B	35	99	106	69	66	87	113	104
DCTR 70 B	70	134	141	69	66	100	143	104

Technical data

DCTR	Type A		Type B	
	DCTR A 35	DCTR A 70	DCTR B 35	DCTR B 70
Supply voltage				
Rated voltage Ue	24 V DC \pm 10%			
Overvoltage category	III			
Rated impulse withstand voltage Uimp	1.5 kV			
Rated insulation voltage Ui	30 V			
Internal consumption Pe	< 1.5 W			
Transformers				
Rated residual current Idn	300 mA			
Rated voltage range of monitored circuit Un	0 – 690 V			
Rated frequency range of monitored circuit fn	50 – 60 Hz	0 – 400 Hz		
Residual current detection characteristic curve	50 – 60 Hz	DC – 100 kHz		
Rated impulse withstand voltage Uimp	8 kV			
Rated insulation voltage Ui	700 V			
Overvoltage category/pollution degree	IV/2			
Rated current in	200 A	300 A	200 A	300 A
Max. overcurrent regarding non-tripping	1200 A	1800 A	1200 A	1800 A
Rated residual short-circuit current I Δ c	10 kA			
Thermal rated short-time withstand current I Δ th	100 A			
Thermal rated continuous withstand current I Δ cth	100 A			
Rated impulse residual current I Δ dyn	10 kA			
Response values				
AC rated response residual current relay	50% I Δ n \pm 10%			
AC rated response residual current output	100% I Δ n \pm 10%			
DC rated response residual current relay	/	50% I Δ n +0 -20%		
DC rated response residual current output	/	100% I Δ n +0 -20%		
Memory displays				
Fault memory	none			
Green LED	Un = OK / I Δ n < 50%			
Red LED	Relay switched / I Δ n > 50%			
Inputs and outputs				
Test key				
Cable length for external test key	0 – 3 m			
Short-circuit current	10 mA DC, short-circuit-proof			
Voltage at open terminals:	24 V DC			
Type of terminals				
Terminal type	Push-in terminal			
Conductor cross-section (rigid/flexible with ferrule)	0.25 – 1.5 mm ²			

DCTR	Type A		Type B	
	DCTR A 35	DCTR A 70	DCTR B 35	DCTR B 70
Conductor cross-section (rigid/flexible)	0.5 – 1.5 mm ²			
Stripping length	10 mm			
Interface				
Type 3 as per ISA-50.1, see figure with three-wire circuit				
Current output (corresponds to 0...100% I Δ n AC/DC)	4–20 mA DC			
Current output at 0% I Δ n AC/DC	4–4.5 mA DC			
Current output at 100% I Δ n AC/DC	20–22 mA DC			
Peak to peak noise	\leq 0.25%			
Resolution	0.01 mA analogue			
Short-circuit current	25 mA DC, short-circuit-proof			
Load resistance/apparent ohmic resistance (class L)	\leq 300 Ω			
Voltage at open terminals:	24 V DC			
Response time 1 \times I Δ n AC/DC Step response 10–90%	\leq 300 ms			
Response time 1 \times I Δ n AC/DC Step response 0–50%	\leq 150 ms			
Response time 5 \times I Δ n AC/DC Step response 10–90%	\leq 150 ms			
Response time 5 \times I Δ n AC/DC Step response 0–50%	\leq 100 ms			
Relay				
Contact type	1 changeover contact			
Rated voltage	30 V AC/DC			
Rated current	1 A AC/DC			
Response time 1 \times I Δ n AC/DC	\leq 300 ms			
Response time 5 \times I Δ n AC/DC	\leq 150 ms			
Response threshold I Δ n AC	50% \pm 10%			
Response threshold I Δ n DC	50% +0 -20%			
Hysteresis I Δ n AC	< 30%			
Environment/EMC				
Operating temperature range	-25°C – 70°C			
Storage temperature range	-40°C – 85°C			
Protection class (housing)	IP 20			
Installation position	Optional			
Housing material	Polycarbonate			
Device design regulations	DIN EN 62020 DIN EN 61000-4-3 DIN EN 61000-4-6	DIN EN 62020 DIN VDE 0664-400 DIN EN 61000-4-3 DIN EN 61000-4-6		
Interface design regulations	DIN IEC 381-1/ISA-50.1			
Article number	09342631	09342641	09344632	09344642

Warranty

All professionally installed, unaltered devices are covered by warranty for the duration of the statutory warranty period from the day of purchase by the end user. The warranty is not applicable to damage incurred during transport or caused by short-circuit, overloading or improper use. In the event of defects in workmanship or material being discovered within the warranty period, the company will provide repair or replacement free of charge.