
# System pro *M* compact®
# new F200 B Type
# Built to make the difference

Power and productivity
for a better world™

ABB

# System pro *M* compact®, new F200 B Type
## The new benchmark for guaranteed efficiency and operational continuity


Cutting-edge features: safety, service continuity, compactness, integration. These are the characteristics of the new F200 B RCCBs (residual current circuit breakers), the state-of-the-art technology by ABB which has been providing the best solutions for residential, commercial and industrial installations for over 120 years.
The F200 B Type is the ultimate novelty of the System pro *M* compact offering.
The most compact device in the market. Type B RCCBs can be adapted perfectly to all types of installation requirements and application fields. The new F200 B Type can be perfectly integrated with all devices produced by ABB in terms of connection, selectivity data and coordination.

### Compact and functional design
The new F200 B RCCBs feature an innovative design that makes the products compact. Indeed, the two-pole device is the first one on the market that is built in just two modules and its compact dimensions ensure significant space savings in the switchboard. The new range of F200 B RCCBs is certified by the IMQ and VDE markings for operation in extremely harsh weather conditions up to 60 °C.

### Fast and easy to install
Made with cutting-edge production technologies, the F200 B pure RCCBs have an innovative bi-directional cylindrical clamp designed to facilitate safe execution of the electrical connections thanks to the presence of two distinct seats for cable entry (the larger front one for cables up to 25 mm$^2$ and the rear one for connection busbars and smaller cables). The clamp structure eliminates any chance of improper cable fastening operations, because once the clamp is closed all other non-used seats are also fully closed so that no other cable can be inserted and the IP protection degree cannot be altered. Moreover, to guarantee timely detection of any hazardous situation for people and for the system, the front of the circuit breakers have a test button to check the proper operation of the devices and a LED indicator to signal the kind of leakage that the RCD is detecting.

- ● Green LED ON: RCDs functioning like Type B
- ○ Green LED OFF: RCDs functioning like Type A or Type F

**The safety marking IMQ (Italian Quality Marking Institute) guarantees that a product and the materials it is made of complies with legal and safety requirements.**

**VDE (German Electrotechnical Association) is a German body that tests and certifies the conformity of products, equipment and electrical and electronic systems in relation to national and international regulatory requirements.**

**The new F200 B RCCBs are certified by both bodies, ensuring the highest level of quality, for which ABB is known as a market leader, and full acceptability in public and private tender specifications.**

# The universal devices that guarantee tripping with all fault currents

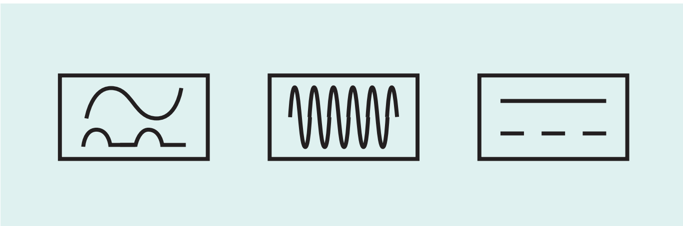
## The F200 B RCCBs of the System pro *M* compact range are protection devices that detect the different waveforms of residual fault currents and intervene when the electrical system has a high leakage current to ground.

The increasing usage of power electronics embedded in earthed devices may generate leakage currents that include a significant direct current or high frequency component which may affect the reliability of standard Type A residual current devices.

In order to overcome this, Type B residual current devices were introduced.
They ensure higher protection levels with maximum operational continuity under all working conditions.
For this reason, Type B RCDs are considered universal devices because they provide protection against all the tripping waveforms listed in the Standards EN 62423.

Type B residual current devices are marked according to EN 62423 as follows:

**Marking of Type B RCDs**



The marking indicates the different current types to which these residual current devices are sensitive.

# Make the right choice for maximum security

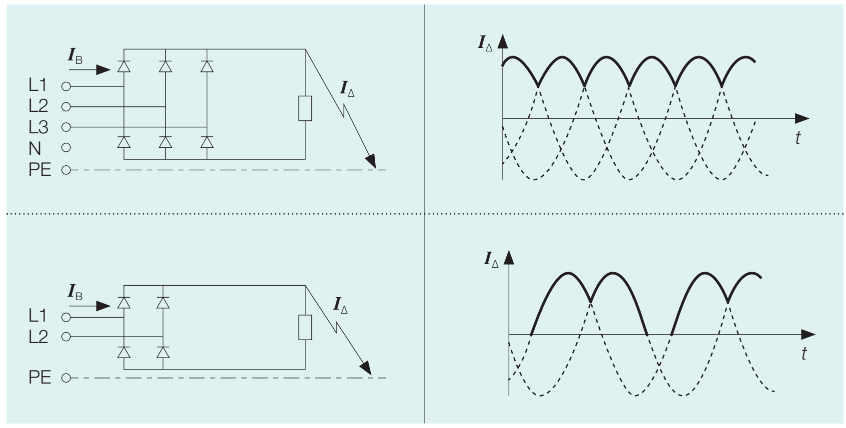
## F200 B RCCBs provide additional protection against direct contact and are the right choice to ensure maximum system safety thanks to early detection of fault currents with continuous waveforms or high frequencies.

**Selection of RCDs. General rules**

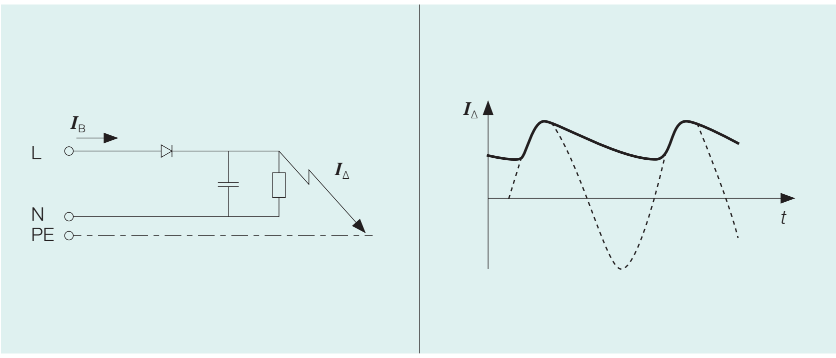
Type B RCDs are suitable for non-linear circuits that can generate leakages with high direct current (> 6 mA) and/or high frequency components. Such components can be found in several industrial components and applications that embed or depend on electronics.

The main circuits that can be considered responsible for such leakages and the common applications where Type B could be demanded are:

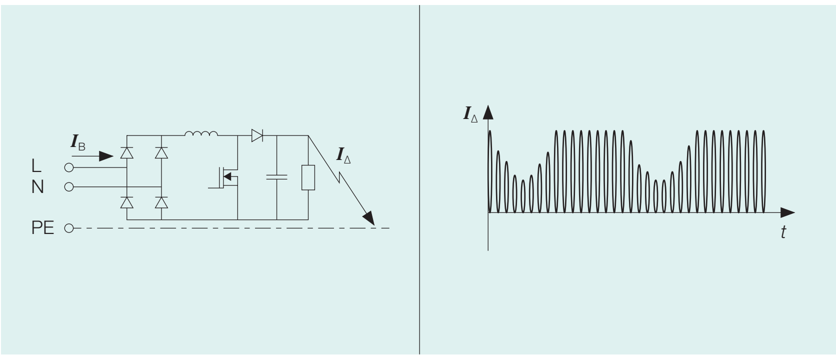
– Circuits containing single and three-phase rectifiers




– Circuits containing rectifiers with high levelling capacity

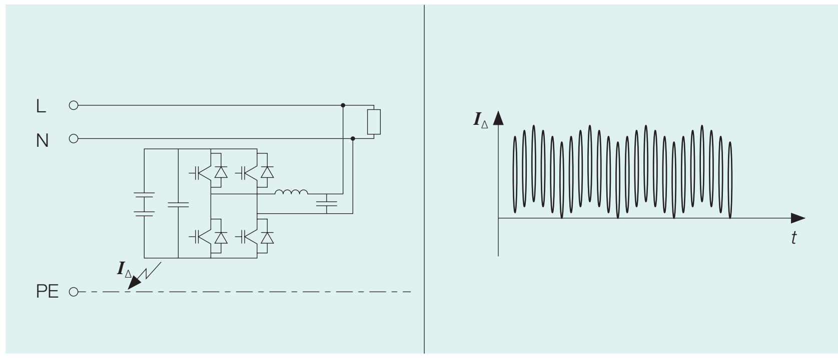



– Circuits containing rectifiers with active power factor correction

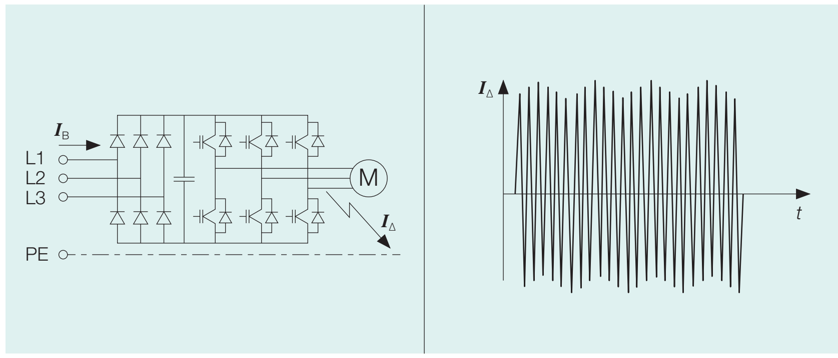




– Circuits containing continuos voltage generators with no separation from a.c. network




– Circuits containing continuos voltage generators




# Immunity to nuisance tripping: advantages of Type B RCCBs

**RCDs Type B are advance-designed products that, on one hand, are able to protect from different kinds of faults, regardless of their waveform; on the other hand, they are immune to unwanted trippings.**

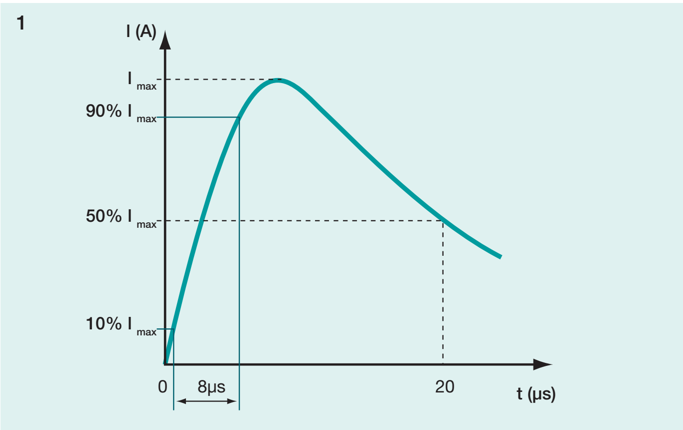
In order to be such an effective device in terms of protection, every Type B RCD must withstand successfully all the tests provided by the Standards. In the testplan are foreseen several tripping waveforms that are considered to represent the best approximation to a real fault condition in case of non linear circuits.

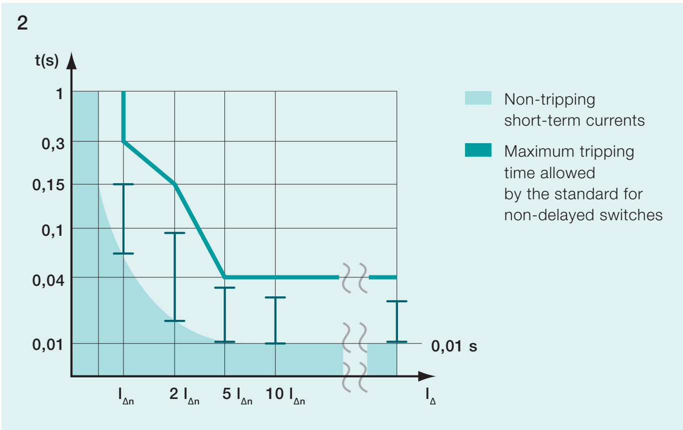
**Tripping waveforms for Type B RCDs**

| | Residual current form | Limit value of tripping current |
|---|---|---|
| Alternating | | 0,5...1,0 $I_{\Delta n}$ |
| Unidirectional pulsating | | 0,35...1,4 $I_{\Delta n}$ |
| Unidirectional pulsating with phase angle mode | | Cut-off angle 90° from 0,25 to 1,4 $I_{\Delta n}$ |
| | | Cut-off angle 135° from 0,11 to 1,4 $I_{\Delta n}$ |
| Alternating sinusoidal residual current plus pulsating dc current, suddenly applied or smoothly increasing | | Max. 1,4 $I_{\Delta n}$ + 0,4 $I_{\Delta n}$ d.c. |
| Unidirectional pulsating superimposed on direct | | Max. 1,4 $I_{\Delta n}$ + 0,4 $I_{\Delta n}$ d.c. |
| Multi-frequency | | From 0,5 to 1,4 $I_{\Delta n}$ |
| Two-phase rectified | | From 0,5 to 2,0 $I_{\Delta n}$ |
| Three-phase rectified | | |
| Direct without ripple | | |
| Alternating up to 1 kHz | | Current frequency 150 Hz from 0,5 a 2,4 $I_{\Delta n}$ |
| | | Current frequency 400 Hz from 0,5 a 6 $I_{\Delta n}$ |
| | | Current frequency 1000 Hz from 0,5 a 14 $I_{\Delta n}$ |

**To prove their immunity to unwanted tripping, Type B residual current devices must successfully pass further severe tests such as:**
- 8/20 µs impulse up to 3000 A (s. fig. 1);
- 10 ms impulse up to10 $I_{\Delta n}$ (s. fig. 2).

These tests emulate the conditions that an RCD must withstand in case of overvoltages or leakages due to EMC filters or electronic loads. Type B and devices can be considered suitable for all difficult applications, not only in terms of protection, but of operational continuity as well.

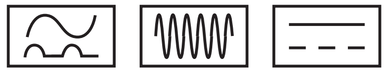



**1 Impulse 8/20 µs | 2 Insensitivity to short-term residual currents**

# Details that make the difference

Type B residual current devices are marked according to EN 62423. The marking reminds the different current types that Type B residual current devices are sensitive to



Easy to connect and compatible with busbars thanks to the System pro *M* compact clamps


Sole two-pole device in only two modules on the market

VDE approved

Green LED to monitor operation of the residual current circuit breaker

Indication of the position of the contacts

## Advantages

- Compatible with all System pro *M* compact accessories of F200 series
- Higher operational continuity thanks to auto-reclosing units and motor operating devices
- Operating temperature from -25 to +60 °C with high immunity for extremely harsh weather conditions
- F200 B can be installed either in two-phase and three-phase networks
- A lot of space saving thanks to the two poles device in just two modules
- Coordination and back-up with all ABB devices.

# Type B RCCBs: principle of operation

The term RCCB states a device capable of detecting any current leakage to ground.
In normal operating conditions, the incoming currents from RCCBs must be equal to the outgoing currents; however, whenever there is a disturbance in this balance between the incoming and outgoing currents (i.e. residual currents), the RCCBs trip, opening the circuit.

### Design features and operation

Type B residual current devices manufactured according to EN 62423 are equipped with two toroids in series: one detects alternating and pulsating residual currents; the other detects direct current leakages. Line and neutral pass through both toroids in which residual currents flow.
The operation of the first toroid is the same as traditional electromechanical devices. The operation of the second one is based on the saturation of its magnetic core. An alternating voltage that magnetizes the material is permanently applied to its secondary winding. An electronic circuit can detect the inductance at the secondary winding. When direct residual current flows, the material saturates and modifies its magnetic permeability. This variation triggers the tripping relay.

Type B RCDs can operate like Type A RCD even if there is no voltage between line and neutral, though they need minimum voltage to operate like Type B protection devices.

The RCDs are manufactured at ABB's factory located in Santa Palomba, Italy

# Order codes

F202 B

F204 B

**New F200 B Type from 16 to 63 A**

| Number of poles | Type | Rated residual current $I_{\Delta n}$ [mA] | Rated current In [A] | Description: ABB Type | Order Code | Bbn 8012542 EAN | Weight [kg] | Pack Unit pc |
|---|---|---|---|---|---|---|---|---|
| 2 | B | 30 | 16 | F202 B-16/0,03 | 2CSF202592R1160 | 961932 | 0,220 | 1 |
| | | | 25 | F202 B-25/0,03 | 2CSF202592R1250 | 961734 | 0,220 | 1 |
| | | | 40 | F202 B-40/0,03 | 2CSF202592R1400 | 960737 | 0,220 | 1 |
| | | | 63 | F202 B-63/0,03 | 2CSF202592R1630 | 629634 | 0,220 | 1 |
| | | 300 | 16 | F202 B-16/0,3 | 2CSF202592R3160 | 372233 | 0,220 | 1 |
| | | | 25 | F202 B-25/0,3 | 2CSF202592R3250 | 372738 | 0,220 | 1 |
| | | | 40 | F202 B-40/0,3 | 2CSF202592R3400 | 372639 | 0,220 | 1 |
| | | | 63 | F202 B-63/0,3 | 2CSF202592R3630 | 372530 | 0,220 | 1 |
| 4 | B | 30 | 25 | F204 B-25/0,03 | 2CSF204592R1250 | 348139 | 0,380 | 1 |
| | | | 40 | F204 B-40/0,03 | 2CSF204592R1400 | 358336 | 0,380 | 1 |
| | | | 63 | F204 B-63/0,03 | 2CSF204592R1630 | 348030 | 0,380 | 1 |
| | | 300 | 25 | F204 B-25/0,3 | 2CSF204592R3250 | 347934 | 0,380 | 1 |
| | | | 40 | F204 B-40/0,3 | 2CSF204592R3400 | 358138 | 0,380 | 1 |
| | | | 63 | F204 B-63/0,3 | 2CSF204592R3630 | 347835 | 0,380 | 1 |
| | | 300 S | 40 | F204 B S-40/0,3 | 2CSF204892R3400 | 347736 | 0,380 | 1 |
| | | | 63 | F204 B S-63/0,3 | 2CSF204892R3630 | 357933 | 0,380 | 1 |
| | | 500 | 40 | F204 B-40/0,5 | 2CSF204592R4400 | 776932 | 0,380 | 1 |
| | | | 63 | F204 B-63/0,5 | 2CSF204592R4630 | 347637 | 0,380 | 1 |
| | | 500 S | 40 | F204 B S-40/0,5 | 2CSF204892R4400 | 357834 | 0,380 | 1 |
| | | | 63 | F204 B S-63/0,5 | 2CSF204892R4630 | 347538 | 0,380 | 1 |

F204 B 100, 125 A

**F200 B Type high ratings**

| Number of poles | Type | Rated residual current $I_{\Delta n}$ [mA] | Rated current In [A] | Description: ABB Type | Order Code | Bbn 8012542 EAN | Weight [kg] | Pack Unit pc |
|---|---|---|---|---|---|---|---|---|
| 4 | B | 30 | 80 | F204B-80/0,03 | 2CSF204501R1800 | 988601 | 0,500 | 1 |
| | | | 125 | F204B-125/0,03L[1] | 2CSF204523R1950 | 988700 | 0,500 | 1 |
| | | 300 | 80 | F204B-80/0,3 | 2CSF204501R3800 | 989103 | 0,500 | 1 |
| | | | 125 | F204B-125/0,3L[1] | 2CSF204523R3950 | 989202 | 0,500 | 1 |
| | | 300 S | 125 | F204BS-125/0,3L[1] | 2CSF204823R3950 | 989509 | 0,500 | 1 |
| | | 500 | 125 | F204B-125/0,5L[1] | 2CSF204523R4950 | 730439 | 0,500 | 1 |
| | | 500 S | 125 | F204BS-125/0,5L[1] | 2CSF204823R4950 | 731238 | 0,500 | 1 |

[1] Left-sided neutral pole

# Technical specifications

F202 B

F204 B

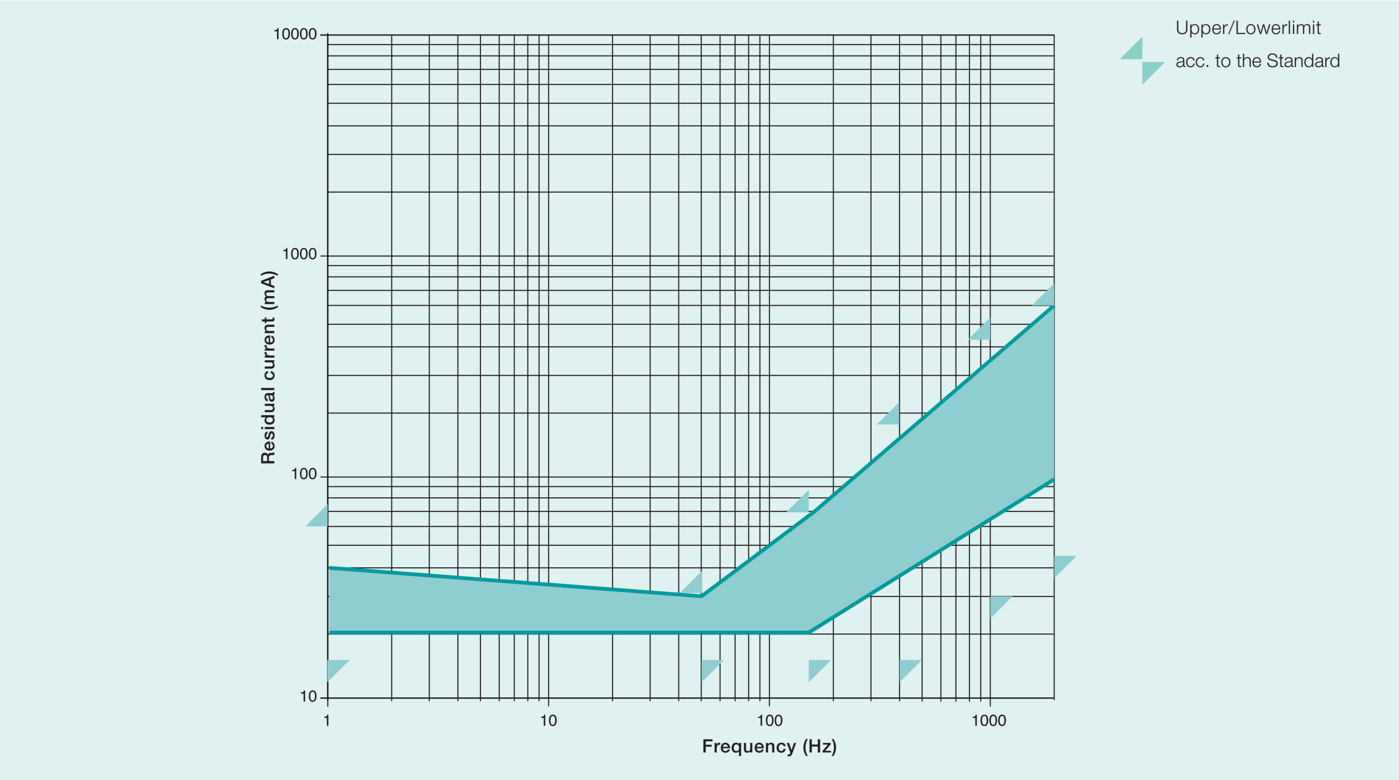
F204 B 125 A

| | | | | New F200 B Type | | F200 B Type high ratings |
|---|---|---|---|---|---|---|
| | | | | F202 16-63 A | F204 16-63 A | F204 B 80-125 A |
| | Standards | | | IEC/EN 61008-1 EN 62423 | | |
| Electrical features | Type (wave form of the earth leakage sensed) | | | B | | |
| | Poles | | | 2P | 4P | 4P |
| | Rated current $I_n$ | | A | 16, 25, 40, 63 | | 80, 125 |
| | Rated sensitivity $I_{\Delta n}$ | | A | 0,03 - 0,3 | 0,03 - 0,3 - 0,5 | 0,03 - 0,3 - 0,5 |
| | Rated voltage $U_e$ | IEC | V AC | 230 | | 230/400 |
| | Insulation voltage $U_i$ | | V | 500 | | |
| | Max. operating voltage of circuit test | IEC | V | 110/253 V AC<br>170/253 V AC (30 mA) | 185/440 V AC<br>300/440 V AC (30 mA) | |
| | Min. operating voltage for detecting Type A/AC residual currents | | V AC | 0 | | |
| | Min. operating voltage for detecting Type B residual currents | | V AC | 50 | 50 | 50 |
| | Rated frequency | | Hz | 50/60 | | 50 |
| | Frequency range of residual current | | kHz | B: 2 | | B: 100 |
| | Rated conditional short-circuit current Inc=$I_\Delta$ [3] | SCPD - fuse gG 100 A | kA | 10 (for 125 A fuse is gG 125 A) | | |
| | Rated residual breaking capacity $I_{\Delta m}$=Im | | kA | 1 | | 125 A: 1,25 |
| | Rated impulse withstand voltage (1.2/50) Uimp | | kV | 4 | | |
| | Dielectric test voltage at ind. freq. for 1 min. | | kV | 2,5 | | |
| | Overvoltage category | | | III, disconnector abilities | | |
| | Surge current resistance (wave 8/20) | | A | 3.000 | 3.000 - 5.000 (B S) | 3.000 - 5.000 (B S) |
| | Maximum electronic consumption | | W | 1,2 | 3,5 | 7,2 |
| Mechanical features | Toggle | | | Blue sealable in ON-OFF position | | |
| | Contact position indicator (CPI) | | | yes | | |
| | Electrical life | | | 10.000 | | 2.000 |
| | Mechanical life | | | 20.000 | | 5.000 |
| | Protection degree | housing | | IP4X | | |
| | | terminals | | IP2X | | |
| | Environmental conditions (damp heat) acc. to IEC/EN 60068-2-30 | | °C/RH | 28 cycles with 55°C/90-96% and 25°C/95-100% | | |
| | Ambient temperature (with daily average ≤ +35 °C) | IEC | °C | -25…+60 | | -25…+40 |
| | Storage temperature | | °C | 40…+70 | | |
| Installation | Terminal Type | | | Failsafe bi-directional cylinder-lift terminal at top and bottom (shock protected) (cage for In > 63 A) [2] | | |
| | Min/Max Terminal size top/bottom for cable | IEC | $Mm^2$ | 1 - 25 | | |
| | Terminal size top/bottom for busbar | IEC | $Mm^2$ | 10/10 | | |
| | Tightening torque | IEC | Nm | 2,8 | | 3 |
| | Tool | | | Flat tip PZ2 | | |
| | Mounting | | | Any position on DIN rail EN 60715 (35 mm) by means of fast clip device | | |
| | Supply | | | Top/bottom | | |
| | Withdrawal from busbar | | | It is possible without using any tools only from the bottom | | no |
| Dimensions and weight | Dimensions (H x D x W) | 2P | Mm | 85 x 69 x 35 | 85 x 69 x 70 | 85 x 69,5 x 72 |
| | Weight | 2P | g | 200 | 380 | 460 |
| Combination with auxiliary elementsi | Combinable with: | auxiliary contact | | yes | | no |
| | | signal contact/auxiliary switch | | yes | | |
| | | motor operating device | | yes | | no |
| | | shunt trip | | yes | | no |
| | | undervoltage release | | yes | | no |

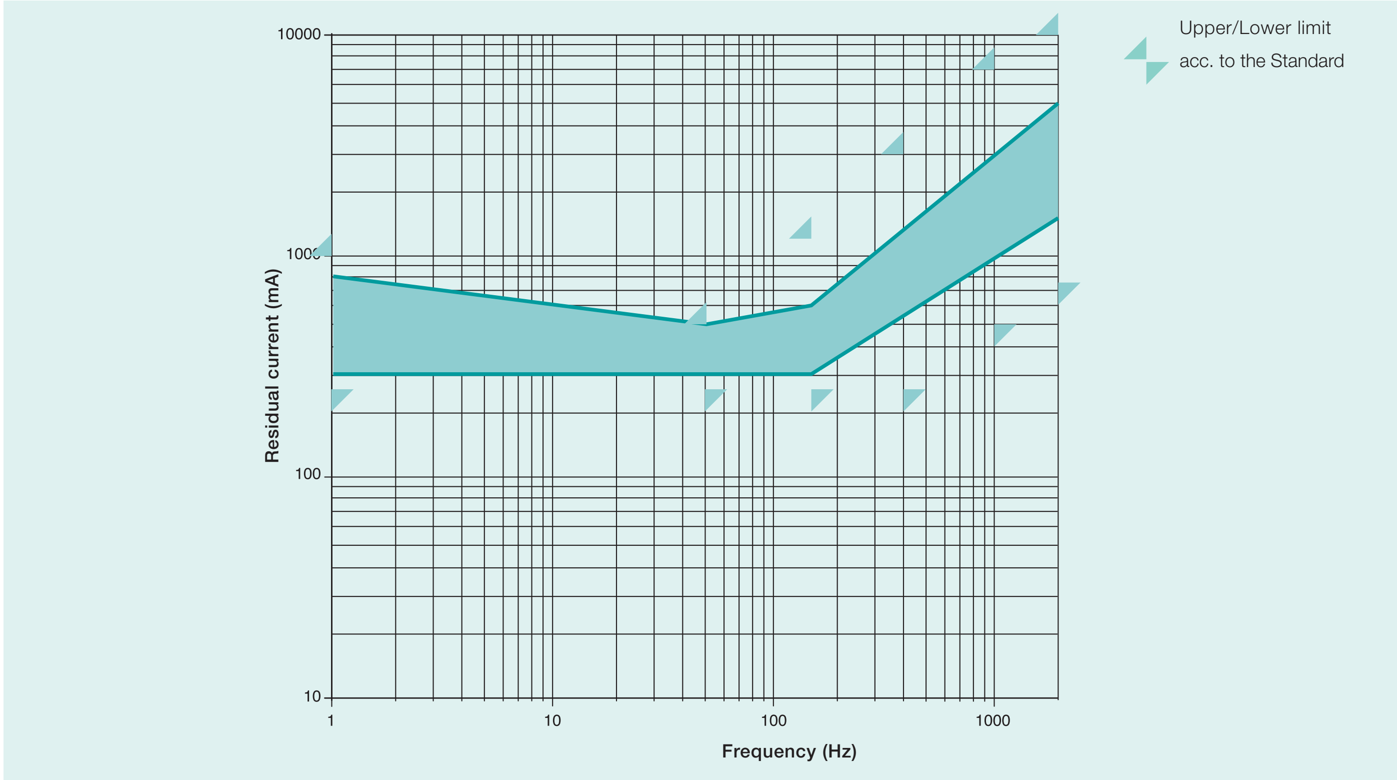
[1] "Ground-Fault Sensing and Relaying Equipment" (F200 up to 100 A)
[2] Prior to connection of aluminium conductors (≥ 4 $mm^2$) ensure that their contact points are cleaned, brushed and coated with grease
[3] for S700-E/K 100A, S750-E 63A, S750DR-E/K 63A and other SCPD coordination values are available.

# Technical details
## Residual current tripping thresholds according to frequency

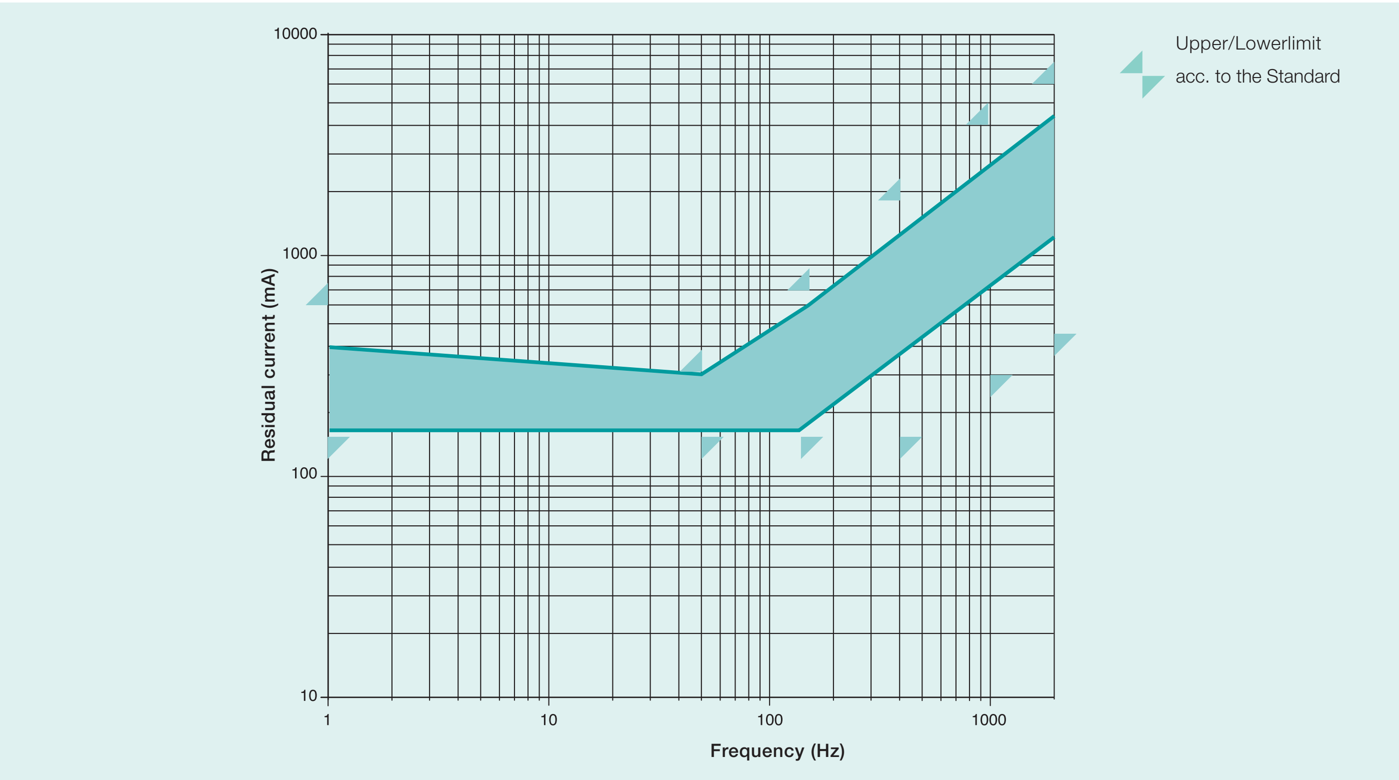
### New F200 B Type from 16 to 63 A




F200 B 30 mA



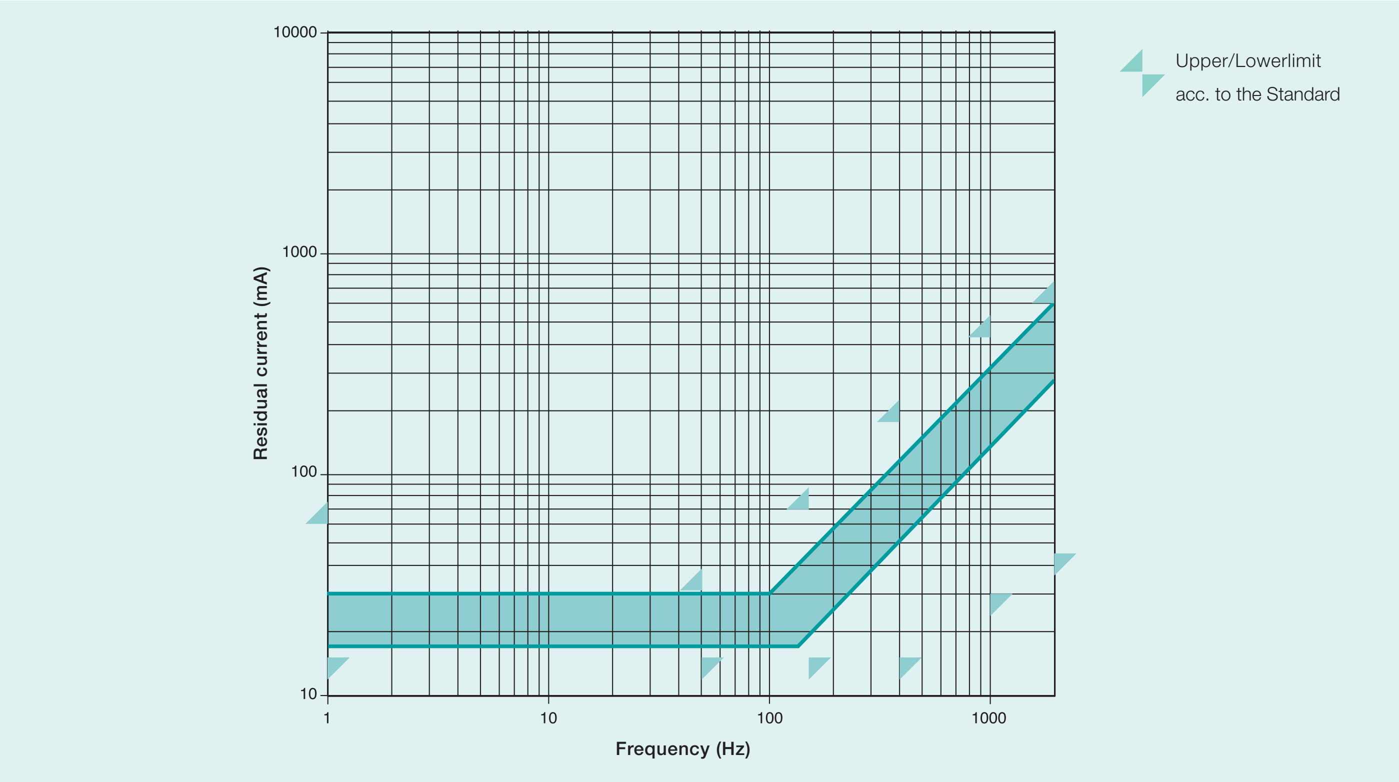

F200 B 500 mA



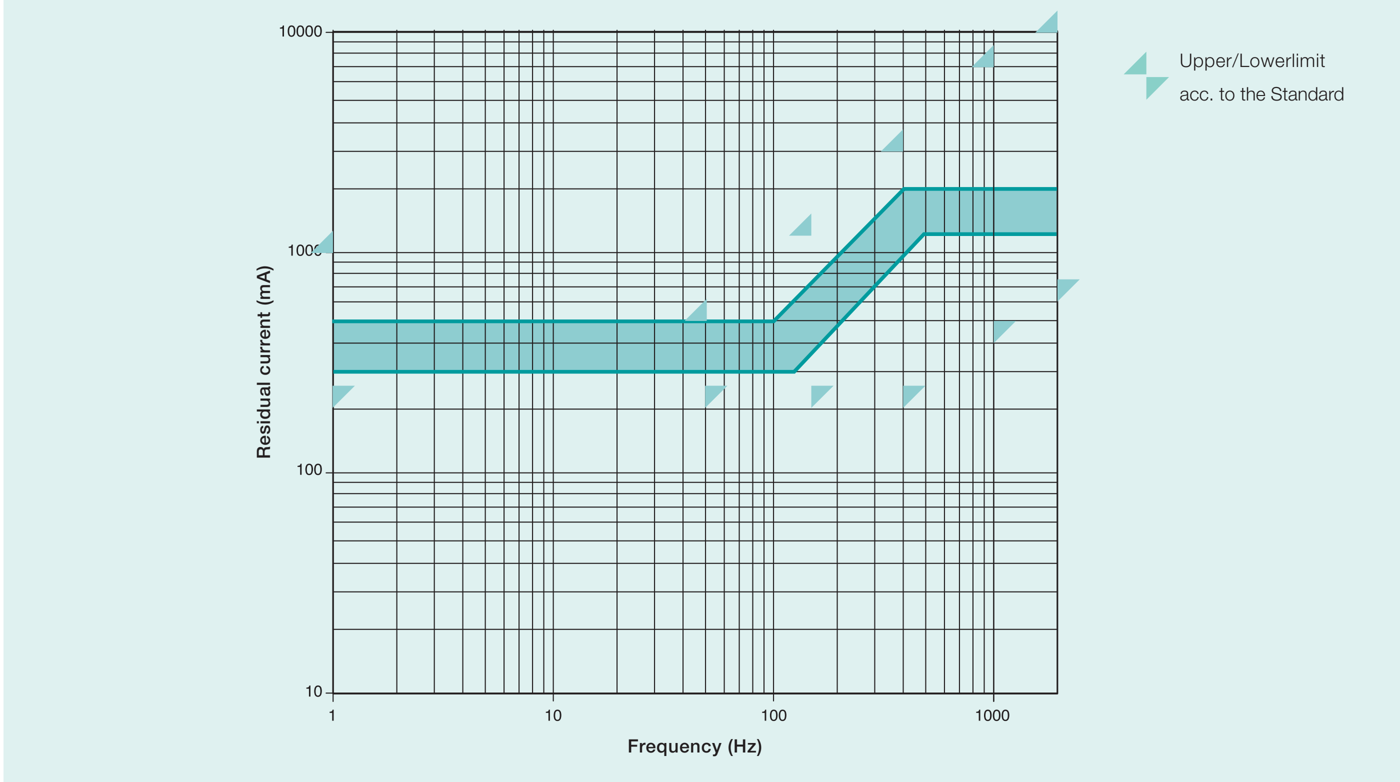

F200 B 300 mA

# Technical details
## Residual current tripping thresholds according to frequency

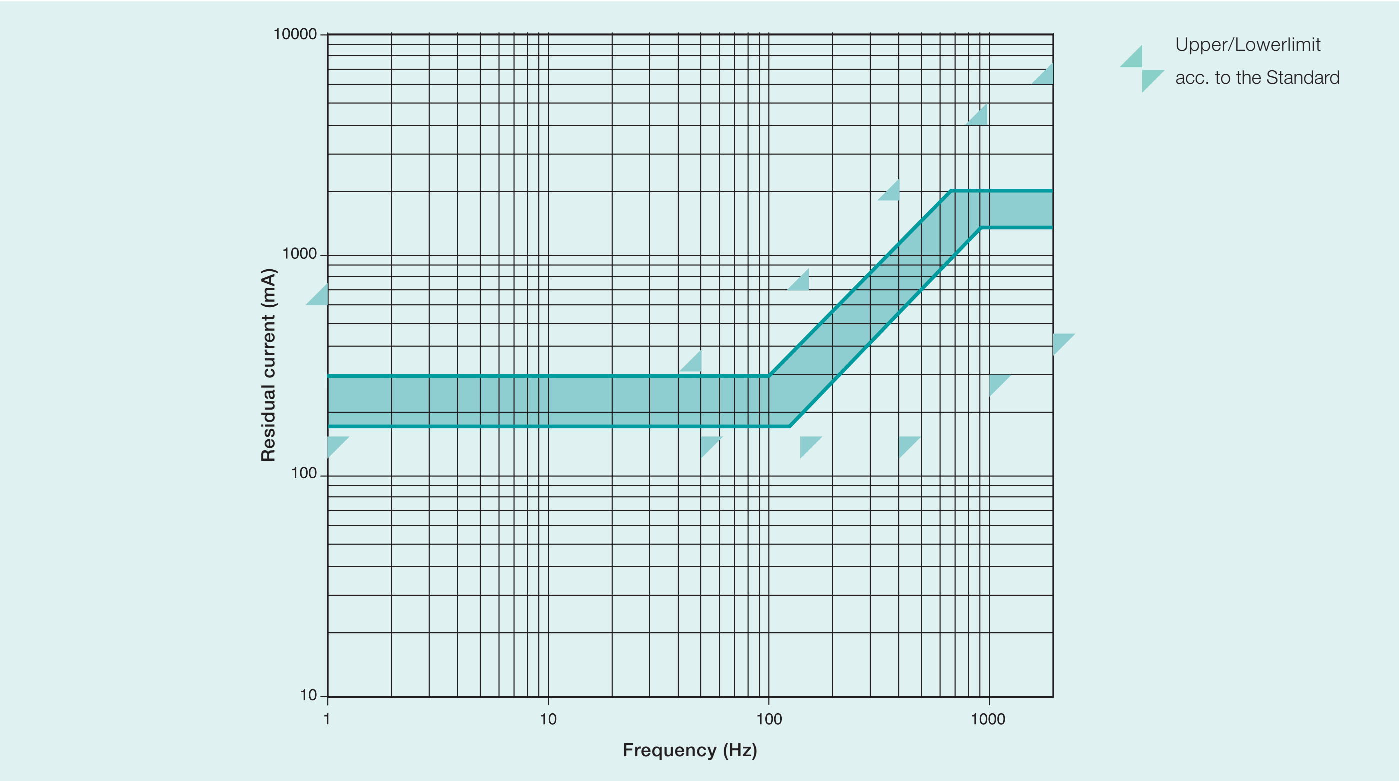
### F200 B high ratings




F204 B 30 mA




F204 B 500 mA




F204 B 300 mA

# Tripping times

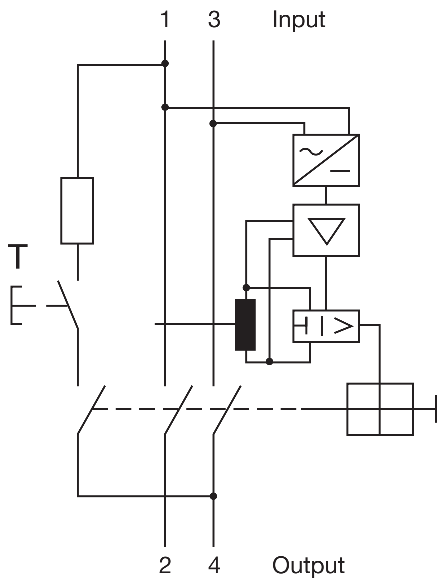
| Tripping times | | | | | |
|---|---|---|---|---|---|
| **Type** | **Fault currents** | **Tripping time at** | | | |
| | Alternating currents | 1 x $I_{\Delta n}$ | 2 x $I_{\Delta n}$ | 5 x $I_{\Delta n}$ | 500 A |
| | Pulsating DC currents | 1,4 x $I_{\Delta n}$ | 2 x 1,4 x $I_{\Delta n}$ | 5 x 1,4 x $I_{\Delta n}$ | 500 A |
| | Smooth DC currents | 2 x $I_{\Delta n}$ | 2 x 2 x $I_{\Delta n}$ | 5 x 2 x $I_{\Delta n}$ | 500 A |
| Standard or short-time delay | | Max. 0,3 s | Max. 0,15 s | Max. 0,04 s | Max. 0,04 s |
| Selectiv S | | 0,13 - 0,5 s | 0,06 - 0,2 s | 0,05 - 0,15 s | 0,04 - 0,15 s |

# Power Loss Values

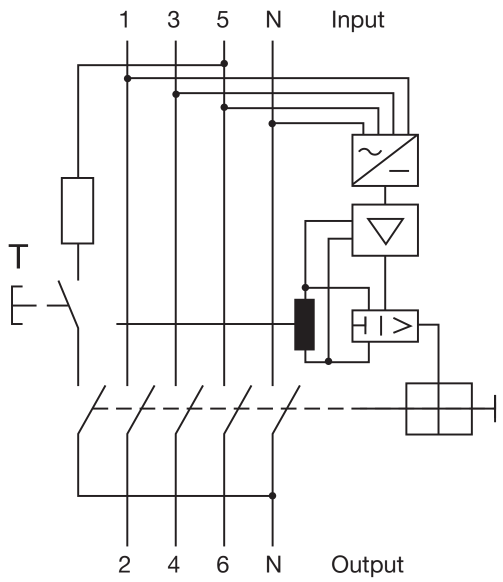
| Power Loss [W] | | | |
|---|---|---|---|
| | **In [A]** | **Per Pole** | **Total** |
| F202 B | 16 | 0,02 | 0,04 |
| | 25 | 0,27 | 0,54 |
| | 40 | 1,70 | 3,40 |
| | 63 | 4,22 | 8,44 |
| F204 B | 25 | 0,29 | 1,16 |
| | 40 | 1,81 | 7,23 |
| | 63 | 4,50 | 17,98 |
| | 80 | 3,5 | 14 |
| | 125 | 7,5 | 44,8 |

# RCDs wiring diagrams

**F202 B**

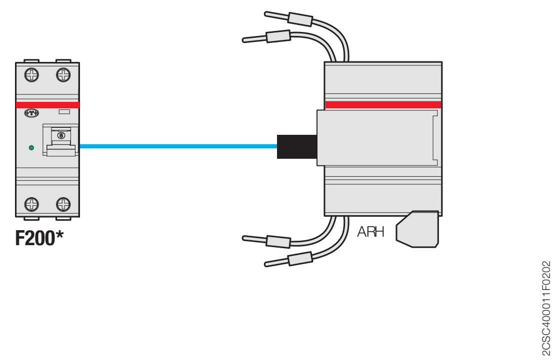


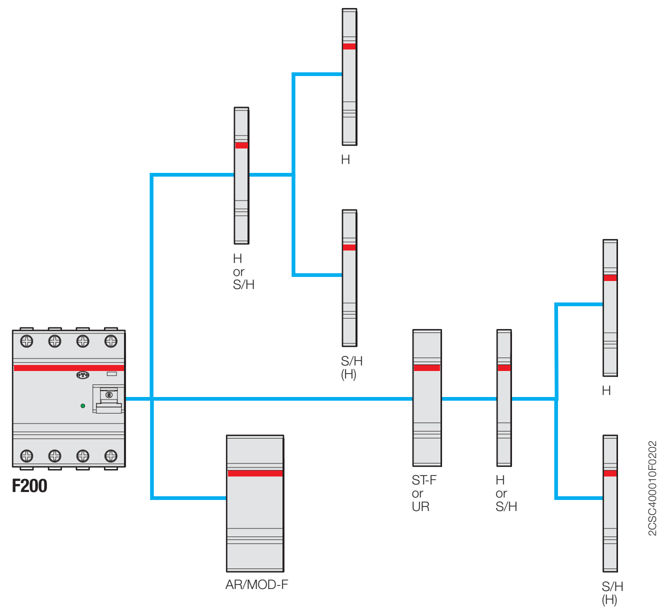

**F204 B**



# Auxiliary elements and accessories for MCBs and RCDs
## Selection tables

### New F200 B Type from 16 to 63 A



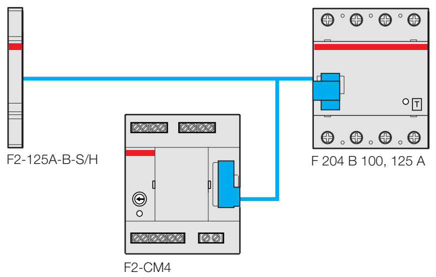




| | | |
|---|---|---|
| **ARH** | Home automatic resetting unit | F2C-ARH |

* F202 30 mA or 100 mA (depending on ARH model), max 63 A

| | | |
|---|---|---|
| **H** | Auxiliary contact | S2C-H6_...R |
| **S/H** | Signal/Auxiliary contact | S2C-S/H6R |
| **S/H (H)** | Signal/Auxiliary contact used as auxiliary contact | S2C-S/H6R |
| **UR** | Undervoltage release | S2C-UA |
| **AR** | Auto reclosing unit | F2C-ARI |
| **MOD-F** | Motor operating device | F2C-CM |
| **ST-F** | Shunt trip for F 200 RCCB | F2C-A |

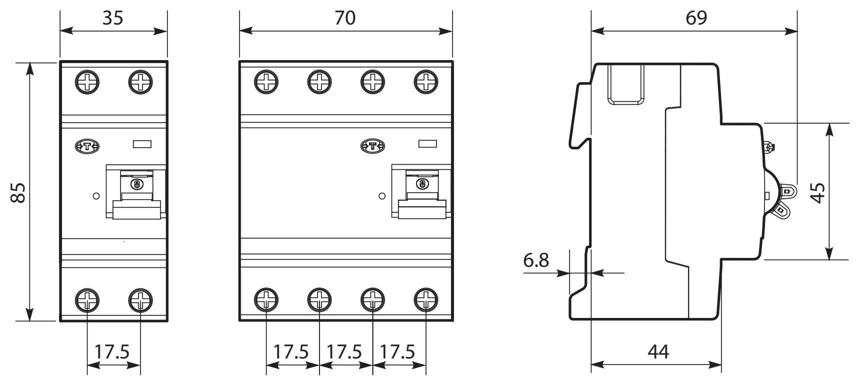
### F200 B high ratings



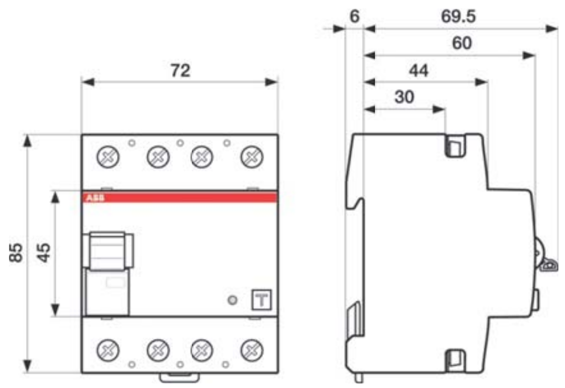

| | |
|---|---|
| **F2-125A-B-S/H** | Signal/Auxiliary contact |
| **F2-CM4-MOD** | |

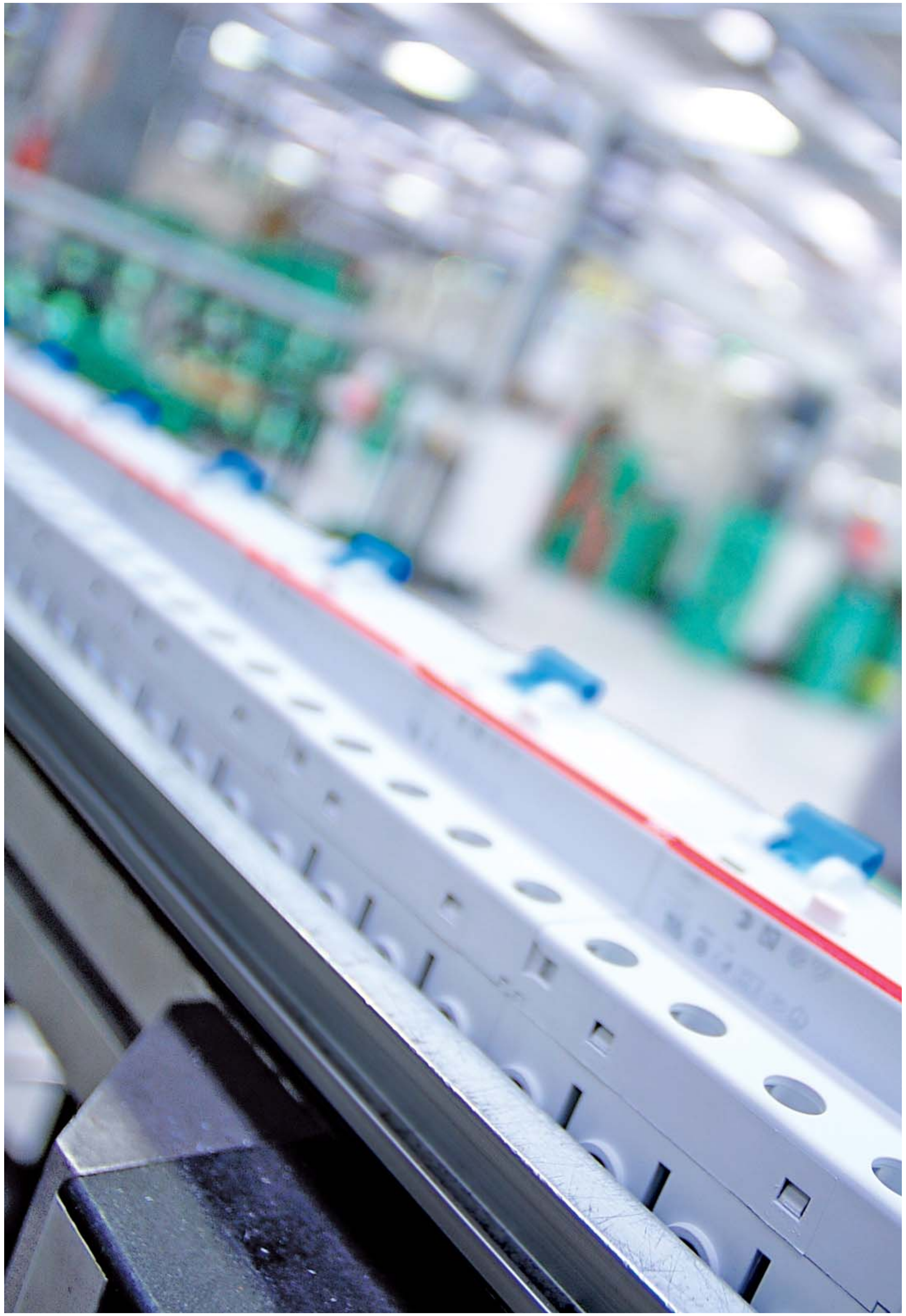
# Overall dimensions

### New F200 B Type from 16 to 63 A




### F200 B high ratings





## Questions & answers
## Answers on regulations, application fields and installation methods for Type B RCCBs

**How could a high-frequency residual current affect the proper operation of Type A RCCBs?**
Depending on the specific case, Type A RCCBs could present the following drawbacks:
- they may not trip in case of fault current to ground with a high continuous component or a high frequency (or they may trip late or at excessive residual current values);
- the RCCB may become desensitized and therefore not trip within the established limits should another piece of equipment fail (even if this fault has a sinusoidal alternating form);
- nuisance tripping with no fault condition.

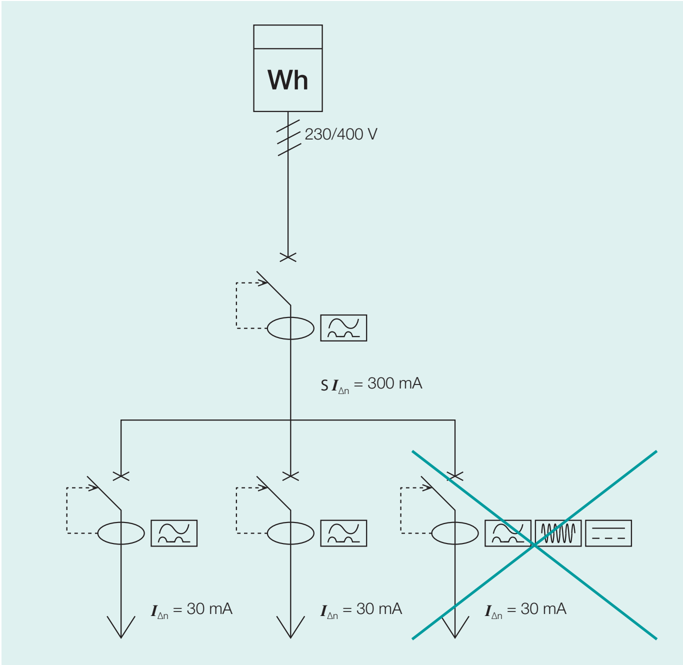
**Which types of residual currents set in the Standard EN 62423 are tested on Type B RCCBs?**
The residual current tripping waveforms required by the standards for Type B are:
- sinusoidal alternating current at mains frequency;
- pulsating unidirectional current, with or without phase angle;
- unidirectional current generated by two or three-phase rectifiers;
- sinusoidal alternating current up to a frequency of 1 kHz
- direct current without ripple;
- current obtained by the overlap of direct current on alternating current;
- current obtained by the overlap of direct current on pulsating unidirectional current;
- current obtained by the overlap of several frequencies.

**Which standards define Type B RCCBs?**
The Standard EN 62423, “Type F and B RCCBs with or without integral overcurrent protection for household and similar uses”, must be used in conjunction with the Standard IEC EN 61008 or IEC EN 61009, since it contains only the requirements and tests in addition to those set out in the aforesaid standards for Type A circuit breakers. For industrial applications only, the Standard IEC EN 60947-2 must be added to the aforesaid standards.

**When do the Standards require Type B RCCBs?**
- In photovoltaic systems that do not have at least a simple separation between the ac side and the dc side, if the converter is not exempt by construction design from injecting direct ground fault currents into the electrical system, one must install a Type B RCCB on the ac side;
- in group 1 and group 2 rooms for medical use, only Type A or Type B RCCBs must be used according to the type of possible fault current;
- when STS and UPS devices are used and the project includes the possibility of fault current to ground with direct current components, their installation instructions must state that the building’s RCCBs must be as follows: Type B for UPS and three-phase STS devices; Type A for single-phase STS devices (see IEC EN 62040-1 Art. 4.7.12 and IEC EN 62310-1 Art. 4.1.10);
- when electric vehicles are charged with a three-phase power supply, one must use protection measures that are sensitive to ground fault currents, for example a Type B RCCB;
- more in general, regarding the correct choice of RCCBs for power electronics equipment other than the cases indicated above, please refer to the Standard IEC EN 50178 “Electronic equipment for use in power installations”, Art. 5.2.11.2, which states: mobile electronic equipment with allocated power > 4 kVA or fixed electronic equipment of any power that is not compatible with Type A RCCBs must be provided with a warning on the equipment and in the operating manual to require the use either of a Type B RCCB or of another protection method (e.g. isolation transformer).

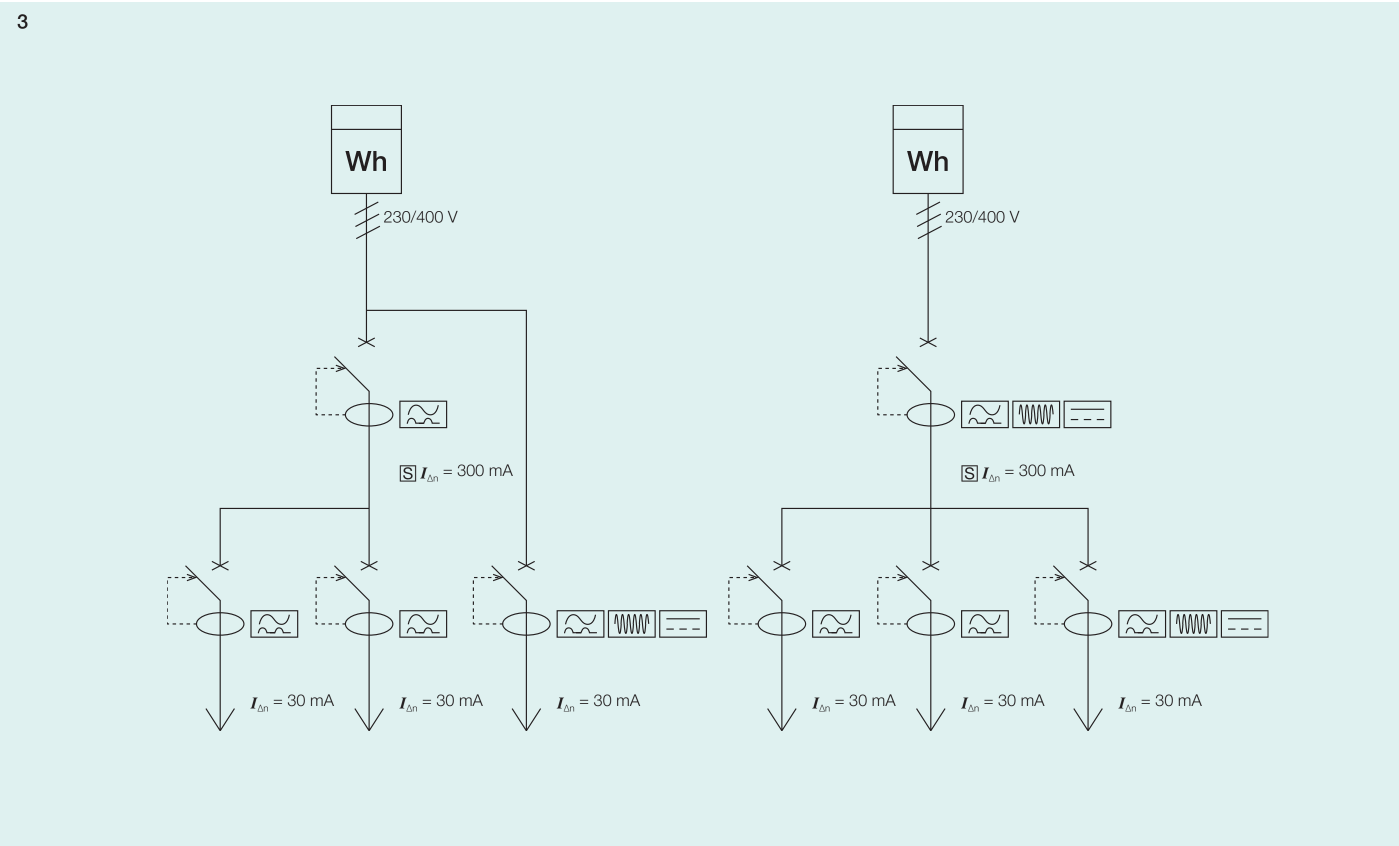
# Answers on regulations, application fields and installation methods for Type B RCCBs

**What's the correct installation?**
Since Type B RCCBs are used in the presence of loads that can also generate direct fault currents, when designing the electrical system any other RCCB installed upstream of a Type B RCCB, and which is traversed by the same fault current, must also be a Type B RCCB (s. Fig. 3). Any direct current leakage could impair the proper operation of the upstream Type AC, A or F RCCBs which are not suitable in the case of direct residual currents. In fact, even if Type B RCCBs protect against direct fault currents, the tripping value (for example 60 mA for a circuit breaker with $I_{\Delta n}$ = 30 mA) is high enough to compromise the regular operation of other non-Type B RCCBs. It is therefore necessary to derive the power supply of Type B RCCBs upstream of any non-Type B RCCBs; or, if an upstream RCCB is required, one must use a Type B for this one as well.




Example of a wrong installation of a Type B RCD

3 Example of an appropriate installation of a Type B RCD




**How do you coordinate with the grounding system to provide protection against indirect contact at high frequencies?**
To provide protection against indirect contact in TT systems, the circuit breaker must be coordinated with the resistance of the grounding system with the customary ratio:

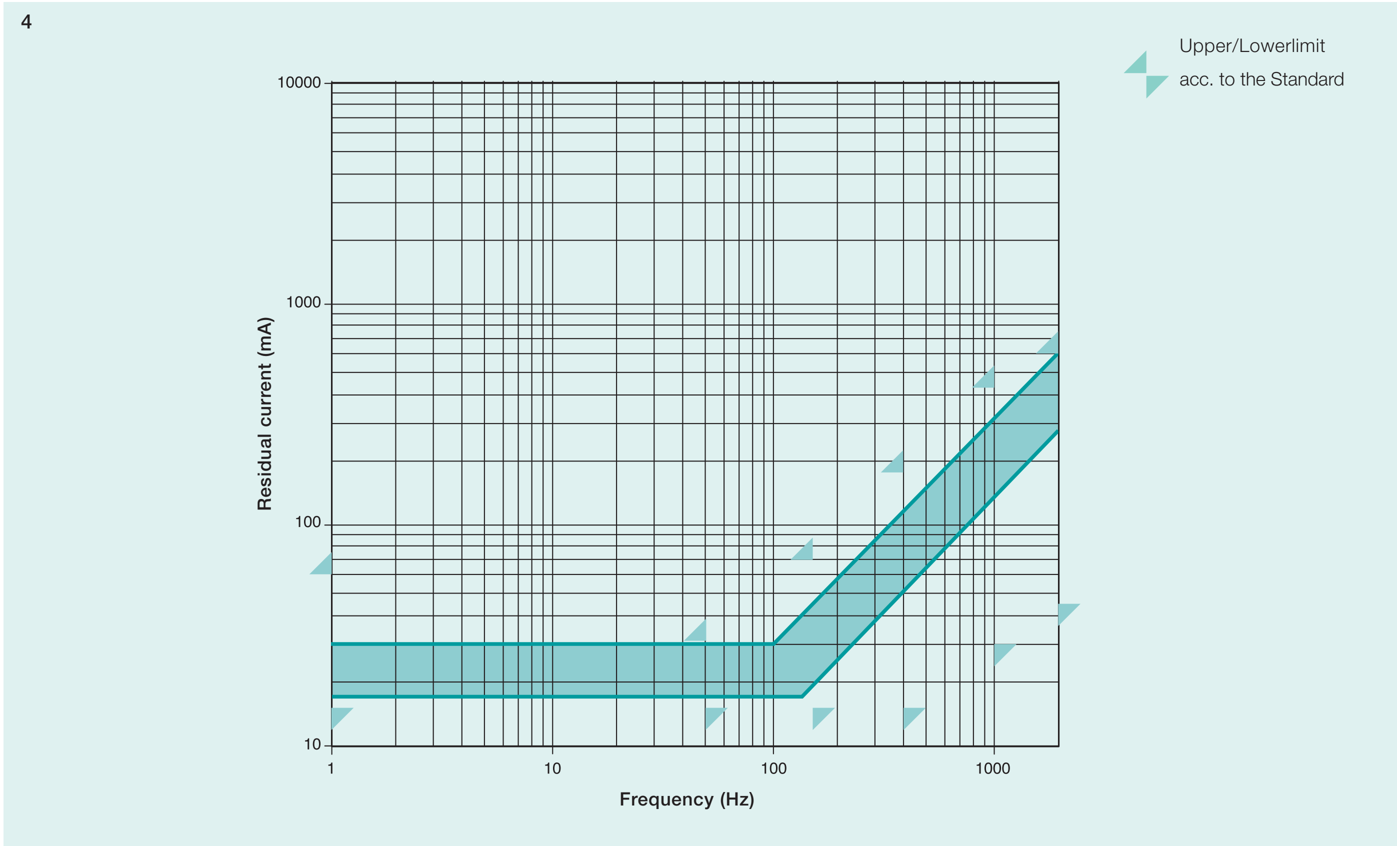
$$R_E \cdot I_{\Delta n} \leq 50 \text{ V}$$

With this coordination ratio the protection against indirect contact is automatically checked in the case of direct current faults, since the permissible limit contact voltage in direct current is 120 V, which corresponds to 50 V in alternating current.

In the case of high-frequency faults, however, a permissible limit contact voltage has not yet been established at the regulatory level. Although the risks for the human body decrease as the frequency increases, until the standards have set these values, the Standard IEC EN 62423 recommends as a precautionary measure to maintain unchanged the value of 50 V also at higher frequencies. To do this, it is necessary to take into account the actual tripping value of a possible fault frequency. For example, in the case of a Type B circuit breaker whose tripping characteristic is that shown in Figure 4, at 1,000 Hz tripping is guaranteed with a residual current of 300 mA (lower than the regulatory limit of 420 mA). Therefore, if the power consuming equipment can generate a fault current of 1,000 Hz, the ground resistance must meet the ratio

$$R_E \cdot \mathbf{0{,}3\ A} \leq 50 \text{ V}$$
$$\text{i.e. } R_E \leq \mathbf{166\ \Omega}$$

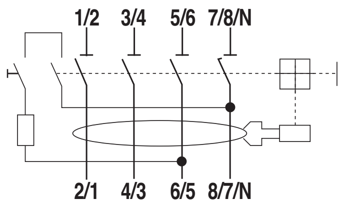
4 Frequency tripping curve for a given RCD



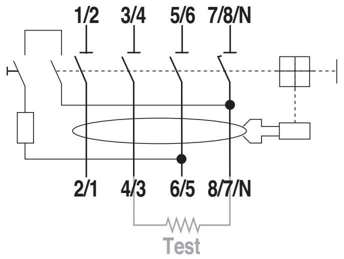
# Questions & answers
## Answers on regulations, application fields and installation methods for Type B RCCBs

**How's insultation test performed?**
It is possible to perform the insulation test without disconnecting the neutral; however, in order to prevent the electronic board from failures, it is necessary to set the toggle in OFF position and then unplug the terminal 2-4-6-8.
This test procedure is valid whenever the device is supplied from upstream. When the device is fed from the bottom terminals, it is enough to set the toggle in OFF position.

**Is it possible to use an RCCB in a three-phase network with no neutral?**
Yes, but you have to make sure that the test button works properly. In fact, the test button circuit of an RCCBs 4P F200 is wired between terminal 5/6 and 7/8/N as indicated in the diagram below and is designed for operation between 110 and 254 V




In case of installation in a 3 phase circuit without neutral, there are two possible installations:
1. Concatenate voltage between 110 and 254 V connect the 3 phases to the terminals 3/4 5/6 7/8/N and the terminals 4/3 6/5 8/7/N (supply and load side respectively) or connect the 3 phases normally (supply to terminals 1/2 3/4 5/6 and load to terminals 2/1 4/3 6/5), bridging terminal 1/2 and 7/8/N
2. Concatenate voltage higher than 254 V




| $I_{\Delta n}$ [A] | Test [Ω] |
|---|---|
| 0,03 | 3300 |
| 0,1 | 1000 |
| 0,3 | 330 |
| 0,5 | 200 |

a. connect normally the phases (supply to terminals 1/2 3/4 5/6 and load to terminals 2/1 4/3 6/5)
b. bridge terminal 4/3 and 8/7/N with an electric resistance according to the table.

Test resistance must have a power loss higher than 4 W.

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