

WITH A RESIDUAL CURRENT CIRCUIT BREAKER (RCCB) THE FOLLOWING PROTECTIVE MEASURES ARE AVAILABLE:

- protection against indirect contact
- fire protection
- additional protection in the event of direct contact

FEATURES

When designing residual current devices, manufacturing technology and type of routine tests the IEC 61008, EN 61008 standards were considered.

Important features are:

- up-to-date design
- user-friendly connection of conductors and bus bars
- resistance to current surges; unwanted tripping excluded
- simple and solid fixing to a 35 mm mounting rail in compliance with EN 60715
- additional colour display of main contacts position (red: contacts closed, green: contacts open)

PROTECTION AGAINST INDIRECT CONTACT

Protection level against indirect contact does not depend on the value of residual operating current of RCCB. Only the following condition should be fulfilled:

$$Re < \frac{\text{conventional touch voltage } U_L}{\text{rated residual operating current } I_{\Delta N}}$$

With specified residual current protection as a protective measure against indirect contact the sensitivity of RCCB can be selected regarding rated residual operating current. It is necessary to consider the installation leakage currents. In case of more complex installation it is recommended to envisage more RCCBs in order to prevent damage of complete system.

FIRE PROTECTION

RCCB with rated residual operating currents $I_{\Delta N} < 300$ mA provide protection against fire caused by fault currents. In case of fault currents $I_{\Delta N} < 300$ mA or larger, which are disconnected by a circuit breaker in less than 0,2 seconds, the dissipated heat in the system is not sufficient to ignite materials which are usually used in civil works.

Additional protection in the event of direct contact

This is the latest protection mode, which is required or recommended for installation in areas with particularly high electric shock hazard (sockets in bathrooms, camping sites, caravans, rooms used for medical purposes etc.) The additional RCCB with rated residual operating current $I_{\Delta N} < 30$ mA protects the user also against dangerous effects of electric current if both below stated measures fail:

- protection against direct contact (removed covers, damaged housings, etc.),
- protection against indirect contact (interruption of a protective conductor, accidentally transposed protective and live conductor, damaged insulation of electrical device, etc.)

In case of direct contact the fault current flows through the human body and disconnection occurs before the current reaches a dangerous limit.

However, additional protection should not – under any circumstances – be regarded as a basic protection measure.

TYPES

RCCBs are manufactured in compliance with EN 61008 standard:

- Type A – sensitive to alternating and pulsating dc residual operating currents. The RCCBs are marked with A symbol and designated PCHB2 or PCHB4,

SPECIAL VERSIONS

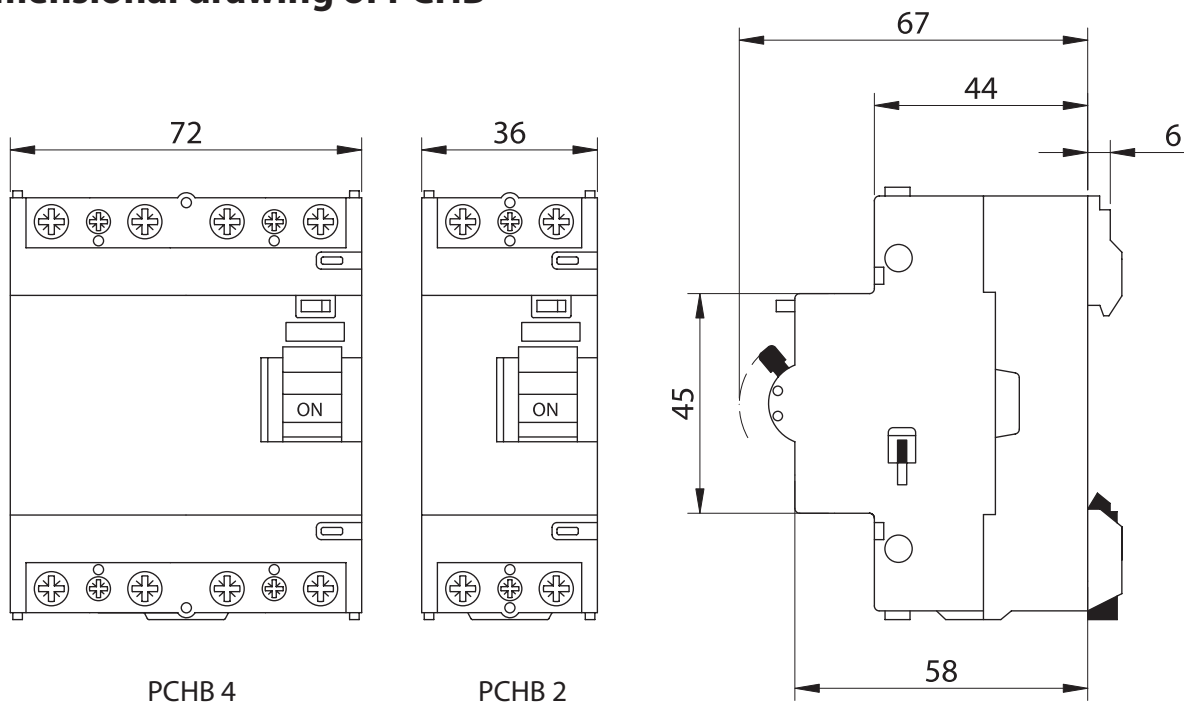
Four-pole selective switches (switches with delayed break-out) are available at customer's request. Their rated currents are 40 A or 63 A, and rated differential currents are 0,3 A or 0,5 A. Break out times at different values of differential currents comply with the EN 61008 standard.



Technical data

Type A			PCHB2-16	PCHB2-25	PCHB2-40	PCHB2-63	PCHB2-80	PCHB4-25	PCHB4-40	PCHB4-63	PCHB4-80
Number of poles			2	2	2	2	2	4	4	4	4
Rated current	I_n A		16	25	40	63	80	25	40	63	80
Rated residual operating current	I_{Dn} A		0,01	0,01							
			0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03
			0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
			0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3
			0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5
Rated voltage	U_n V		230	230	230	230	230	230/400	230/400	230/400	230/400
Rated frequency		Hz	50/60								
Rated res. making and breaking capacity	I_m										
Rated res. making and breaking capacity $I_{\Delta m}$											
$I_m = I_{Dn}$		A	800								
Max. conventional back-up fuses GL	I_n A	A	63	63	63	80	80	63	63	80	80
Rated conditional short-circuit current	I_{cn} A	A	10.000								
Protection degree			IP 20, IP 40 after installation								
Mounting position			optional								
Ambient temperature			from -25°C to +40°C								
Weight		g	230	230	230	230	230	390	390	390	390
Terminal capacity		mm ²	1 to 25								
Tripping times		s	at $1 \times I_n < 0,2$; at $5 \times I_n < 0,04$								
Endurance			> 10.000 operations								

Dimensional drawing of PCHB

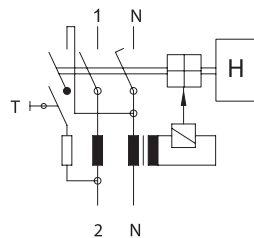


Type	Ordering Nr.
PCHB2 - 16/0,01	PCHB2/721011
PCHB2 - 16/0,03	PCHB2/721031
PCHB2 - 16/0,1	PCHB2/721101
PCHB2 - 16/0,3	PCHB2/721301
PCHB2 - 25/0,01	PCHB2/722011
PCHB2 - 25/0,03	PCHB2/722031
PCHB2 - 25/0,1	PCHB2/722101
PCHB2 - 25/0,3	PCHB2/722301
PCHB2 - 40/0,03	PCHB2/724031
PCHB2 - 40/0,1	PCHB2/724101
PCHB2 - 40/0,3	PCHB2/724301
PCHB2 - 63/0,03	PCHB2/726031
PCHB2 - 63/0,1	PCHB2/726101
PCHB2 - 63/0,3	PCHB2/726301
PCHB2 - 80/0,03	PCHB2/728031
PCHB2 - 80/0,1	PCHB2/728101
PCHB2 - 80/0,3	PCHB2/728301

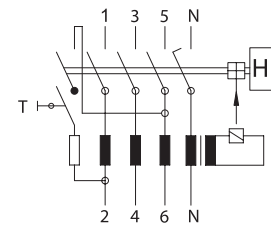
Type	Ordering Nr.
PCHB4 - 25/0,03	PCHB4/742031
PCHB4 - 25/0,1	PCHB4/742101
PCHB4 - 25/0,3	PCHB4/742301
PCHB4 - 40/0,03	PCHB4/744031
PCHB4 - 40/0,1	PCHB4/744101
PCHB4 - 40/0,3	PCHB4/744301
PCHB4 - 40/0,5	PCHB4/744501
PCHB4 - 63/0,03	PCHB4/746031
PCHB4 - 63/0,1	PCHB4/746101
PCHB4 - 63/0,3	PCHB4/746301
PCHB4 - 80/0,03	PCHB4/748031
PCHB4 - 80/0,1	PCHB4/748101
PCHB4 - 80/0,3	PCHB4/748301

Contacts scheme

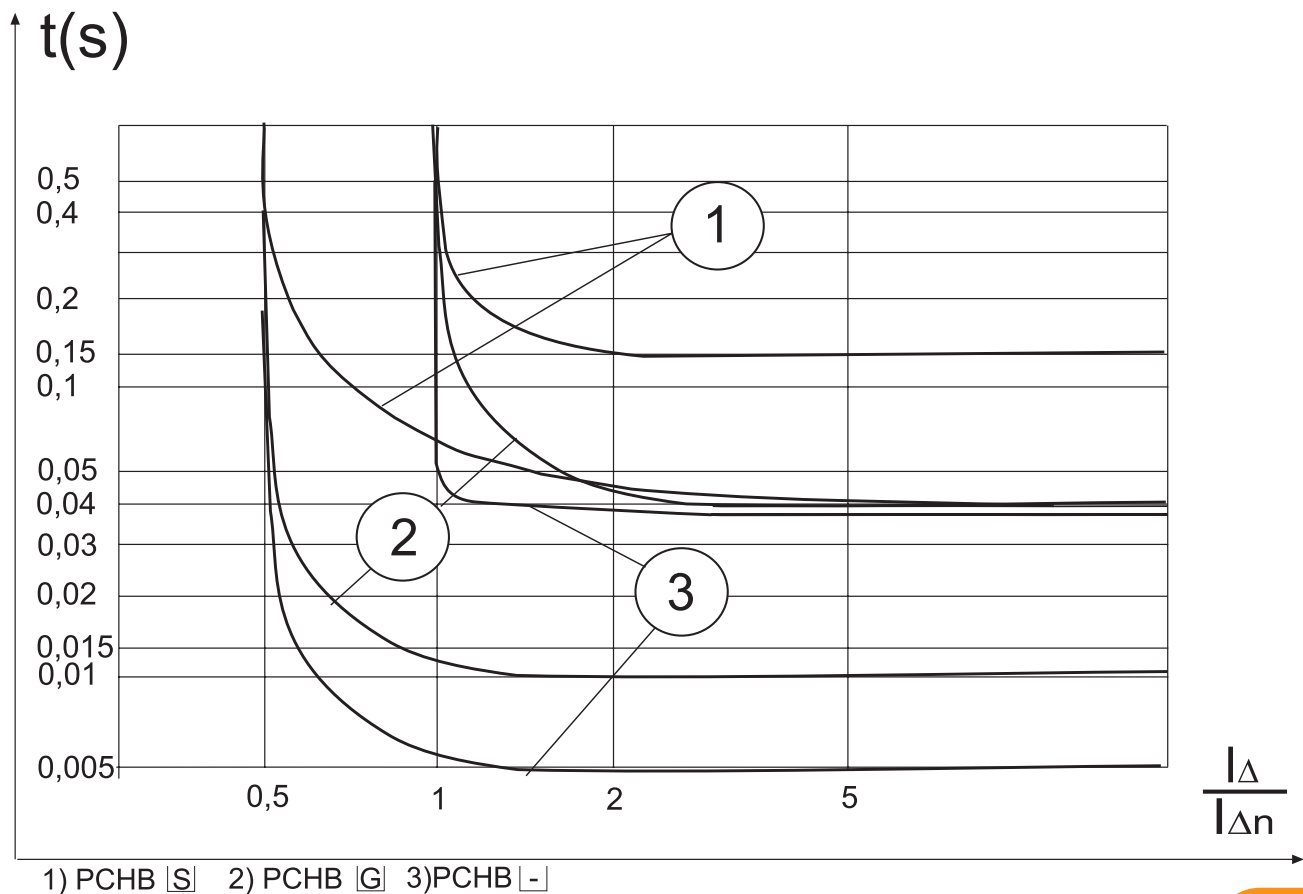
PCHB - 2



PCHB - 4



Instantaneous tripping characteristics PCHB



BASIC TERMS AND SYMBOLS

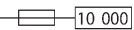
•**Rated residual current $I_{\Delta n}$** is the value of residual current $I_{\Delta n}$ specified by the manufacturer at which the residual current circuit breaker must switch out under specified conditions. Alternating residual current must release the residual current circuit breaker within $(0.5 \div 1) I_{\Delta n}$

•**Rated current I_n** is the value of current specified by the manufacturer, which can be transferred by the residual current circuit breaker continuously. So the current I_n can pass through the contacts for an unlimited time. Therefore it is, for instance, possible to use a residual current circuit breaker with $I_n = 25$ A in 16 A circuit. For protection against overload of the residual current circuit breakers PCHB, it is recommended to use the miniature circuit breakers PR 60, PR 120, PRe 60 with rated current $I_{n\text{ MCB}} \leq I_{n\text{ RCCB}}$

•**Rated operating voltage U_e** is the voltage the residual current circuit breaker is to be connected to and which properties are related to. The connected voltage has no effect on the device function but on the function of the test circuit and isolation properties.

•**Rated frequency f_n** is the frequency the residual current circuit breaker is designed for and at which it works correctly under stated conditions. Majority of residual current circuit breakers are designed for $f_n = 50$ to 60 Hz. As the residual current circuit breaker function is based on the induction principle, the residual current behaviour and frequency show an effect upon tripping. When using a device designed for 50/60 Hz in a network with a different frequency, the user must count on a change of the tripping threshold i.e. a change of $I_{\Delta n}$

•**Rated conditional short-circuit current I_{nc}** – short-circuit strength. The function and design principle does not allow for the residual current circuit breaker use for protection against short-circuit. For circuit protection it is necessary to use a circuit breaker or a fuse. These elements cut the short-circuited circuit safely off. The residual current circuit breaker must only withstand the through-going short-circuit current. The amplitude of the maximum through current is defined as rated conditional short-circuit current I_{nc} . The short-circuit strength is then expressed by the current I_{nc} . For example, on the rating plate, $I_{nc} = 10$ kA is expressed by the following symbol:

—  —

•**Ambient temperature T** for the residual current circuit breakers is $(-5 \div +40)$ °C according to almost all international standards. Some residual current circuit breakers work in an extended range $(-25 \div +40)$ °C. This possibility is identified by the following symbol on the rating plate:



•**Residual current circuit breaker – type AC** – reacts to sine-wave residual current – it is used in conventional AC networks.

•**Residual current circuit breaker – type A** – reacts to sine-wave alternating and pulsating direct residual currents - it is used in conventional AC networks and the networks with phase power regulation etc.

•**Residual current circuit breaker – type G** – special residual current circuit breaker reducing the number of undesirable releases. It is mainly installed before the devices causing short-time (up to 10 ms) stray currents.

Identification: G

Release delay: 10 ms

•**Residual current circuit breaker – type S** – special residual current circuit breaker, which is mainly intended for selective switching of residual current circuit breakers and reduction of undesirable releases. It is installed before the devices causing short-time (up to 40 ms) stray currents. Identification: S release delay: 40 ms Selective (discriminating) switching means that if the residual current circuit breakers are connected in series, only the device in which circuit a failure occurs will release. More specifically, only the device in which the release residual current appears due to a failure in the protected circuit will release. The advantage consists in maintaining the power supply in the other circuits not affected by the failure. Such function of the protected circuit is achieved by connection of the selective residual current circuit breaker before the standard or G type residual current circuit breaker, with the following ratio of rated residual currents: $I_{\Delta n S} \geq 3 \times I_{\Delta n - G}$ $I_{\Delta n S}$ rated residual of the selective residual current circuit breaker $I_{\Delta n - G}$ maximum rated residual current of G type residual current circuit breaker. The main reason of selective switching is higher time delay of the selective residual current circuit breakers in releasing (compared to standard or G type ones).

•**Residual current circuit breaker with overcurrent protection** – the device is a combination of residual current circuit breaker and miniature circuit breaker with 2-module width - it saves the space in the switchboard compared to conventional connection of two separate devices (3 modules). This eliminates the problem of primary protection and interconnection. The disadvantage of such a design compared to conventional ones is that it is not possible to identify whether the release was actuated by the residual current circuit breaker or by overcurrent release of the circuit breaker.