2 Residual Current Circuit Breakers

Who “nose” where his finger will be tomorrow!

General:

Electricity is usually taken for granted, but any imprudence could be fatal. Damaged insulation and faulty wiring cause a 'Leakage current' to flow to earth. Due to leakage currents, everyday activities like ironing, using a geyser, washing machine, a hair-dryer, an air-conditioner or industrial machinery etc. could turn out to be potentially lethal.

In addition, leakage currents of about 300-500 mA are capable of causing electrical sparks that could cause hazardous fire.

Minigard RCCB is the safest device to detect and trip on leakages and thereby offer instant protection against electrocution and electrical fire. In addition, they prevent energy wastage and thus save on electricity costs.

Dangers of Leakage Currents:

1. Direct / Indirect contact with a live parts
2. Electrical fires
3. Energy wastage

The solution:

30mA: Offers the highest level of protection to human and animal life against direct and indirect contact with live parts.

Recommended for residences, commercial and industrial premises, power sockets, schools, hotels etc, wet areas and during temporary construction installation. Siemens RCCBs trip between 10 to 30 ms, which is nearly 10 times faster than IEC requirements of 200 ms.

100mA: Normally provides protection only against indirect contact and hence protects both the entire wiring system and components e.g. in buildings, laboratories, industry, workshops etc. for faults caused through misuse, accidental damage or appliance failure.

300mA: Used where only fire protection is required and risk of electric shock is small. It is normal to use 300mA as incomer and subsequent 30mA/100mA protective RCCBs in the downstream circuit.

Types of Residual Current Protection Devices

1. Type AC
2. Type A
3. Type B

Current wave-shape	Proper functioning of residual current protective devices of type AC	A	B	Tripping current
~	•	•	•	0.5 ... 1.0 $I_{\Delta n}$
	–	•	•	0.35 ... 1.4 $I_{\Delta n}$
	–	•	•	current delay angle 90°: 0.25 to 1.4 $I_{\Delta n}$
		•	•	current delay angle 135°: 0.11 to 1.4 $I_{\Delta n}$
	–	•	•	max. 1.4 $I_{\Delta n}$+ 6 mA
	–	–	•	0.5 to 2 $I_{\Delta n}$

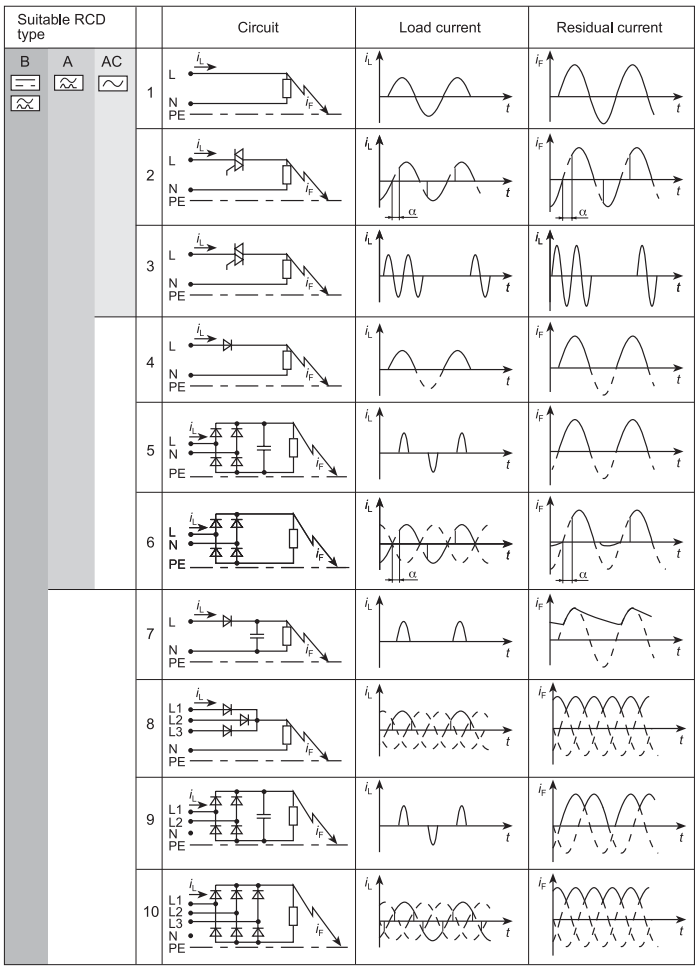


Table 1: Possible residual current wave shapes and suitable residual current protective devices

Design, Construction & Features

Type AC: ~

Residual current protective devices of type AC are suitable only for detecting sinusoidal AC residual current (see circuits 1 to 3 in Table 1). This device type to DIN VDE 0100-530 is not authorized in Germany for residual current protection, and cannot carry the VDE mark of conformity.

Type A: ~

In addition to sinusoidal AC residual currents, residual current protective devices of type A also measure pulsating DC residual currents.

This device type is the most commonly used pulse current-sensitive residual current operated circuit-breaker. It also covers the residual current waveforms which can occur in power supply units (e.g. ECG, washing machines) in the case of single-phase loads with electronic components. This type of residual current protective device is suitable for electronic resources with input current circuits nos. 1 to 6 in Table 1.

There are further sub types in Type A RCCB s. They are as follows

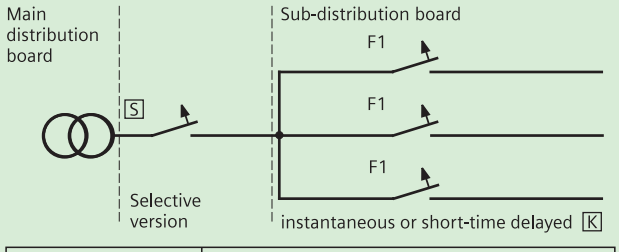
Type S, Selective S

Type K, Super Resistant K

Type S Selective S

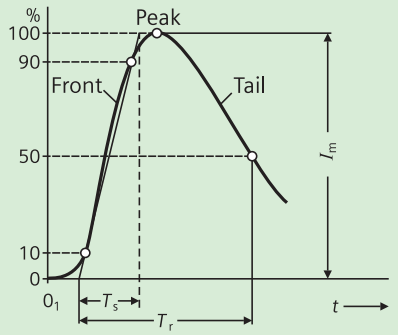
In order to achieve selective tripping in the case of series-connected residual current protective devices in the event of a fault scenario, both the rated residual current IΔn and the tripping time of the devices must be staggered. The different permissible tripping times of the standard and selective residual current protective devices can be taken from Figure 1. The suitable staggering of the rated residual currents can also be seen in Figure below.

Selective residual current protective devices of type S also have a very high surge withstand capability of 5 kA (8/20 µs current waveform). They are identified by the symbol S.



Upstream RCCB for selective disconnecting S		Downstream RCCB	or instantaneous version	short-time delayed version K
$I_{\Delta n}$	*Disconnecting time* $I_{\Delta n}$			
300 mA 500 mA 1000 mA	60 ... 110 ms	10 mA, 30 mA or 100 mA 10 mA, 30 mA or 100 mA 10 mA, 30 mA, 100 mA, 300 mA or 500 mA	< 20 ms [1]	20 ... < 40 ms

Figure 1: Layout of different residual current protective devices and their tripping times



Characteristics of a current impulseacc. to DIN VDE 0432 Part 2

T_s *Front time in s*

T_r *Virtual time to half-value on tail in s*

0_1 *Virtual origin*

I_m *Peak value*

Figure 2: Surge current wave 8/20 µs

Type K, Short Time- Delayed

As far as the device specification is concerned, there are only two device versions: instantaneous and selective. The "K" versions must therefore fulfill the maximum permissible tripping times for instantaneous devices. Residual current protective devices of type K are slightly delayed (approx. 10 ms for high residual currents).

The tripping times for the "K" versions are therefore somewhat longer as those for the standard devices, for example for residual currents > 5 IΔn: approx. 30 ms instead of around 10 to 15 ms.

They therefore conform to the maximum permissible tripping times (40 ms) for the standard versions (see Figure 2). They are identified by the symbol K.

The layout of the tripping circuit reduces the electrical interference of transient residual currents. This results in an increased surge withstand strength of 3 kA (8/20 µs current waveform, see Figure below) compared to the standard version (1 kA). In addition, these RCCB s are insensitive to surge leakage currents, such as those which occur in switched-mode power supplies or filters when capacitors are switched on.

Type B: ~ ⎓

In addition to detecting residual current waveforms of type A, residual current protective devices of type B are used to measure smooth DC residual currents. Residual current operated circuit breakers of this type are suitable for use in three-phase AC systems with 50/60 Hz also upstream of input circuits No. 7 to 10 in Table 1 and therefore for all the circuits shown.

Breaking capacity:

Every RCCB requires suitable rating backup fuse in order to achieve required breaking capacity. When used along with a MCB ≥ 10kA, no additional back-up fuse is required and are suitable for a network having a prospective short circuit current of 10 kA. (e.g. 5SX4 MCBs)

Protection against contact welding:

The contacts are made of special silver alloys with a large safety margin. This avoids the danger of Minigard RCCBs getting welded under heavy fault currents. Contacts are also free from Noxious Nickel & Cadmium.

False tripping avoided:

Travelling surges caused by thunderstorms, lightning, motor switching etc. can cause undesirable tripping of RCCBs. Minigard RCCBs have special filters and pass exacting standards to prevent this occurring.

Modular N-system:

Being extremely compact with space-saving dimensions, they are fully compatible in modular size to our 'Minigard' MCBs and DBs. Provides IP42 degree of protection within our Double Door DB design.

Fixed trip setting:

Precision tripping sensitivity (mA) is factory-set at Germany; thus hazardous tampering is prevented.

Rugged service life:

After tests comprising 10,000 electrical and mechanical switching cycles at rated current with no negative results, Siemens RCCBs have been found fully usable. Our RCCBs provide reliability even at 95% humidity and at ambient temperature of 45°C. They are also vibration-proof and can be mounted on machinery or mobile vehicles.

Standards:

Meets the highest technical standards of IEC/EN 61008, VDE 0664 part 10, IEC/EN 61543, VDE 0664 part 30 and IS 12640.

Quality & testing:

Precision and perfection are the only ways of assuring quality. Siemens RCCBs passes through more than 40 stringent automated tests, before it is considered reliable.

Other key features:

- Mounting is possible in any position and on temporary structures
- Finger-touch proof terminals for operator safety
- Podzidrive screws for use with any screwdriver (Star/Split)
- Special tunnel terminals ensure perfect cable grip.
- Current-operated mechanism provides maximum reliability
- Snap-on fit to 35mm DIN rail
- Busbar connection also possible
- Auxiliary Contacts for remotely indicating ON/OFF status of RCCB

Protection against dangerous leakage currents acc. 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 $I_{\Delta n} \leq 30$mA also largely protects against direct contact (direct personnel protection) - as additional protection through tripping as soon as live parts are touched.

Protective action:

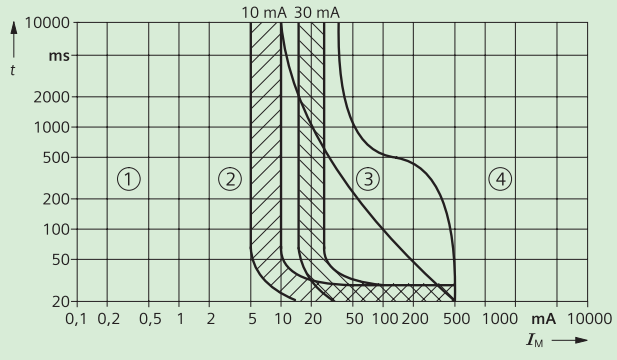
While devices for rated residual current $I_{\Delta n} > 30$ mA provide protection again indirect contact, using devices with $I_{\Delta n} \leq$ 30 mA also offers the best possible additional protection against the accidental direct contact of live parts.

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 10mA and 30mA. The tripping time lies in the middle between 10 ms and 30 ms.

The permissible tripping time of max. 0.3 s (300 ms) acc. to VDE 0664 or EN 61008 or IEC 61008 is not reached.



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

Figure 3: Effective current ranges acc. to IEC 60479

Design, Construction & Features

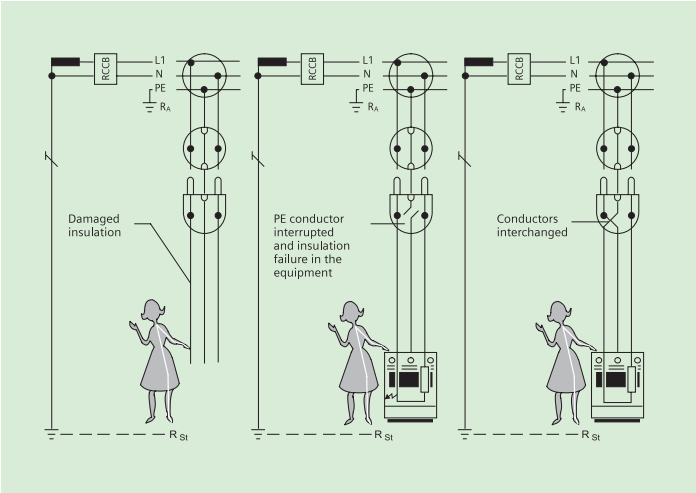


Figure 4: Examples of accidental direct contact

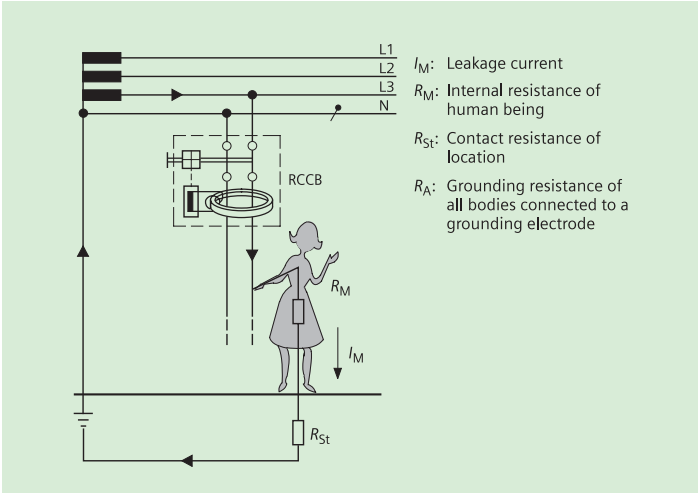


Figure 5: Additional protection against direct contact with live parts

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.

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.

The resistance of the human body depends on the current path. Measurements have shown that, e.g. that a current path of hand to hand or hand to 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 to hand.

Usage:

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

In the IT system, 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 system 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.

Fire protection acc. 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:

HD 384.4.482, DIN VDE 0100-482 requires measures to be taken to prevent fires in “Locations exposed to fire hazards” that may result from isolation faults.

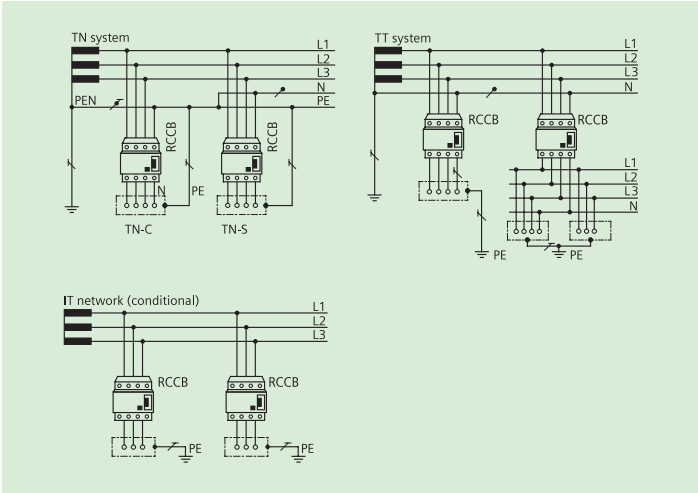


Figure 6:

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 is 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. (Ref: Figure 6)

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 insulation fault, this destroys the equilibrium and a residual magnetic field is left in the core of the converter.

Rated residual current	Max. permissible grounding resistance at a max. permissible touch voltage of	
I_{Dn}	50 V	25 V
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

This generates a voltage in the secondary winding, which then uses the release and the breaker mechanism to switch off the electrical circuit afflicted with 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 acc. 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 5SM).

Distribution Networks:

Minigard RCCBs can be used in all 3 distribution network types viz. TN, TT & an IT network system. 4 pole RCCBs can also be used in 3 pole supply networks by adhering to installation guidelines.

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 and 5 and 2, 4 and 6.

The function of the test equipment is only ensured if a jumper is fitted between terminals 3 and N. (Ref: Figure 7)

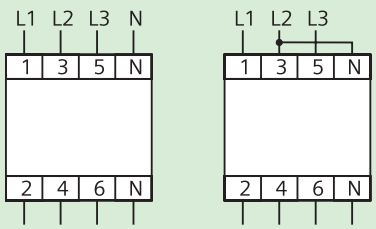


Figure 7:

Design, Construction & Features

Type of current	Current waveform	Correct function of residual current protective devices of type			Tripping current [1]
		Type AC	Type A	Type 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		–	✓	✓	0.25 ... 1.4 $I_{\Delta n}$
Start angle 135° el			✓	✓	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 according to IEC/EN 61008-1 (VDE 0664, Part-10); for smooth DC residual currents defined to IEC 60755 UB1 INT.

Recommendations for RCCB Selection

Application	Required $I_{\Delta n}$ [mA]	Recommended residual current protective devices		
		5SM (Type AC)	5SM (Type A)	5SM (Type B)
Socket outlet ≤ 20A and branch circuits for out door use ≤ 32A	≤ 30	✓	✓	–
Fire protection for particular risks or safety hazard	30, 300	✓	✓	✓
Low Voltage Genarating Sets	≤ 30	–	✓	–
Lumanaries and lighting installations, display stands for lights	≤ 30	✓	✓	–
Rooms with baths or showers, socket outlets in zone 3	≤ 30	✓	✓	–
Swimming Pools, zone 1 and 2	≤ 30	✓	✓	–
Construction and demolition site installations, socket outlet current circuits (single-phase operation) up to 32A and for hand-held equipment	≤ 30	✓ ✓	– ✓	– ✓
Agricultural and general horticultural premises Socket outlet current circuits	≤ 500 ≤ 30	– ✓	✓ ✓	– –
Conductive areas with limited freedom of movement	≤ 30	✓	✓	–
Feeding points for caravan parking spaces, camping sites	≤ 30	✓	✓	–
Medical Premises, depending on application group 1 or 2 and equipment	≤ 30 or ≤ 300	– –	✓ ✓	✓ ✓
Classroom with experiment equipment	≤ 30	–	–	✓
Fountain Zones 2, General Socket outlets in Zone 2 Zones 0 and 1	≤ 500 ≤ 30 ≤ 30	– ✓ ✓	✓ ✓ ✓	– – –
Additional Protection against diret contact in homes	≤ 30	✓	✓	–
Mining Plants	≤ 500	–	✓	–
Finding of power installations with electronic equipment	General requirements for correct selection when using res. Current protection	✓	✓	✓
Traffic Signals - Class T1 - Class U1	 ≤ 300 ≤ 30	 ✓ ✓	 ✓ ✓	 – –
Selection and Operation of electrical equipement at worksites General: Socket outlet circuits ≤ 32A Socket outlet circuits > 32A Frequency Controlled Equipment: With Plug and socket device ≤ 32A With Plug and socket device > 32A	 ≤ 30 ≤ 500 ≤ 30 ≤ 500	 ✓ ✓	 ✓ ✓	 ✓ ✓ ✓ ✓
Chemical Industry and food processing industries	30 recommened	✓	✓	✓

Note:

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

Technical Specifications

Standards		IS 12640 Part 1, IEC/EN 61008, VDE 0664 Part 10, IEC/EN 61543, VDE 0664 Part 30		
Versions		DP and FP		
Rated Voltage U_n	V AC	125...240 50...60Hz 230....415 50....60Hz		
Rated Current I_n	A	25, 40, 63, 80, 100, 125		
Rated Residual Currents $I_{\Delta n}$	mA	30, 100, 300, 500		
Enclosure		Grey Moulded Plastic (RAL 7035)		
Mounting Depth	mm	70		
Terminals		Tunnel terminals at both ends with wire protection, lower combined terminal for simultaneous connection of busbars (fork type) and conductors	Conductor Cross-Section mm^2	Recommended terminal tightening Torque Nm
		For 2 MW at I_n = 25A, 40A	1.0...16	2.5....3.0
		at I_n = 100A, 125A	1.5...50	3.0....3.5
		For 2.5 MW at I_n = 63A, 80A	1.5....25	2.5....3.0
		For 4 MW at I_n = 25A, 40A, 63A, 80A	1.5....25	2.5....3.0
		at I_n = 125A	2.5....50	3.0....3.5
Surge Current Withstand capacity of RCCB s		With Current Wave Form 8/20µs		
Instantaneous		1 kA		
Super Resistant K		3 kA		
Selective S		5 kA		
Supply Connection		Optionally Top or Bottom		
Mounting position		Any		
Mounting Technique		Can be snapped onto standard mounting rail 35mm (TH 35 acc. to EN 60715)		
Degree of Protection		IP 20 acc. to EN 60529 (VDE 0470 Part 1) IP 40 for installation in distribution boards		
Protection against Contact		Protection against contact of fingers or the back of the hand acc. to EN 50274 (VDE 0660 Part 514)		
Minimum operating Voltage for test function operation	V AC	100		
Device Service Life		> 10,000 operations (electrical and mechanical; Test cycle acc. to regulations)		
Storage Temperature	°C	-40...+75		
Ambient Temperature	°C	-40...+75 For versions with the symbol -25 : -25...+45		
Resistance to Climate acc. to IEC 60068-2-30		28 Cycles (55 °C; 95% relative humidity)		
CFC and Silicon free		Yes		

Type AC

	Rated residual current I_n (mA)	Rated current I_n (A)	MW*	Reference No.	Std. Pkg. (Nos.)
2 Pole	30	25	2	5SM33120RC	10
	100	25		5SM34120RC	10
	300	25		5SM36120RC	10
	30	40		5SM33140RC	10
	100	40		5SM34140RC	10
	300	40		5SM36140RC	10
	30	63	2.5	5SM33160RC	10
	100	63		5SM34160RC	10
	300	63		5SM36160RC	10
	30	80		5SM33170RC	5
	100	80		5SM34170RC	5
	300	80		5SM36170RC	5
	30	100	2	5SM33180KK	1
	100	100		5SM34180KK	1
	300	100		5SM36180KK	1
	30	125		5SM33150KK	1
	100	125		5SM34150KK	1
	300	125		5SM36150KK	1
4 Pole	30	25	4	5SM33420RC	5
	100	25		5SM34420RC	5
	300	25		5SM36420RC	5
	30	40		5SM33440RC	5
	100	40		5SM34440RC	5
	300	40		5SM36440RC	5
	30	63		5SM33460RC	5
	100	63		5SM34460RC	5
	300	63		3SM36460RC	5
	30	80		5SM33470RC	5
	100	80		5SM34470RC	5
	300	80		5SM36470RC	5
	30	100		5SM33480RC	1
	100	100		5SM34480RC	1
	300	100		5SM36480RC	1
	30	125		5SM33450RC	1
	100	125		5SM34450RC	1
	300	125		5SM36450RC	1
	500	125		5SM37450RC	1

Product Overview

Type A

		Rated residual current I_n (mA)	Rated current I_n (A)	MW*	Reference No.	Std. Pkg. (Nos.)
	2 Pole	30	25	2	5SM33126RC	1
		100	25		5SM34126RC	1
		300	25		5SM36126RC	1
		30	40		5SM33146RC	1
		100	40		5SM34146RC	1
		300	40		5SM36146RC	1
		30	63	2.5	5SM33166RC	1
		100	63		5SM34166RC	1
		300	63		5SM36166RC	1
		30	80		5SM33176RC	1
		100	80		5SM34176RC	1
		300	80		5SM36176RC	1
		30	100	2	5SM33186KK	1
		100	100		5SM34186KK	1
		300	100		5SM36186KK	1
		30	125		5SM33156KK	1
		100	125		5SM34156KK	1
		300	125		5SM36156KK	1
	4 Pole	30	25	4	5SM33426RC	1
		100	25		5SM34426RC	1
		300	25		5SM36426RC	1
		30	40		5SM33446RC	1
		100	40		5SM34446RC	1
		300	40		5SM36446RC	1
		30	63		5SM33466RC	1
		100	63		5SM34466RC	1
		300	63		3SM36466RC	1
		30	80		5SM33476RC	1
		100	80		5SM34476RC	1
		300	80		5SM36476RC	1
		30	100		5SM33486RC	1
		100	100		5SM34486RC	1
		300	100		5SM36486RC	1
		30	125		5SM33456RC	1
		100	125		5SM34456RC	1
		300	125		5SM36456RC	1
		500	125		5SM37456RC	1

Type A

		Rated residual current I_n (mA)	Rated current I_n (A)	MW*	Reference No.	Std. Pkg. (Nos.)
Super Resistant K						
	2 Pole	30	25	2	**5SM33126RC01**	1
		30	40		**5SM33146RC01**	1
		30	63	2.5	**5SM33166RC01**	1
		300	63		**5SM36166RC01**	1
	4 Pole	30	25	4	**5SM33426RC01**	1
		30	40		**5SM33446RC01**	1
		300	40		**5SM36446RC01**	1
		30	63		**5SM33466RC01**	1
		300	63		**5SM36466RC01**	1
		300	80		**5SM36476RC01**	1
Selective S						
	2 Pole	300	40	2	**5SM36148RC**	1
		100	63	2.5	**5SM34168RC**	1
		300	63		**5SM36168RC**	1
		300	80		**5SM36178RC**	1
	4 Pole	100	40	4	**5SM34448RC**	1
		300	40		**5SM36448RC**	1
		100	63		**5SM34468RC**	1
		300	63		**5SM36468RC**	1
		300	125		**5SM36458RC**	1
		500	125		**5SM37458RC**	1

Product Overview

Type B

		Rated residual current I_n (mA)	Rated current I_n (A)	MW*	Reference No.	Std. Pkg. (Nos.)
Super Resistant K						
	4 Pole	30	25		5SM33424RC	1
		300	25		5SM36424RC	1
		30	40		5SM33444RC	1
		300	40		5SM36444RC	1
		30	63		5SM33464RC	1
		300	63		5SM36464RC	1
		500	63		5SM37464RC	1
		30	80		5SM33474RC	1
		300	80		5SM36474RC	1
		500	80		5SM37474RC	1
Selective S						
	4 Pole	300	63	4	5SM36465RC	1
		500	63		5SM37465RC	1
		300	80		5SM36475RC	1
		500	80		5SM37475RC	1