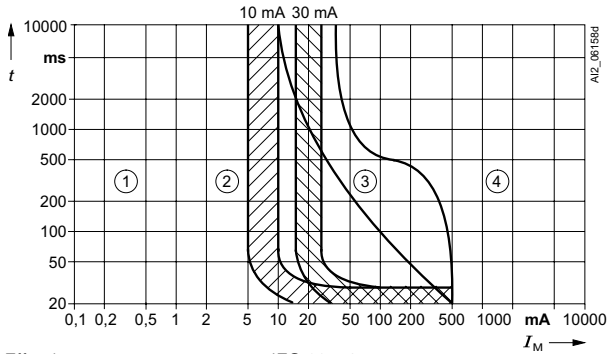


Overview

Protection against dangerous leakage currents according to DIN VDE 0100 Part 410

Application

- Protection against indirect contact (indirect personnel protection) – as leakage protection through tripping in the event of higher touch voltages due to short-circuits to frame on equipment
- Using residual current protective devices with $I_{\Delta n} \leq 30 \text{ mA}$ also largely protects against direct contact (direct personnel protection) – as additional protection through tripping as soon as live parts are touched



Effective current ranges acc. to IEC 60479

- Range ① Usually, the effect is not perceived.
- Range ② Usually, there are no noxious effects.
- Range ③ Usually, no danger of heart fibrillation.
- Range ④ Heart fibrillation danger.

I_M : Shock current
 t : Duration

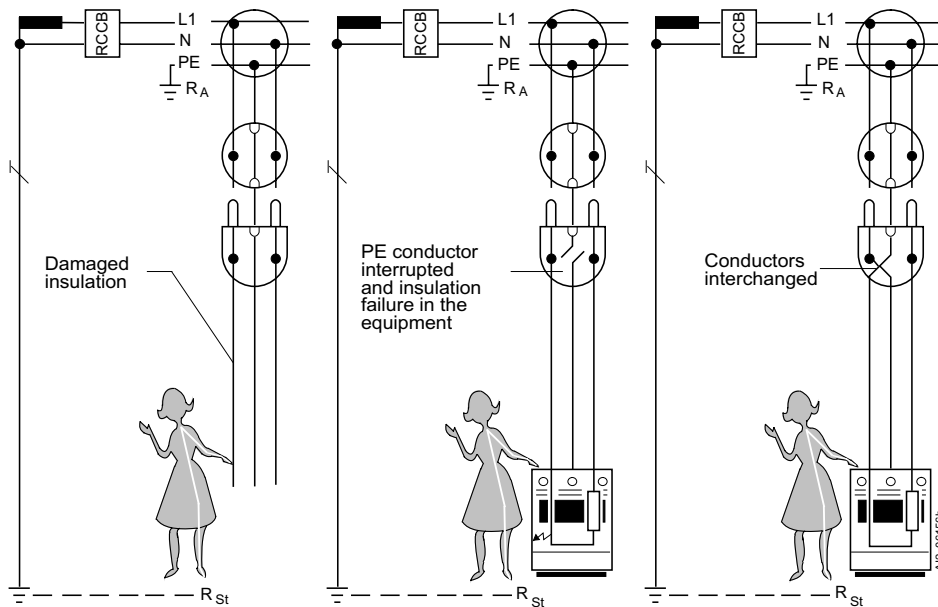
Protective action

While devices for rated residual current $I_{\Delta n} > 30 \text{ mA}$ provide protection against indirect contact, using devices with $I_{\Delta n} \leq 30 \text{ mA}$ also offers the best possible additional protection against accidental direct contact with live parts.

The diagram above shows a summary of the physiological reactions of the human body to power flows in the effective current ranges. The dangerous values are the current/time values in range 4 as they can trigger ventricular fibrillations, which can cause death. It also shows the tripping range of the residual current protection device with rated residual current 10 mA and 30 mA. The instantaneous tripping time lies in the middle between 10 ms and 30 ms.

The permissible tripping time of max. 0.3 s (300 ms) according to EN 61008 or IEC 61008 is not reached. Residual current protective devices with rated residual current 10 or 30 mA also offer reliable protection when a current flows through a person after accidental direct contact with live parts. This protective action is not matched by any other comparable protective measure in the event of indirect contact.

However, when using residual current protective devices, a suitably grounded PE conductor must also be fitted to the devices and equipment to be protected. This means that it is only possible for a person to be subjected to a flow of current if two faults occur or in the event of accidental contact with live parts.



Examples of accidental direct contact

If live parts are directly touched, two resistors determine the level of the current – the internal resistance of the person R_M and the contact resistance of the location R_{St} . For a proper assessment of the accident risk, the worst case scenario must be assumed, which is that the contact resistance of the location is virtually zero.

Residual Current Protective Devices

General Data

Description

Overview

The resistance of the human body depends on the current path. Measurements have shown, for example, that a current path of hand/hand or hand/foot has a resistance of approx. 1 000 Ω . Taking into account a fault voltage of 230 V AC, this produces a current of 230 mA for the current path hand/hand.

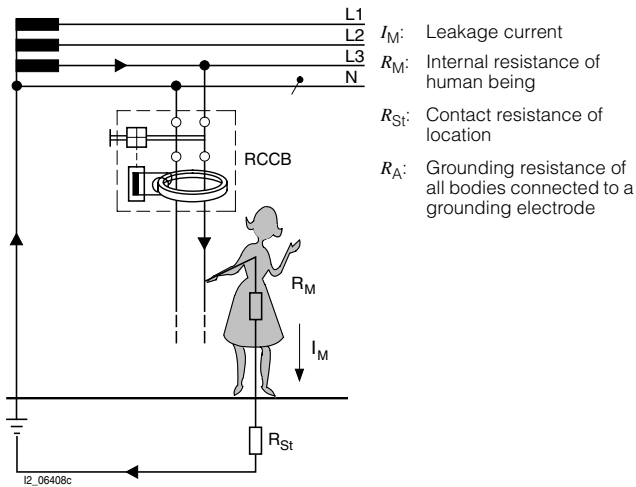


Diagram: Additional protection against direct contact with live parts

Usage

Residual current protective devices can be used in all three network configurations (IEC 364-4-41, HD 384.4.41, DIN VDE 0100-410).

In the IT network, tripping is not required for the first fault as this situation cannot produce any dangerous touch voltages. It is essential that an insulation monitoring device is fitted so that the first fault is indicated by an acoustic or visual signal and the fault can be eliminated as quickly as possible. Tripping is not requested until the 2nd fault. Depending on the grounding situation, the tripping conditions of the TN or TT network must be complied with. A residual current protective device is also a suitable circuit-protective device, whereby a separate residual current protective device is required for each piece of current-using equipment.

Grounding resistances

When using residual current protective devices in a TT system, the maximum grounding resistances (as shown in the following table) must be complied with, depending on the rated residual current and the max. permissible touch voltage.

Rated residual current	Max. permissible grounding resistance at a max. permissible touch voltage of	
	50 V	25 V
$I_{\Delta n}$		
10 mA	5000 Ω	2500 Ω
30 mA	1660 Ω	830 Ω
100 mA	500 Ω	250 Ω
300 mA	166 Ω	83 Ω
500 mA	100 Ω	50 Ω
1 A	50 Ω	25 Ω

Fire protection according to HD 384.4.482, DIN VDE 0100-482

Application

- When using residual current protective devices with $I_{\Delta n} \leq 300$ mA protection against the occurrence of fires started electrically due to isolation faults

Protective action

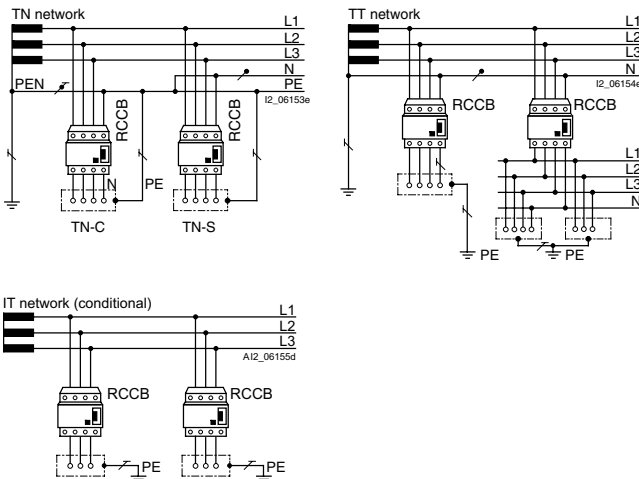
DIN VDE 0100-482 requires measures to be taken to prevent fires in "Locations exposed to fire hazards" that may result from isolation faults.

Electrical equipment must be selected and set up taking external influences into account so that their temperature rise during normal operation, and the foreseeable temperature rise, cannot cause a fire in the event of a fault.

This is achieved by ensuring the equipment is suitably designed or by implementing additional safety measures during installation. For this reason, additional residual current protective devices with a rated residual current of max. 300 mA are required for TN and TT systems used in "Locations exposed to fire hazards".

Where resistance-related faults may cause a fire (e.g. when using ceiling heating with panel heating elements), the rated residual current must not exceed max. 30 mA.

The additional protection against fires provided by separate residual current protective devices should not just be restricted to locations exposed to fire hazards, rather it should be universally implemented.



Overview

Setup and method of operation of residual current protective devices

The setup of residual current protective devices is largely determined by 3 function groups:

- 1) Summation current transformers for fault-current detection
- 2) Releases to convert the electrical measured quantities into a mechanical tripping operation
- 3) Breaker mechanism with contacts

The summation current transformer covers all conductors required to conduct the current, i.e. also the neutral conductor where applicable.

In a fault-free system, the magnetizing effects of the conductors through which current is flowing cancel each other out for the summation current transformer as, in accordance with Kirchhoff's current law, the sum of all currents is zero. There is no residual magnetic field left that could induce a voltage in the secondary winding.

However, by contrast, if a residual current is flowing due to an isolation fault, this destroys the equilibrium and a residual magnetic field is left in the core of the converter. This generates a voltage in the secondary winding, which then uses the release and the breaker mechanism to switch off the electrical circuit afflicted by the isolation fault.

This tripping principle operates independently of the system voltage or an auxiliary power supply. This is also a condition for the high protection level, offered by residual current protective devices according to IEC/EN 61008 (VDE 0664).

Only this way can it be ensured that the full protective action of the residual current protective device is maintained even in the event of a system fault, e.g. failure of an outer conductor or an interruption in the neutral conductor.

Test button

You can test whether the residual current protective device is ready to run by simply pressing a test button, with which every residual current protective device is equipped. Pressing the test button generates an artificial residual current – the residual current protective device must trip.

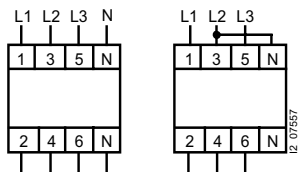
We recommend testing the functionality when commissioning the system and then at regular intervals – approx. every six months. Furthermore, it is also essential to ensure compliance with the test intervals specified in the pertinent rules and regulations (e.g. accident prevention regulations).

The minimum working voltage for operation of the test equipment normally is 100 V AC (series 5SM3). For detailed information see Technical specifications.

3-pole connection

4-pole residual current protective devices can also be operated in 3-pole systems. In this case, connection must be at terminals 1, 3, 5 and 2, 4, 6.

The function of the test equipment is only ensured if a jumper is fitted between terminals 3 and N.



SIGRES RCCB for severe environmental conditions **i**

Our SIGRES RCCBs have been developed for use in environments with increased pollution gas loads, such as

- Indoor swimming pools: chlorine gas atmosphere;
- Agriculture: ammoniac;
- Worksite distribution boards, chemical industry: nitrogen oxides [NO_x], sulfur dioxide [SO₂]

The SIGRES RCCBs are identified by the symbol **i**.

A significant increase in service life is achieved using our patented active condensation protection.

When using SIGRES RCCBs, the following points must be observed:

- The incoming supply must always be from below, from terminals 2/N or 2/4/6/N.
- Before carrying out insulation tests on installation systems with voltages greater than 500 V, the SIGRES RCCB must be switched off or the cables on the input side (underneath) must be disconnected.

Short-time delayed tripping **K**

Electrical loads that temporarily produce high leakage currents when they are switched on (e.g. temporary residual currents flowing through interference-suppression capacitors between outer conductor and PE) may trip instantaneous residual current protective devices, if the leakage current exceeds the rated residual current $I_{\Delta n}$ of the residual current protective device.

Short-time delayed residual current protective devices can be installed for this type of application, where it is not possible, or only partially possible, to eliminate such interference sources.

These devices have a minimum tripping delay of 10 ms, i.e., they should not trip for a residual current pulse of 10 ms. This complies with the maximum permissible break times according to IEC/EN 61008-1 (VDE 0664 Part 10). The devices have a high surge current withstand capability of 3 kA.

Short-time delayed residual current protective devices have the identification code **K**.

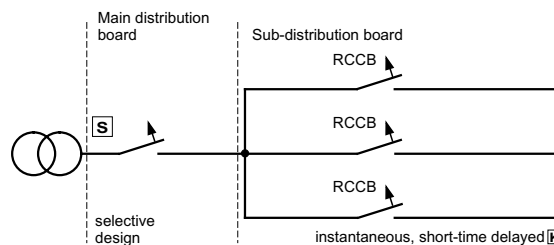
Selective tripping **S**

Residual current protective devices normally have an instantaneous tripping operation. This means that a series connection of this type of residual current protective devices does not provide selective tripping in the event of a fault. In order to achieve selectivity for a series connection of residual current protective devices, both the tripping time and the rated residual current of series-connected devices must be time graded. Selective residual current protective devices have a tripping delay.

Furthermore, selective residual current protective devices must have an increased surge current withstand capability of at least 3 kA according to IEC/EN 61008-1 (VDE 0664, Part 10). Siemens devices have a surge current withstand capability of ≥ 5 kA.

Selective residual current protective devices have the identification code **S**.

The table below shows the time grading options available for residual current protective devices for selective tripping in series connection with devices without time delay and with short-time delay **K**.



Upstream RCCB		Downstream RCCB or instantaneous or short-time delayed design K		
For selective disconnection S		$I_{\Delta n}$	Disconnection time (at $5I_{\Delta n}$)	Disconnection time (at $5I_{\Delta n}$)
300 mA	60...110 ms	10 mA, 30 mA or 100 mA	< 20 ms ¹⁾	20...< 40 ms
500 mA		10 mA, 30 mA or 100 mA		
1000 mA		10 mA, 30 mA, 100 mA,		
		300 mA or 500 mA		

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1) For residual current circuit-breakers of type AC: <40 ms.

Residual Current Protective Devices

General Data

Description

Overview

Versions for 50 to 400 Hz

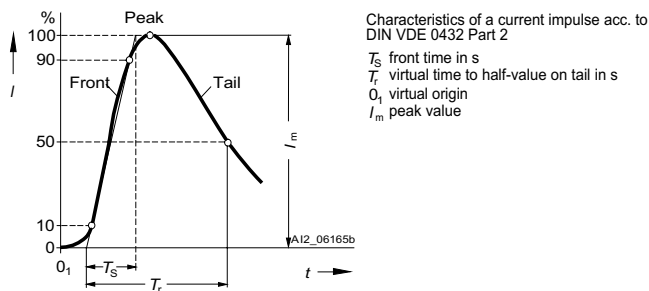
Due to their principle of operation, the standard versions of residual current protective devices are designed for maximum efficiency in 50/60 Hz systems. Product standards and tripping conditions also refer to this frequency. The sensitivity decreases with increasing frequency. In order to implement an effective fault-current protection for applications in systems up to 400 Hz (e.g. industry), you need to use suitable devices. This type of residual current protective devices fulfills the tripping conditions up to the specified frequency and provides the appropriate level of protection.

Residual current circuit-breaker with left-side N-connection

Because the RCCBs are usually located to the left of the circuit-breakers, but have their N wire connection on the right-hand side, this interferes with the integrated busbar connection. For this reason, when used with circuit-breakers, RCCBs require a special busbar. In order to enable the use of standard busbars, 4-pole RCCBs are also provided with their N connection on the left-hand side. This means that RCCBs can continue to be installed to the left of miniature circuit-breakers using standard busbar connections.

Surge current withstand capability

During thunderstorms, atmospheric overvoltages in the form of traveling waves can penetrate the installations of a system over an overhead system and trip the residual current protective devices. To prevent such inadvertent tripping operations, residual current protective devices sensitive to power pulse currents must pass specific tests proving its surge current withstand capability. These tests are carried out using a surge current of the standardized surge current wave 8/20 μ s.



Surge current wave 8/20 μ s (front time μ s: Time to half-value 20 μ s)

Siemens residual current protective devices of types A and B all have a high surge current withstand capability. The following table shows the surge current withstand capability of the various versions:

Version	Surge current withstand capability
Instantaneous	>1 kA
Short-time delayed [K]	>3 kA
Selective [S]	>5 kA

Switching capacity, short-circuit strength

In accordance with installation regulations DIN VDE 0100 Part 410 (protection against electric shock) residual current protective devices can be installed in three system types (TN, TT and IT systems).

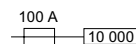
However, if using the neutral conductor as protection conductor in TN systems, a fault may cause residual currents similar to a short-circuit. For this reason, residual current protective devices must be installed together with a series fuse and have the appropriate short-circuit strength. Tests have been defined for this purpose. The short-circuit strength of the combination must be specified on the devices.

Siemens residual current protective devices, together with a suitable series fuse, have a short-circuit strength of 10 000 A. This is the highest possible level of short-circuit strength as specified in the VDE regulations.

Data for the rated short-circuit capacity according to IEC/EN 61008 i.e. the maximum permissible short-circuit series fuses for residual current protective devices are contained in the following table:

Rated current of the residual current protective device	Rated short-circuit capacity I_m acc. to IEC/EN 61008 (VDE 0664) for a grid distance of 35 mm	Maximum permissible short-circuit series fuse NH, DIAZED, NEOZED utilization category gL/gG for residual current protective device	
		125 ... 400 V AC	500 V AC
A	A	A	A
Type A			
16 ... 40	2 MW	500	63
63	2.5 MW	800	100
80	2.5 MW	800	100
25	4 MW	800	100
40	4 MW	800	100
63	4 MW	800	100
80	4 MW	800	100
125	4 MW	1250	125
Type B			
25 ... 80	4 MW	800	100

Example:



Short-circuit strength 10 kA with max. permissible short-circuit series fuse 100 A.

Residual Current Protective Devices

General Data

Description


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Overview



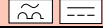





Types of current

Due to the use of electronic components in household appliances and industrial plants, insulation faults can also cause non-AC residual currents to flow through residual current protective devices, even in the case of devices with ground terminals (Safety class I).

The regulations for residual current protective devices contain additional requirements and test regulations for residual currents whose line frequency is zero or virtually zero within a certain period.

Residual current protective devices that trip for both sinusoidal AC residual currents and pulsating DC residual currents (type A) are identified by the mark .

Residual current protective devices that also trip for smooth DC residual currents (type B) are identified by the mark .

Type of current	Current waveform	Correct function of residual current protective devices of type			Tripping current ¹⁾
		AC 	A 	B 	
AC residual current		•	•	•	0.5 ... 1.0 $I_{\Delta n}$
Pulsating DC residual currents (pos. or neg. half-waves)		--	•	•	0.35 ... 1.4 $I_{\Delta n}$
Started half-wave currents Start angle 90°el Start angle 135°el		--	• •	• •	0.25 ... 1.4 $I_{\Delta n}$ 0.11 ... 1.4 $I_{\Delta n}$
Half-wave current during superimposition with smooth direct current of 6 mA		--	•	•	max. 1.4 $I_{\Delta n}$ + 6 mA
Smooth direct current		--	--	•	0.5 ... 2.0 $I_{\Delta n}$

1) Tripping currents acc. to IEC/EN 61008-1 (VDE 0664, Part 10);
specified for smooth DC residual currents acc. to IEC 60755.

Residual Current Protective Devices

General Data

Description

Application

Standards	Application	Required $I_{\Delta n}$ [mA]	Recommended residual current protective device		
			5SM.. (Type A)	5SM.. (Type B)	SIGRES [i]
DIN VDE 0100-470	Socket outlets up to 20 A, outdoor plants	≤ 30	•	--	--
DIN VDE 0100-482	Fire protection for particular risks or safety hazard	30, 300	•	•	--
DIN VDE 0100-551	Low-voltage generating sets	≤ 30	•	--	--
DIN VDE 0100-559	Luminaires and lighting installations, display stands for lights	≤ 30	•	--	--
DIN VDE 0100-701	Rooms with baths or showers, socket outlets in zone 3	≤ 30	•	--	--
DIN VDE 0100-702	Swimming pools, zone 1 and 2	≤ 30	•	--	•
DIN VDE 0100-704	Construction and demolition site installations, socket outlet current circuits (single-phase operation) up to 32 A and for hand-held equipment	≤ 30	•	--	•
DIN VDE 0100-705	Agricultural and general horticultural premises	≤ 500	•	--	•
	Socket outlet current circuits	≤ 30	•	--	•
DIN VDE 0100-706	Conductive areas with limited freedom of movement	≤ 30	•	--	--
DIN VDE 0100-708	Feeding points for caravan parking spaces, camping sites	≤ 30	•	--	--
DIN VDE 0100-710	Medical premises, depending on application group 1 or 2 and equipment	≤ 30 or	•	•	--
		≤ 300	•	•	--
DIN VDE 0100-722	Temporary buildings, vehicles for travelling exhibitions and caravans	≤ 500	•	--	•
DIN VDE 0100-723	Classrooms with experiment equipment	≤ 30	•	•	--
DIN VDE 0100-738	Fountains zone 2, general	≤ 500	•	--	•
	Socket outlets in zone 2	≤ 30	•	--	•
	Zones 0 and 1	≤ 30	•	--	•
DIN VDE 0100-739	Additional protection against direct contact in home dwellings	≤ 30	•	--	--
DIN VDE 0118-100	Mining plants	≤ 500	•	--	•
EN 50178 (VDE 0160)	Electronic equipment for use in power installations	General requirements for correct selection when using residual current protection	•	•	--
DIN VDE 0832-100	Traffic signals • Class T1 • Class U1	≤ 300	•	--	•
		≤ 30	•	--	•
BG FE BGI 608	Selection and operation of electrical equipment on worksites General: • Socket outlet circuits ≤ 32 A • Socket outlet circuits > 32 A Frequency-controlled equipment: • With plug-and-socket device ≤ 32 A • With plug-and-socket device > 32 A	≤ 30	•	•	•
		≤ 500	•	•	•
		≤ 30	--	•	--
		≤ 500	--	•	--
	Chemical industry and food processing industries	30 (recommended)	•	•	•

Note:

For reasons of basic fire protection, we recommend a maximum rated residual current of 300 mA for residual current protection devices.



Residual Current Protective Devices

Residual Current Operated Circuit-Breakers (RCCBs)

5SM3, type AC and type A, product overview

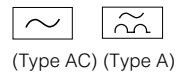
Overview

	Number of poles	Rated current I_n A	Rated residual current $I_{\Delta n}$ mA	MW	Auxiliary circuit switches can be retrofitted	N-connection		
						right	left	
Residual current operated circuit-breakers, type AC¹⁾, 16 ...125 A								
Instantaneous tripping	2	16	10	2	•	•	--	
		25	30, 100, 300		•	•	--	
		40			•	•	--	
	4	63	30, 100, 300	2.5	•	•	--	
		80			•	•	--	
		25	30, 300, 100, 500		4	•	•	•
		40	30, 300, 100, 500			•	•	--
		63	30, 300, 100, 500			•	•	•
		80	30, 300			•	•	•
		100	300			•	•	--
125	30, 100, 300, 500	•	•	--				
[S] selective, surge current withstand capability >3 kA	4	100	300	4	•	•	--	
Residual current operated circuit-breakers, type A²⁾, 16 ...125 A								
Instantaneous tripping, surge current withstand capability >1 kA	2	16	10, 30	2	•	•	--	
		25	30, 100, 300		•	•	--	
		40			•	•	--	
	4	63	30, 100, 300	2.5	•	•	--	
		80			•	•	--	
		25	30, 300, 500		4	•	•	•
		40	30, 300, 100, 500			•	•	--
		63	30, 300, 100, 500			•	•	•
		80	30, 300			•	•	•
		125	30, 100, 300, 500			•	•	--
[K] short-time delayed, surge current withstand capability >3 kA	4	25	30	4	•	•	--	
		40			•	•	--	
		63	30, 100		•	•	--	
[S] selective, surge current withstand capability >5 kA	2	63	100, 300	2.5	•	•	--	
	4	40	100, 300	4	•	•	--	
		63	100, 1 000		•	•	--	
			300		•	•	•	
	125	300, 500		•	•	--		
SIGRES residual current operated circuit-breakers, type A²⁾, for severe environmental conditions								
Instantaneous tripping, surge current withstand capability >1 kA	2	25	30	2	•	•	--	
		40			•	•	--	
		63	30		2.5	•	•	--
	80		•	•		--		
	4	25	30	4		•	•	--
		40	30, 300		•	•	--	
63			•		•	--		
		80	30		•	•	--	
[S] selective, surge current withstand capability >5 kA	4	63	300	4	•	•	--	

- 1)  = type AC for AC fault currents.
 2)  = type A for AC and pulsating DC residual currents.

Residual Current Protective Devices

Residual Current Operated Circuit-Breakers (RCCBs)



5SM3, type AC and type A, product overview

Overview

	Number of poles	Rated current I_n A	Rated residual current $I_{\Delta n}$ mA	MW	Auxiliary circuit switches can be retrofitted	N-connection	
						right	left
Residual current operated circuit-breakers, type A¹⁾, 500 V							
Instantaneous tripping, surge current withstand capability >1 kA	4	25 40 63	30, 300	4	• • •	• • •	-- -- --
Residual current operated circuit-breakers, type A¹⁾, 50 ... 400 Hz							
Instantaneous tripping, surge current withstand capability >1 kA	4	25 40	30	4	• •	• •	-- --
Residual current operated circuit-breakers, type A¹⁾, 24 ... 125 V							
Instantaneous tripping, surge current withstand capability >1 kA	2	16	30	2	•	•	--

1) = type A for AC and pulsating DC residual currents.

Technical specifications

Standards	IEC/EN 61008-1, VDE 0664 Part 10, IEC/EN 61543, VDE 0664 Part 30		
Versions	2 and 4-pole		
Rated voltages U_n	V AC	24 ... 125 125 ... 230 230 ... 400 500	50 ... 60 Hz 50 ... 60 Hz, 50 ... 60 Hz, 50 ... 400 Hz 50 ... 60 Hz
Rated currents I_n	A	16, 25, 40, 63, 80, 100, 125	
Rated residual currents $I_{\Delta n}$	mA	10, 30, 100, 300, 500, 1 000	
Enclosure	gray molded-plastic (RAL 7035)		
Mounting depth	mm	70	
Terminals	Tunnel terminals at both ends with wire protection, lower combined terminal for simultaneous connection of busbars and conductors		Conductor cross-section mm ² (solid and stranded)
	for 2 MW	at $I_n = 16$ A, 25 A, 40 A	1.0 ... 16
	for 2.5 MW	at $I_n = 63$ A, 80 A	1.5 ... 25
	for 4 MW	at $I_n = 25$ A, 40 A, 63 A, 80 A	1.5 ... 25
		at $I_n = 100, 125$ A	2.5 ... 50
Supply connection	optionally top or bottom (except SIGRES: incoming supply from bottom)		
Mounting position	any		
Mounting technique	can be snapped onto 35 mm standard mounting rails (TH 35 acc. to EN 60715)		
Degree of protection	IP20 acc. to EN 60529 (VDE 0470 Part 1) IP40 if installed in distribution boards IP54 if installed in molded-plastic enclosure		
Protection against contact	Protection against contact with fingers or the back of the hand acc. to EN 50274 (VDE 0660 Part 514)		
Minimum operational voltage for test function operation	V AC	100 195	16 ... 80 A 100 A, 125 A
Device service life	>10 000 operations (electrical and mechanical; test cycle acc. to regulations)		
Storage temperature	°C	-40 ... +75	
Ambient temperature	°C	-5 ... +45, for versions with the symbol : -25 ... +45	
Resistance to climate acc. to IEC 60068-2-30	28 cycles (55 °C; 95 % rel. humidity)		
CFC and silicone-free	yes		



(Type AC)

Residual Current Protective Devices Residual Current Operated Circuit-Breakers (RCCBs)

5SM3, type AC, 16 ... 125 A

4

Benefits

- Terminals with wire protection can be directly rail-mounted with devices with terminals in the modular width, e.g. with 5SY miniature circuit-breakers.
- An auxiliary circuit switch can be fitted to the right-hand side of the enclosure by the customer
- Operating handle and test button can be locked by means of a handle locking device
- N-connection on the left allows easy busbar-mounting with pin busbars if the miniature circuit-breakers are fitted on the right.

Application

- Personnel and fire protection
 - $I_{\Delta n} \leq 30$ mA: additional protection in the case of direct contact
 - $I_{\Delta n} \leq 300$ mA: preventative fire protection in the case of ground fault currents
- Product standards: IEC/EN 61008-1 (VDE 0664, Part 10); IEC 61008-2-1 (VDE 0664, Part 11); IEC/EN 61543 (VDE 0664, Part 30)
- U_n 230/400 V; 50 to 60 Hz; applicable in systems up to 240/415 V AC
- Definition of surge current withstand capability with current waveform 8/20 μ s acc. to DIN VDE 0432, Part 2
- **S** S-type: Can be used as upstream group switch for selective tripping contrary to a downstream standard RCCB. Very high surge current withstand capability: >3 kA.

Selection and ordering data

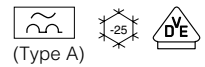
Circuit diagram/ max. permissible short-circuit series fuse	Rated residual current $I_{\Delta n}$ mA	Rated current I_n A	MW	N-connection, right		N-connection, left		Weight 1 unit approx. kg	PS*/ P. unit Unit(s)
				Order No.	Order No.	Order No.	Order No.		
Instantaneous tripping									
125 ... 230 V AC; 50 ... 60 Hz; 2-pole									
	10	16	2	5SM3 111-0		--		0.220	1
	30	25		5SM3 312-0		--		0.220	1
	40	40		5SM3 314-0		--		0.220	1
	100	25		5SM3 412-0		--		0.220	1
	40	40		5SM3 414-0		--		0.220	1
	300	25		5SM3 612-0		--		0.220	1
40	40	5SM3 614-0		--		0.220	1		
	30	63	2.5	5SM3 316-0		--		0.300	1
	80	80		5SM3 317-0		--		0.300	1
	100	63		5SM3 416-0		--		0.300	1
	80	80		5SM3 417-0		--		0.300	1
	300	63		5SM3 616-0		--		0.300	1
	80	80		5SM3 617-0		--		0.300	1
230 ... 400 V AC; 50 ... 60 Hz; 4-pole									
	30	25	4	5SM3 342-0		5SM3 342-OKL		0.473	1
	40	40		5SM3 344-0		5SM3 344-OKL		0.473	1
	63	63		5SM3 346-0		5SM3 346-OKL		0.473	1
	80	80		5SM3 347-0		5SM3 347-OKL		0.473	1
	100	25		5SM3 442-0		--		0.473	1
	40	40		5SM3 444-0		--		0.473	1
	63	63	500	5SM3 446-0		--		0.473	1
	80	80		5SM3 642-0		5SM3 642-OKL		0.473	1
	100	40		5SM3 644-0		5SM3 644-OKL		0.473	1
	63	63		5SM3 646-0		5SM3 646-OKL		0.473	1
	80	80		5SM3 647-0		5SM3 647-OKL		0.473	1
	100	100		5SM3 648-0		--		0.473	1
	25	25	4	5SM3 742-0		--		0.473	1
	40	40		5SM3 744-0		--		0.473	1
	63	63		5SM3 746-0		--		0.473	1
	30	125		5SM3 345-0		--		0.500	1
	100	100		5SM3 445-0		--		0.480	1
	300	300		5SM3 645-0		--		0.480	1
500	500	5SM3 745-0		--		0.480	1		
S selective, surge current withstand capability >3 kA									
230 ... 400 V AC; 50 ... 60 Hz; 4-pole									
	300	100	4	5SM3 648-2		--		0.473	1

For dimension drawings and terminal designations, see page 4/17.

* You can order this quantity or a multiple thereof.

Residual Current Protective Devices

Residual Current Operated Circuit-Breakers (RCCBs)



5SM3, Type A, 16 ... 125 A

Benefits

- Terminals with wire protection can be directly rail-mounted with devices with terminals in the modular width, e.g. with 5SY miniature circuit-breakers.
- An auxiliary circuit switch can be fitted to the right-hand side of the enclosure by the customer
- Operating handle and test button can be locked by means of a handle locking device
- N-connection on the left allows easy busbar-mounting with pin busbars if the miniature circuit-breakers are fitted on the right.

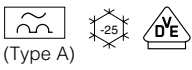
Application

- Personnel and fire protection
 - $I_{\Delta n} \leq 30$ mA: additional protection in the case of direct contact
 - $I_{\Delta n} \leq 300$ mA: preventative fire protection in the case of ground fault currents
- Product standards: IEC/EN 61008-1 (VDE 0664, Part 10); IEC 61008-2-1 (VDE 0664, Part 11); IEC/EN 61543 (VDE 0664, Part 30)
- U_n 230/400 V; 50 to 60 Hz; can be used in systems up to: 240/415 V AC
- Definition of surge current withstand capability with current waveform 8/20 μ s according to DIN VDE 0432, Part 2
- **S** S-type: can be used as upstream group switch for selective tripping contrary to a downstream standard RCCB. Very high surge current withstand capability: >5 kA.
- **K** K-type: short-time delayed tripping in the case of transient leakage currents. High surge current withstand capability: >3 kA.

Selection and ordering data

Circuit diagram/ max. permissible short-circuit series fuse	Rated residual current $I_{\Delta n}$ mA	Rated current I_n A	MW	N-connection, right	N-connection, left	Weight 1 unit approx.	PS*/ P. unit		
				Order No.	Order No.			kg	Unit(s)
Instant. tripping, surge current withstand capability >1 kA									
125 ... 230 V AC; 50 ... 60 Hz; 2-pole									
		10	16	2	5SM3 111-6	--	0.230	1	
		30	16		5SM3 311-6	--	0.230	1	
			25		5SM3 312-6	--	0.230	1	
			40		5SM3 314-6	--	0.230	1	
			100		25	5SM3 412-6	--	0.230	1
			40		5SM3 414-6	--	0.230	1	
		300	25	5SM3 612-6	--	0.210	1		
			40	5SM3 614-6	--	0.210	1		
		N-connection, right	30	63	2.5	5SM3 316-6	--	0.320	1
				80	5SM3 317-6	--	0.320	1	
			100	63	5SM3 416-6	--	0.300	1	
				80	5SM3 417-6	--	0.300	1	
N-connection, left	300	63	5SM3 616-6	--	0.280	1			
		80	5SM3 617-6	--	0.280	1			
230 ... 400 V AC; 50 ... 60 Hz; 4-pole									
		30	25	4	5SM3 342-6	5SM3 342-6KL	0.500	1	
			40		5SM3 344-6	5SM3 344-6KL	0.500	1	
			63		5SM3 346-6	5SM3 346-6KL	0.500	1	
			80		5SM3 347-6	5SM3 347-6KL	0.500	1	
		N-connection, right	100		40	5SM3 444-6	--	0.460	1
					63	5SM3 446-6	--	0.460	1
		300	25	5SM3 642-6	5SM3 642-6KL	0.440	1		
			40	5SM3 644-6	5SM3 644-6KL	0.440	1		
			63	5SM3 646-6	5SM3 646-6KL	0.440	1		
			80	5SM3 647-6	5SM3 647-6KL	0.440	1		
		N-connection, left	500	25	5SM3 742-6	--	0.440	1	
				40	5SM3 744-6	--	0.440	1	
	63	5SM3 746-6	--	0.440	1				
		30	125	5SM3 345-6	--	0.500	1		
		100	5SM3 445-6	--	0.480	1			
		300	5SM3 645-6	--	0.480	1			
		500	5SM3 745-6	--	0.480	1			

Additional components see page 4/22.



Residual Current Protective Devices Residual Current Operated Circuit-Breakers (RCCBs)

5SM3, Type A, 16 ... 125 A

Selection and ordering data

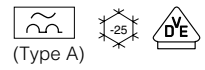
Circuit diagram/ max. permissible short- circuit series fuse	Rated residual current $I_{\Delta n}$ mA	Rated current I_n A	MW	N-connection, right Order No.	N-connection, left Order No.	Weight 1 unit approx. kg	PS*/ P. unit Unit(s)
[K] short-time delay; surge current withstand capability > 3 kA							
230 ... 400 V AC; 50 ... 60 Hz; 4-pole							
	30	25	4	5SM3 342-6KK01 5SM3 344-6KK01 5SM3 346-6KK01 5SM3 446-6KK01	--	0.500	1
	30	40				0.500	1
	100	63				0.500	1
	100	100				0.460	1
[S] selective; surge current withstand capability > 5 kA							
125 ... 230 V AC; 50 ... 60 Hz; 2-pole							
	100	63	2.5	5SM3 416-8 5SM3 616-8	--	0.300	1
	300	63				0.280	1
230 ... 400 V AC; 50 ... 60 Hz; 4-pole							
	100	40	4	5SM3 444-8 5SM3 446-8 5SM3 644-8 5SM3 646-8 5SM3 846-8	--	0.460	1
	100	63				0.460	1
	300	40				0.440	1
	300	63				0.440	1
	1 000	63				0.515	1
	1 000	63				0.515	1
N-connection, right							
	100	40	4	5SM3 444-8 5SM3 446-8 5SM3 644-8 5SM3 646-8 5SM3 846-8	--	0.460	1
	100	63				0.460	1
	300	40				0.440	1
	300	63				0.440	1
	1 000	63				0.515	1
	1 000	63				0.515	1
N-connection, left							
	300	125	4	5SM3 645-8 5SM3 745-8	--	0.480	1
	500	125				0.480	1

Additional components see page 4/22.

4

Residual Current Protective Devices

Residual Current Operated Circuit-Breakers (RCCBs)



5SM3, type A, SIGRES,
for severe environmental conditions **i**, 25 ... 80 A

Benefits

- Our patented active condensation protection significantly increases service life under harsh ambient conditions
- Terminals with wire protection can be directly busbar-mounted with devices with terminals in the modular width, e.g. with 5SY miniature circuit-breakers.
- An auxiliary circuit switch can be fitted to the right-hand side of the enclosure by the customer
- Operating handle and test button can be locked by means of a handle locking device

Application

- For use in areas with high levels of pollution gas and humidity, such as indoor swimming pools, in agriculture, construction distribution boards or in the chemical industry
- Personnel and fire protection
 - $I_{\Delta n} \leq 30$ mA: additional protection in the case of direct contact
 - $I_{\Delta n} \leq 300$ mA: preventative fire protection in the case of ground fault currents
- Product standards: IEC/EN 61008-1 (VDE 0664, Part 10); IEC 61008-2-1 (VDE 0664, Part 11); IEC/EN 61543 (VDE 0664, Part 30)
- U_n 230/400 V; 50 to 60 Hz; can be used in systems up to: 240/415 V AC
- Definition of surge current withstand capability with current waveform 8/20 μ s according to DIN VDE 0432, Part 2
- **S** S-type: can be used as upstream group switch for selective tripping contrary to a downstream standard RCCB. Very high surge current withstand capability: >5 kA.

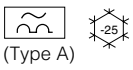
Function

- Function of condensation protection with switched off RCCBs through supply from below (2/N or 2/4/6/N terminals).

Selection and ordering data

Circuit diagram	Maximum permissible short-circuit series fuse	Rated residual current	Rated current	MW	Version	Order No.	Weight 1 unit approx.	PS*/P. unit
		$I_{\Delta n}$ mA	I_n A					
<i>i</i> Instantaneous tripping, surge current withstand capability >1 kA								
125 ... 230 V AC; 50 ... 60 Hz; 2-pole								
	63 A 10 000	30	25 40	2	i	5SM3 312-6KK12	0.230	1
					i	5SM3 314-6KK12	0.230	1
	100 A 10 000		63 80	2.5	i	5SM3 316-6KK12	0.320	1
					i	5SM3 317-6KK12	0.320	1
230 ... 400 V AC; 50 ... 60 Hz; 4-pole								
	100 A 10 000		25 40 63 80	4	i	5SM3 342-6KK12	0.500	1
					i	5SM3 344-6KK12	0.500	1
					i	5SM3 346-6KK12	0.500	1
					i	5SM3 347-6KK12	0.500	1
		300	40 63		i	5SM3 644-6KK12	0.440	1
					i	5SM3 646-6KK12	0.440	1
<i>i</i>, <i>S</i> selective; surge current withstand capability >5 kA								
230 ... 400 V AC; 50 ... 60 Hz; 4-pole								
		300	63	4	i S	5SM3 646-8KK12	0.440	1

Additional components see page 4/22.



Residual Current Protective Devices

Residual Current Operated Circuit-Breakers (RCCBs)

5SM3, type A, 500 V, 25 ... 63 A

4


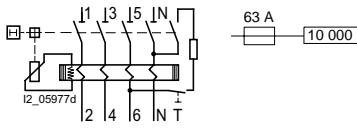
Benefits

- Terminals with wire protection can be directly busbar-mounted with devices with terminals in the modular width, e.g. with 5SY miniature circuit-breakers.
- An auxiliary circuit switch can be fitted to the right-hand side of the enclosure by the customer
- Operating handle and test button can be locked by means of a handle locking device

Application

- Personnel and fire protection
 - $I_{\Delta n} \leq 30$ mA: additional protection in the case of direct contact
 - $I_{\Delta n} \leq 300$ mA: preventative fire protection in the case of ground fault currents
- Product standards: IEC/EN 61008-1 (VDE 0664, Part 10); IEC 61008-2-1 (VDE 0664, Part 11); IEC/EN 61543 (VDE 0664, Part 30); VDE 0664 Part 101
- U_n 500 V; 50 to 60 Hz; can be used in systems up to: 500 V AC
- Definition of surge current withstand capability with current waveform 8/20 μ s according to DIN VDE 0432, Part 2

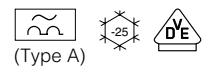
Selection and ordering data

Circuit diagram	Maximum permissible short-circuit series fuse	Rated residual current $I_{\Delta n}$ mA	Rated current I_n A	MW	Order No.	Weight 1 unit approx. kg	PS*/ P. unit Unit(s)
Instantaneous tripping, surge current withstand capability >1 kA							
		30	25	4	5SM3 352-6	0.500	1
		40	40		5SM3 354-6	0.500	1
		63	63		5SM3 356-6	0.500	1
		300	25		5SM3 652-6	0.440	1
			40		5SM3 654-6	0.440	1
			63		5SM3 656-6	0.440	1

Additional components see page 4/22.

Residual Current Protective Devices

Residual Current Operated Circuit-Breakers (RCCBs)



5SM3, Type A, 50 ... 400 Hz, 25 ... 40 A

Benefits

- Terminals with wire protection can be directly busbar-mounted with devices with terminals in the modular width, e.g. with 5SY miniature circuit-breakers.
- An auxiliary circuit switch can be fitted to the right-hand side of the enclosure by the customer
- Operating handle and test button can be locked by means of a handle locking device

Application

- For use with line frequencies between 50 and 400 Hz
- Personnel and fire protection
 - $I_{\Delta n} \leq 30$ mA: additional protection in the case of direct contact
- Product standards: IEC/EN 61008-1 (VDE 0664, Part 10); IEC 61008-2-1 (VDE 0664, Part 11); IEC/EN 61543 (VDE 0664, Part 30)
- U_n 230/400 V; 50 to 400 Hz; can be used in systems up to: 240/415 V AC
- Definition of surge current withstand capability with current waveform 8/20 μ s according to DIN VDE 0432, Part 2

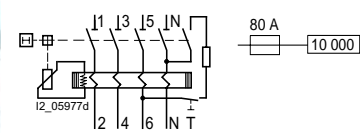
Selection and ordering data

Circuit diagram	Maximum permissible short-circuit series fuse	Rated residual current $I_{\Delta n}$ mA	Rated current I_n A	MW	Order No.	Weight 1 unit approx. kg	PS*/ P. unit Unit(s)
-----------------	---	--	-----------------------------	----	-----------	-----------------------------------	----------------------------

Instantaneous tripping, surge current withstand capability >1 kA

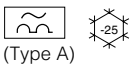


230 ... 400 V AC; 50 ... 400 Hz; 4-pole



30 25 4
mA A

5SM3 342-6KK03	0.500	1
5SM3 344-6KK03	0.500	1



Residual Current Protective Devices Residual Current Operated Circuit-Breakers (RCCBs)

NEW

5SM3, type A, 24 V, 16 A

4

Benefits

- Terminals with wire protection can be directly busbar-mounted with devices with terminals in the modular width, e.g. with 5SY miniature circuit-breakers.
- An auxiliary circuit switch can be fitted to the right-hand side of the enclosure by the customer
- Operating handle and test button can be locked by means of a handle locking device.

Application

- For special applications (e.g. laboratories)
- Personnel and fire protection
- $I_{\Delta n} = 30$ mA: additional protection in the case of direct contact
- Product standards: IEC/EN 61008-1 (VDE 0664, Part 10); IEC 61008-2-1 (VDE 0664, Part 11); IEC/EN 61543 (VDE 0664, Part 30)
- U_n 24 to 125 V; 50 to 60 Hz; can be used in systems up to: 125 V AC
- Definition of surge current withstand capability with current waveform 8/20 μ s according to DIN VDE 0432, Part 2

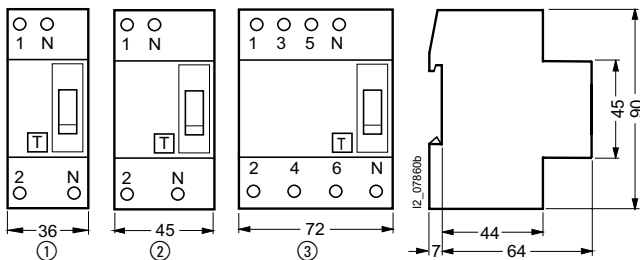
Selection and ordering data

Circuit diagram	Maximum permissible short-circuit series fuse	Rated residual current $I_{\Delta n}$ mA	Rated current I_n A	MW	Order No.	Weight 1 unit approx. kg	PS*/ P. unit Unit(s)
Instantaneous tripping, surge current withstand capability >1 kA 24 ... 125 V AC; 50 ... 60 Hz; 2-pole					5SM3 311-6KK13	0.230	1
		30	16	2			

Additional components see page 4/22.

Dimensional drawings

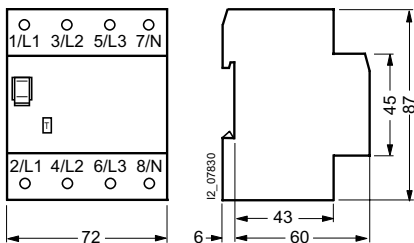
5SM3 residual current protective devices (up to 80 A)



- ① 2-pole
5SM3 111,
5SM3 311, 5SM3 312, 5SM3 314,
5SM3 412, 5SM3 414,
5SM3 612, 5SM3 614
- ② 2-pole
5SM3 316, 5SM3 317,
5SM3 416, 5SM3 417,
5SM3 616, 5SM3 617
- ③ 4-pole
5SM3 342, 5SM3 344, 5SM3 346, 5SM3 347,
5SM3 352, 5SM3 354, 5SM3 356,
5SM3 444, 5SM3 446,
5SM3 642, 5SM3 644, 5SM3 646, 5SM3 647,
5SM3 652, 5SM3 654, 5SM3 656,
5SM3 742, 5SM3 744, 5SM3 746,
5SM3 846

5SM3 residual current protective devices (100 A and 125 A)

- 5SM3 345
- 5SM3 445
- 5SM3 645, 5SM3 648
- 5SM3 745



Residual Current Protective Devices

SIQUENCE RCCBs, UC Sensitive

5SM3, type B, product overview

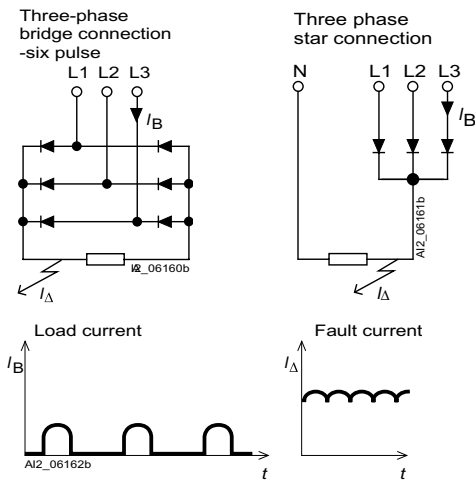
Overview

DC residual currents

Industrial current-using equipment is increasingly using connection methods where smooth DC residual currents or currents with low residual ripple may occur in the case of faults. This is illustrated in the following diagram of current-using equipment with three-phase rectifier circuits. Such equipment includes frequency converters, medical devices (e.g. x-ray devices and CT systems) and UPS systems.

Pulse-current-sensitive residual current protective devices are not able to detect and switch off such DC residual currents, which also negatively influence their tripping functions.

For this reason, current-using equipment that generates these kind of residual currents in the event of a fault should not be operated with pulse-current-sensitive residual current protective devices connected to the electrical power supply. Protective measures may be e.g. safety isolation; however this can only be achieved using heavy and expensive transformers. Universal current-sensitive residual current protective devices provide a perfect technical and cost-effective solution. This type of residual current protective device (type B) is mentioned also in EN 50178 (DIN VDE 0160) "Equipping power installations with electronic equipment".

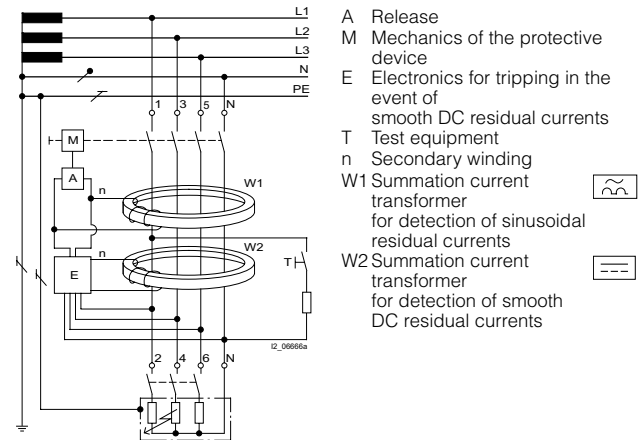


Block diagram with fault location

Design

Universal current sensitive protective devices are based on a pulse-current-sensitive circuit-protective device with tripping independent of line voltage, supplemented with an auxiliary unit for the detection of smooth DC residual currents. The diagram below shows the basic setup.

The summation current transformer W1 monitors the electrical system for AC and pulse current-type residual currents, as always. The summation current transformer W2 detects the smooth DC residual currents and, in the event of a fault, relays the tripping command through electronic unit E to release A.



Method of operation

In order to provide maximum security of supply, the power supply of the electronic unit is taken from all three phase conductors and the neutral conductor. Furthermore, it is dimensioned so that the electronics still reliably trip even with a voltage reduction of up to 70 % (e.g. between phase conductor and neutral conductor). This ensures tripping for smooth DC residual currents, as long as such residual current waveforms can occur, even in the event of faults in the electrical power supply, e.g. an N-conductor break. This means that the pulse-current-sensitive switch part, which trips regardless of line voltage, will still reliably trigger the tripping operation – even in the highly unlikely event that two phase conductors and the neutral conductor fail – if the remaining intact phase conductor presents a fire hazard due to a ground fault.

The residual current protective devices of type B are suitable for use in three-phase current systems with 50/60 Hz before input circuits with rectifiers. They are not intended for use in DC systems and in networks with operating frequencies other than 50/60 Hz.

They can be used for the detection and disconnection of residual currents that can occur in three-phase loads with electronic components (rectifiers) in the power supply unit (e.g. frequency converters, computer tomographs).

In addition to the described residual current waveforms (AC residual currents, pulsating and smooth DC residual currents), AC residual currents with a wide range of frequencies may also occur on this type of electronic equipment, such as at the outgoing terminal of a frequency converter.

Requirements for frequencies up to 2 kHz are defined in the device regulations VDE 0664 Part 100 for residual current protective devices of type B.

To date, only limited statements can be made with regard to the risk of ventricular fibrillations (up to 1 kHz) for frequencies higher than 100 Hz. No reliable statements can be made on any further effects and influences on the human organism (thermal, electrolytic). For this reason, protection against direct contact is only possible for frequencies up to 100 Hz. For higher frequencies, protection against indirect contact must be implemented under consideration of the frequency response of the residual current protective device, the maximum permissible touch voltages (e.g. 50 V) and permissible grounding resistance derived from this information.

Overview

Configuration



When configuring and erecting electrical plants, electrical loads that can generate smooth DC residual currents in the event of a fault must be assigned a separate electrical circuit with a universal current sensitive residual current protective device (type B) (see configuration example).

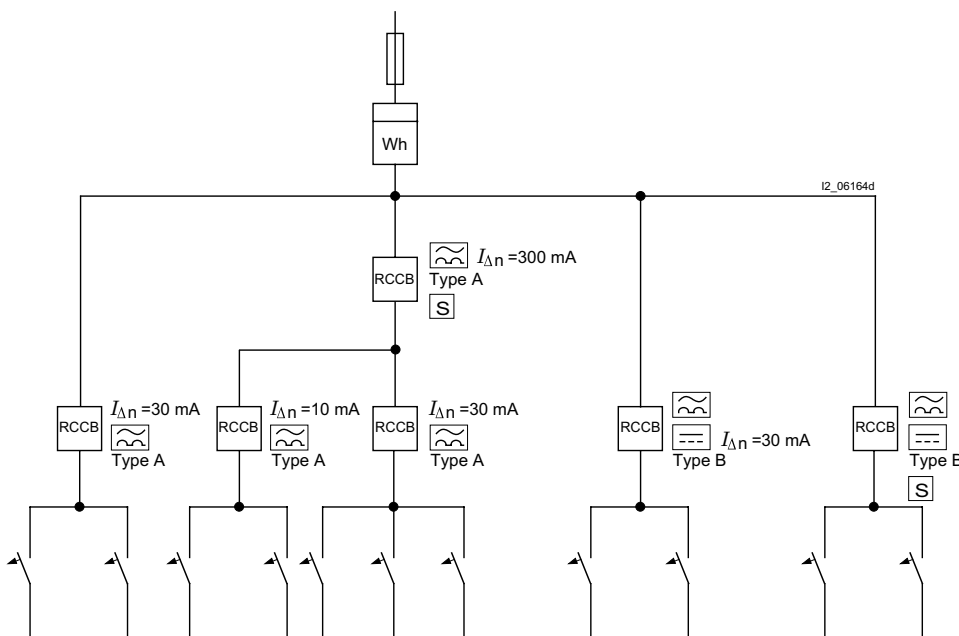
It is not permitted to branch electrical circuit with these types of electrical loads after pulse-current-sensitive residual current protective devices (type A). Loads, which can be the source of smooth DC residual currents in the event of a fault, would restrict the tripping of the pulse-current-sensitive residual current protective devices (type A).

The tripping conditions are defined according to VDE 0664 Part 100 (for residual current protective devices of type B) and are the same as those for type A for AC and pulse residual currents. The tripping values for smooth DC residual currents have been defined in this

product standard, taking into account current compatibility curves according to IEC 60479 for a range between 0.5 to 2.0 times the rated residual current.



The residual current protective devices of type B are suitable for *use in three-phase current systems with 50/60 Hz*. On no account may they be used in direct voltage networks or in systems with changing frequencies or frequencies other than 50/60 Hz (e.g. after frequency converters).

Universal current sensitive residual current protective devices (type B) are marked with the symbol  .



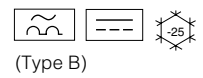
Configuration example with residual current protective devices type A and type B

	Number of poles	Rated current I_n A	Rated residual current $I_{\Delta n}$ mA	MW	Auxiliary circuit switches can be retrofitted	N-connection right
SIQUENCE residual current operated circuit-breakers, type B¹⁾, 25 ... 80 A						
K short-time delayed, surge current withstand capability > 3 kA	4	25 40 63 80	30, 300	4	• • • •	• • • •
S selective, surge current withstand capability > 5 kA	4	63 80	300	4	• •	• •

1)   = type B for AC residual currents, pulsating and smooth DC residual currents.

Residual Current Protective Devices


SIQUENCE RCCBs, UC Sensitive

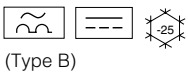


(Type B)

5SM3, type B, product overview

Technical specifications

Standards	IEC/EN 61008, VDE 0664 Part 10, IEC/EN 61543, VDE 0664 Part 30, VDE 0664 Part 100	
Versions	4-pole	
Rated voltages U_n	V AC	230 ... 400
Rated currents I_n	A	25, 40, 63, 80
Rated residual currents $I_{\Delta n}$	mA	30, 300
Enclosure	gray molded-plastic (RAL 7035)	
Mounting depth	mm	70
Terminals	Tunnel terminals at both ends with wire protection, lower combined terminal for simultaneous connection of busbars (pin-type) and conductors	
• Conductor cross-section, solid and stranded	mm ²	1.5 ... 25
• Terminal tightening torque, recommended	Nm	2.5 ... 3.0
Supply connection	either top or bottom	
Mounting position	any	
Mounting technique	can be snapped onto 35 mm standard mounting rails (TH 35 acc. to EN 60715)	
Degree of protection	IP20 acc. to EN 60529 (VDE 0470 Part 1) IP40 if installed in distribution boards IP54 if installed in molded-plastic enclosure	
Protection against contact	Protection against contact with fingers or the back of the hand acc. to EN 50274 (VDE 0660 Part 514)	
Minimum operational voltage for test function operation	V AC	150
Device service life	>10 000 operations (electrical and mechanical; test cycle acc. to regulations)	
Storage temperature	°C	-40 ... +75
Ambient temperature	°C	-5 ... +45, for versions with the symbol  : -25 ... +45
Resistance to climate acc. to IEC 60068-2-30	28 cycles (55 °C; 95 % rel. humidity)	
CFC and silicone-free	yes	



(Type B)

Residual Current Protective Devices SEQUENCE RCCBs, UC Sensitive

NEW

5SM3, type B, 25 ... 80 A

4

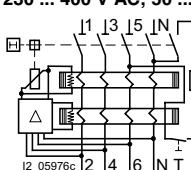
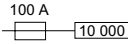
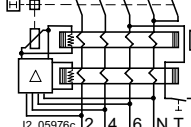
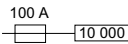
Benefits

- UC sensitive: for detection of AC residual currents, pulsating and smooth DC residual currents
- Terminals with wire protection can be directly busbar-mounted with devices with terminals in the modular width, e.g. with 5SY miniature circuit-breakers.
- Increased operating safety in systems with capacitive impedances due to adapted tripping characteristic
- An auxiliary circuit switch can be fitted to the right-hand side of the enclosure by the customer
- Operating handle and test button can be locked by means of a handle locking device.

Application

- Systems with equipment in which smooth DC residual currents can also arise (e.g. with B6 bridge circuit on frequency converters and medical equipment)
- Product standards: IEC/EN 61008-1 (VDE 0664, Part 10); VDE 0664 Part 100; IEC/EN 61543 (VDE 0664, Part 30)
- For use in three-phase current systems
- U_n 230/400 V; 50 to 60 Hz; can be used in systems up to: 240/415 V AC
- Definition of surge current withstand capability with current waveform 8/20 μ s according to DIN VDE 0432, Part 2
- **K** K-type: short-time delayed tripping in the case of transient leakage currents. High surge current withstand capability: >3 kA
- **S** S-type: can be used as upstream group switch for selective tripping contrary to a downstream standard RCCB. Very high surge current withstand capability: >5 kA.

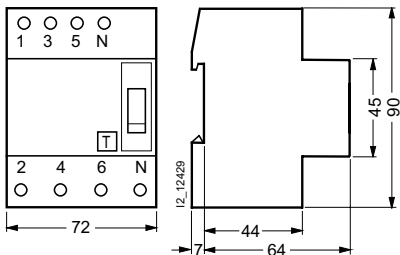
Selection and ordering data

Circuit diagram	Maximum permissible short-circuit series fuse	Rated residual current	Rated current	MW	Version	Order No.	Weight 1 unit approx.	PS*/P. unit				
		$I_{\Delta n}$ mA	I_n A									
K short-time delayed; surge current withstand capability > 3 kA												
		30	25	4	K	5SM3 342-4	0.520	1				
		40	40						K	5SM3 344-4	0.520	1
		63	63						K	5SM3 346-4	0.520	1
		80	80						K	5SM3 347-4	0.520	1
		300	25	4	K	5SM3 642-4	0.520	1				
		40	40						K	5SM3 644-4	0.520	1
		63	63						K	5SM3 646-4	0.520	1
		80	80						K	5SM3 647-4	0.520	1
		S selective; surge current withstand capability > 5 kA										
				300	63	4	S	5SM3 646-5	0.520	1		
80	80			S	5SM3 647-5						0.520	1

Dimensional drawings

Residual current operated circuit-breakers, type B

5SM3 342-4, 5SM3 344-4, 5SM3 346-4, 5SM3 347-4,
5SM3 642-4, 5SM3 644-4, 5SM3 646-4, 5SM3 647-4,
5SM3 646-5, 5SM3 647-5



Residual Current Protective Devices Additional Components/Accessories for RCCBs

Remote controlled mechanisms for 5SM3

NEW


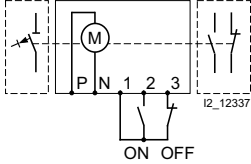
Benefits

- Can be retrofitted individually
- Mounting with factory-fitted brackets
- Can be mechanically latched and locked
- An auxiliary circuit switch can also be retrofitted to the remote controlled mechanism
- Function switch on the front
- Can be connected over binary inputs and outputs to *instabus* KNX *EIB* and AS-Interface
- $U_n = 230\text{ V}$, 50 to 60 Hz.

Function

- Remote ON/OFF switching of 5SM3 RCCBs ($\leq 80\text{ A}$)
- Remote switching ON is possible following acknowledgment of fault occurrence
- Manual switching on-site possible
- Remote display of switching status of remote controlled mechanisms and RCCBs.

Selection and ordering data

	Rated voltage U_n V AC	MW	Order No.	Weight 1 unit approx. kg	PS*/ P. unit Unit(s)
 <p>Remote controlled mechanisms (RC) for 5SM3 RCCBs ($\leq 80\text{ A}$)</p> 	230	3.5	5ST3 051	0.395	1

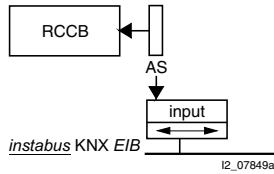
For detailed application information, see operator guide.

Residual Current Protective Devices Additional Components/Accessories for RCCBs

Auxiliary circuit switches for 5SM3

Benefits

- An auxiliary circuit switch can be fitted to the right-hand side of the RCCB enclosure by the customer
- Mounting with factory-fitted brackets
- Can be connected to *instabus* KNX EIB and AS-Interface bus or PROFIBUS through binary inputs.









Application

- Indications of the circuit state of the RCCB: ON/OFF
- Short-circuit protection ensured by miniature circuit-breakers of characteristic B or C with $I_n = 6$ A or fuse gL 6 A
- Product standards: IEC/EN 62019 (VDE 0640)

Technical specifications

		5SW3 30.	5SW3 330
Terminals			
• Conductor cross-section	mm ²	0.75 ... 2.5	
• Recommended tightening torque	Nm	0.6 ... 0.8	
Min. contact load		50 mA/24 V	
Max. contact load			
• 230 V AC, AC-12	A	6	5
• 230 V AC, AC-14	A	3.6	--
• 220 V DC, DC-12	A	1	0.5

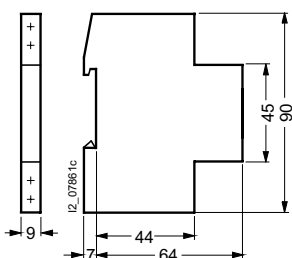
Selection and ordering data

Circuit diagram	Version	MW	Order No.	Weight 1 unit approx. kg	PS*/ P. unit Unit(s)
Auxiliary circuit switches (AS) on RCCBs for 5SM3 up to 80 A					
	Auxiliary switch (AS) 	1 NO + 1 NC	0.5	5SW3 300	0.042 1
		2 NC	0.5	5SW3 301	0.042 1
		2 NO	0.5	5SW3 302	0.042 1
Auxiliary circuit switches (AS) on RCCBs for 5SM3, 100 A and 125 A					
	Auxiliary switch (AS) 	1 NO + 1 NC	0.5	5SW3 330	0.040 1

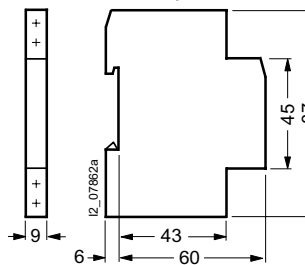
Dimensional drawings

Auxiliary circuit switches (AS), can be retrofitted

on 5SM3 residual current operated circuit-breakers (RCCBs) up to 80 A, 5SW3 30. auxiliary circuit switches, can be retrofitted



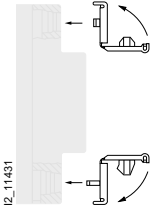


on 5SM3 residual current operated circuit-breakers (RCCBs), 100 A and 125 A, 5SW3 330 auxiliary circuit switches, can be retrofitted



Residual Current Protective Devices Additional Components/Accessories for RCCBs

Accessories for 5SM3

Accessories

Version	Order No.	Weight 1 unit approx. kg	PS*/ P. unit Unit(s)
 <p>Covers for connection terminals for residual current operated circuit-breakers up to 80 A, sealable (2 units in plastic bag)</p> <p>2 MW 2.5 MW 4 MW</p>	5SW3 010	0.003	1
	5SW3 011	0.004	1
	5SW3 008	0.006	1
 <p>Locking devices for residual current operated circuit-breakers up to 80 A, sealable and lockable 4.5 mm lock hasp diameter</p>	5SW3 303	0.008	1
 <p>Padlocks for 5SW3 303 locking device</p>	5ST3 802	0.027	1
<p>Locking devices with padlock Comprising 5SW3 303 locking device and 5ST3 802 padlock</p>	5SW3 312	1 set 0.035	1 set











Residual Current Protective Devices

Additional Components/Accessories for RCCBs

Accessories for 5SM3

4

Accessories

	Version	Order No.	Weight 1 unit approx. kg	PS*/ P. unit Unit(s)
	Cu busbars 10 mm² for the busbar mounting of RCCBs fully insulated			
	2-phase			
	2 x 2-phase	5ST3 606	0.016	1/10
	3 x 2-phase	5ST3 607	0.024	1/10
	6 x 2-phase	5ST3 608	0.048	1/10
	2 x (2-phase + AS)	5ST3 610	0.020	1/10
	3 x (2-phase + AS)	5ST3 611	0.030	1/10
	5 x (2-phase + AS)	5ST3 612	0.050	1/10
	3-phase			
	2 x 3-phase	5ST3 613	0.039	1/10
	3 x 3-phase	5ST3 614	0.060	1/10
	4 x 3-phase	5ST3 615	0.076	1/10
	2 x (3-phase + AS)	5ST3 616	0.040	1/10
	4 x (3-phase + AS)	5ST3 617	0.080	1/10
	3-phase + N			
	2 x 3-phase + N	5ST3 621	0.051	1/10
	3 x 3-phase + N	5ST3 622	0.078	1/10
	3-phase, for a 5SM3 RCCB, 4-pole, with 8 miniature circuit-breakers			
	3/N + 8 terminals	5ST3 624	0.075	1/10
	without end caps length 1016 mm			
	2-phase	5ST3 735	0.290	1/20
	2-phase + AS	5ST3 737	0.290	1/20
	3-phase	5ST3 740	0.430	1/20
	Cu busbars 16 mm² for the busbar mounting of RCCBs fully insulated			
	2-phase			
	2 x 2-phase	5ST3 636	0.024	1/10
	3 x 2-phase	5ST3 637	0.039	1/10
	6 x 2-phase	5ST3 638	0.076	1/10
	2 x (2-phase + AS)	5ST3 640	0.026	1/10
	3 x (2-phase + AS)	5ST3 641	0.045	1/10
	5 x (2-phase + AS)	5ST3 642	0.084	1/10
	3-phase			
	2 x 3-phase	5ST3 643	0.058	1/10
	3 x 3-phase	5ST3 644	0.083	1/10
	4 x 3-phase	5ST3 645	0.110	1/10
	2 x (3-phase + AS)	5ST3 646	0.060	1/10
	4 x (3-phase + AS)	5ST3 647	0.120	1/10
	3-phase + N			
	2 x 3-phase + N	5ST3 651	0.080	1/10
	3 x 3-phase + N	5ST3 652	0.116	1/10
	3-phase, for a 5SM3 RCCB, 4-pole, with 8 miniature circuit-breakers			
	3/N + 8 terminals	5ST3 654	0.114	1/10
	without end caps length 1016 mm			
	2-phase	5ST3 705	0.290	1/20
	2-phase + AS	5ST3 707	0.290	1/20
	3-phase	5ST3 710	0.430	1/20
	End caps for lateral insulation of cut-to-length busbars	2 and 3-phase	5ST3 750	0.001 1/10
	Protection against contact for free connections, yellow (RAL 1004)		5ST3 655	0.003 1/10

Further busbar versions see accessories for miniature circuit-breakers.