

RCCBs - Residual current circuit breakers EFI

Features of residual current circuit breakers EFI

→ Rated conditional short-circuit current : 10 kA

→ AC - pure sinus residual current,
 → A - AC + pulsating direct current
 → B - AC + A + smooth direct current + high frequency (1 kHz)
 → B+ - AC + A + smooth direct current + high frequency (20kHz)

→ Test button enables user to check residual functionality

→ Various quality marks

→ The terminals accept not only wires but also time saving busbars

→ Supply is possible both from top and bottom terminals

→ Real contact position indication for easier contact status identification



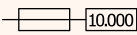




Residual current circuit breakers can be used in TN-S, TN-CS, TT and IT network systems, or with other words, in all systems where neutral and protective conductors are separated. Residual current circuit breakers EFI are used for protection against indirect contact (fault protection) and direct contact (additional protection) of parts under voltage. In the case of protection against indirect contact (fault protection) you can use residual current protective devices with a rated residual current of $I_{\Delta n} \leq 300\text{mA}$. Residual current protective devices with a rated residual current of $I_{\Delta n} \leq 30\text{mA}$ fulfil the conditions for protection against direct contact (additional protection). For protection against fire, according to DIN VDE 0100-482 and IEC 60364-4-482, all cables and conductors in TN and TT systems must be protected by means of residual current protective devices with rated residual current of $I_{\Delta n} \leq 300\text{mA}$. In applications where resistive faults can cause a fire (radiant ceiling heating with panel heating elements), the rated residual current must be $I_{\Delta n} = 30\text{mA}$.



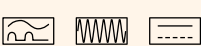

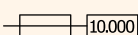




Types

- AC Type: they are sensitive to alternating (sinusoidal) AC residual currents.
- A Type: they are sensitive to alternating (sinusoidal) AC residual currents and pulsating DC residual currents.
- B Type: they are sensitive to alternating (sinusoidal) AC residual currents, pulsating DC residual currents and smooth DC residual currents. Tripping values are defined up to 1kHz.
- B+ Type: they are sensitive to alternating (sinusoidal) AC residual currents, pulsating DC residual currents and smooth DC residual currents. Tripping values are defined up to 20kHz and they are below 420mA.




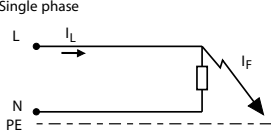
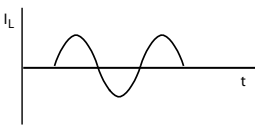
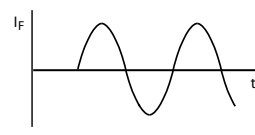
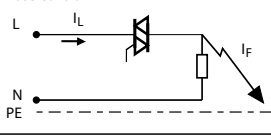
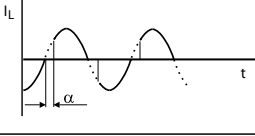
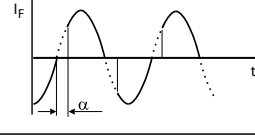
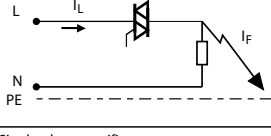
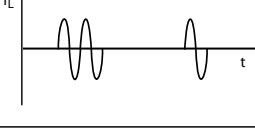
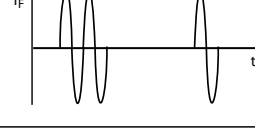
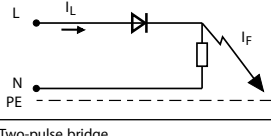
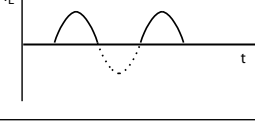
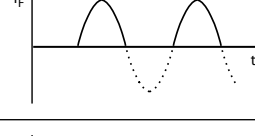
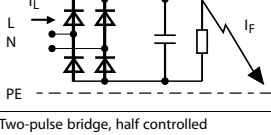
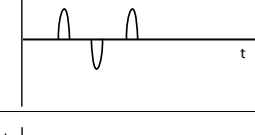
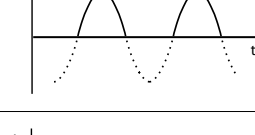
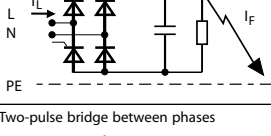
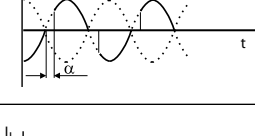
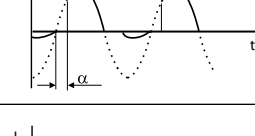
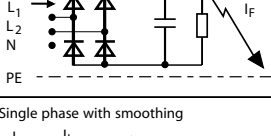
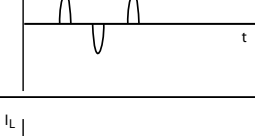
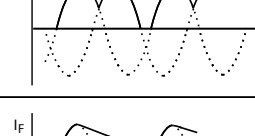
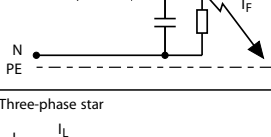
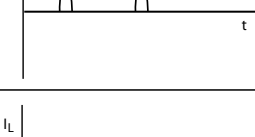
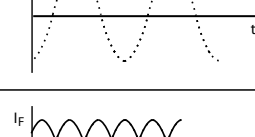
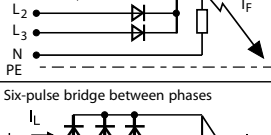
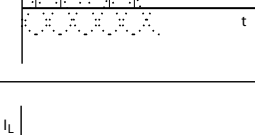
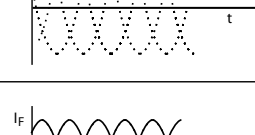
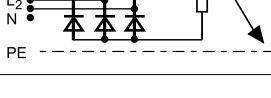

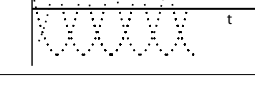
Classification regarding break time

- Instantaneous: max. break time 40ms (Inst.)
- G/KV-Short time delay: time delayed min. 10ms and max. 40ms (G/KV)
- S-Selective: time delayed min. 40ms and max. 150ms (S)

EFI 2 (2M)		Type AC Inst.	Type A Inst.	Type A G/KV	S
	For alternating residual current	✓	✓	✓	✓
	For alternating and pulsating direct residual current		✓	✓	✓
	Short-circuit capacity with back-up fuse	✓	✓	✓	✓
	Lower temperature limit of application -25°C	✓	✓	✓	✓
	VDE 0664, part 1 (up to 80 A)		✓		✓
	Short time delayed (10 - 40 ms)			✓	
	Selective (time delayed 40 -150 ms)				✓

EFI 4 (4M)		Type AC Inst.	Type A Inst.	Type A G/KV	S	Type B Inst.	Type B G/KV	S	Type B+ Inst.	Type B+ G/KV	S
	For alternating residual current	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	For alternating and pulsating direct residual current		✓	✓	✓	✓	✓	✓	✓	✓	✓
	For alternating, pulsating direct and smooth DC residual current (up to 1kHz)					✓	✓	✓	✓	✓	✓
	For alternating, pulsating direct and smooth DC residual current (up to 20kHz)								✓	✓	✓
	Short-circuit capacity with back-up fuse	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Lower temperature limit of application -25°C	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	VDE 0664, part 1 (up to 80 A)		✓		✓	✓		✓	✓		✓
	Short time delayed (10 - 40 ms)			✓			✓			✓	
	Selective (time delayed 40 -150 ms)				✓			✓			✓

Use of AC, A, and B type of RCCB's in case of different fault conditions

			AC	A	B, B+	
Connection						
		Normal mains current				
1	Single phase 			✓	✓	✓
2	Phase control 			✓	✓	✓
3	Burst control 			✓	✓	✓
4	Single phase rectifier 				✓	✓
5	Two-pulse bridge 				✓	✓
6	Two-pulse bridge, half controlled 				✓	✓
7	Two-pulse bridge between phases 				✓	✓
8	Single phase with smoothing 					✓
9	Three-phase star 					✓
10	Six-pulse bridge between phases 					✓

A and AC type residual current circuit breaker EFI-2

Rated residual current
0,03 - 0,5 A

Rated current
16 - 80 A

Type
A, AC



16 - 80 A



100 A

EFI-2 Type A, EFI-2 Type AC

I _n [A]	I _{Δn} [A]	Number of poles	Code No. A			Code No. AC		Weight [g]	Packaging [pcs]
			Instantaneous	G/KV-Short time delay	S-Selective	Instantaneous			
16	0,03	2	002062521	-	-	002062121	197	1/54	
25	0,03	2	002062522	002062727	-	002062122	197	1/54	
40	0,03	2	002062523	002062728	-	002062123	197	1/54	
63	0,03	2	002062524	002062729	-	002062124	206	1/54	
80	0,03	2	002062525	-	-	002062125	208	1/54	
100	0,03	2	002062530	-	-	002062531	244	1/54	
16	0,1	2	002063521	-	-	002063121	193	1/54	
25	0,1	2	002063522	002063727	002063732	002063122	193	1/54	
40	0,1	2	002063523	002063728	002063733	002063123	193	1/54	
63	0,1	2	002063524	002063729	002063734	002063124	196	1/54	
80	0,1	2	002063525	-	-	002063125	198	1/54	
100	0,1	2	002062532	-	002062501	002062533	230	1/54	
16	0,3	2	002064521	-	-	002064121	198	1/54	
25	0,3	2	002064522	002064727	002064732	002064122	198	1/54	
40	0,3	2	002064523	002064728	002064733	002064123	198	1/54	
63	0,3	2	002064524	002064729	002064734	002064124	204	1/54	
80	0,3	2	002064525	-	-	002064125	208	1/54	
100	0,3	2	002062534	-	002062502	002062535	230	1/54	
16	0,5	2	002065521	-	-	002065121	198	1/54	
25	0,5	2	002065522	-	-	002065122	198	1/54	
40	0,5	2	002065523	-	-	002065123	198	1/54	
63	0,5	2	002065524	-	-	002065124	204	1/54	
80	0,5	2	002065525	-	-	002065125	208	1/54	

A and AC type residual current circuit breaker EFI-4

Rated residual current
0,03 - 0,5 A

Rated current
16 - 80 A

Type
A, AC



16 - 80 A



100 A

EFI-4 Type A, EFI-4 Type AC

I _n [A]	I _{Δn} [A]	Number of poles	Code No. A			Code No. AC		Weight [g]	Packaging [pcs]
			Instantaneous	G/KV-Short time delay	S-Selective	Instantaneous			
16	0,03	4	002062541	-	-	002062141	328	1/27	
25	0,03	4	002062542	002062747	-	002062142	328	1/27	
40	0,03	4	002062543	002062748	-	002062143	328	1/27	
63	0,03	4	002062544	002062749	-	002062144	350	1/27	
80	0,03	4	002062545	-	-	002062145	385	1/27	
100	0,03	4	002062150	-	-	002062151	407	1/27	
16	0,1	4	002063541	-	-	002063141	320	1/27	
25	0,1	4	002063542	002063747	002063752	002063142	320	1/27	
40	0,1	4	002063543	002063748	002063753	002063143	320	1/27	
63	0,1	4	002063544	002063749	002063754	002063144	338	1/27	
80	0,1	4	002063545	-	-	002063145	380	1/27	
100	0,1	4	002062152	-	002062503	002062153	407	1/27	
16	0,3	4	002064541	-	-	002064141	320	1/27	
25	0,3	4	002064542	002064747	002064752	002064142	320	1/27	
40	0,3	4	002064543	002064748	002064753	002064143	320	1/27	
63	0,3	4	002064544	002064749	002064754	002064144	338	1/27	
80	0,3	4	002064545	-	-	002064145	380	1/27	
100	0,3	4	002062154	-	002062504	002062155	372	1/27	
16	0,5	4	002065541	-	-	002065141	320	1/27	
25	0,5	4	002065542	-	-	002065142	320	1/27	
40	0,5	4	002065543	-	-	002065143	320	1/27	
63	0,5	4	002065544	-	-	002065144	338	1/27	
80	0,5	4	002065545	-	-	002065145	380	1/27	

* Version with N-pole on the left side is also available.

Features and advantages of UNIVERSAL CURRENT SENSITIVE RCCBs B type and B+ type

APPLICATION

- Fault protection (protection against indirect contact of live parts)
- Additional protection (protection in case of direct contact of live parts, $I_{\Delta n} \leq 30\text{mA}$)
- Fire Protection (for locations exposed to fire hazard)

Residual current sensitivity – UNIVERSAL

AC pure sinus residual current, 50/60Hz

A sinus and pulsating direct current, 50/60Hz

B AC + A + smooth direct current + high frequency (1 kHz)

B+ AC + A + smooth direct current + high frequency (20kHz)

Basic types

according to rated values:

4p B $I_n = 25\text{A}, 40\text{A}, 63\text{A}, I_{\Delta n} = 30\text{mA}, 100\text{mA}, 300\text{mA}$

4p B+ $I_n = 25\text{A}, 40\text{A}, 63\text{A}, I_{\Delta n} = 30\text{mA}, 100\text{mA}, 300\text{mA}$

according to breaking times:

4p B, B+ instantaneous, short time delayed (G/KV), selective (S)

according to the number of poles:

4p, 2p

Standards

IEC/EN 61008-1 basic standard for RCCB's AC and A type

IEC/EN 62423 additional requirements for type B

VDE 0664-400 B+ VDE standard for B+ requirements (20kHz)

Mode of operation

Pure a.c. and pulsating d.c. type residual current sensitivity, A voltage independent

Smooth d.c. current sensitivity: B, B+ voltage dependent

Minimum operating voltage: 50V

Typical applications

Which are vulnerable to smooth d.c. residual currents:

- Frequency converters,
- Photovoltaic systems, a.c side,
- Charging stations for electric vehicles,
- Variable speed machine tools,
- UPS, computer data centres
- Elevator controls,
- Cranes of all kinds
- Electronic equipment on construction sites,
- Test set-ups in laboratories,
- Installation in general where we can expect d.c. smooth direct residual currents, etc.

B type residual current circuit breaker EFI-4 B Instantaneous

Rated residual current **0,03 - 0,3 A** Rated current **25 - 63 A** Type **B (Instantaneous)**



EFI-4 B Instantaneous					
I_n [A]	$I_{\Delta n}$ [A]	Number of poles	Code No	Weight [g]	Packaging [pcs]
25	0,03	4	002062642	335	1/27
40	0,03	4	002062643	335	1/27
63	0,03	4	002062644	340	1/27
25	0,1	4	002063642	335	1/27
40	0,1	4	002063643	335	1/27
63	0,1	4	002063644	340	1/27
25	0,3	4	002064642	335	1/27
40	0,3	4	002064643	335	1/27
63	0,3	4	002064644	340	1/27

B+ type residual current circuit breaker EFI-4 B+ Instantaneous

Rated residual current **0,03 - 0,3 A** Rated current **25 - 63 A** Type **B+ (Instantaneous)**



EFI-4 B+ Instantaneous					
I_n [A]	$I_{\Delta n}$ [A]	Number of poles	Code No	Weight [g]	Packaging [pcs]
25	0,03	4	002062647	335	1/27
40	0,03	4	002062648	335	1/27
63	0,03	4	002062649	340	1/27
25	0,1	4	002063647	335	1/27
40	0,1	4	002063648	335	1/27
63	0,1	4	002063649	340	1/27
25	0,3	4	002064647	335	1/27
40	0,3	4	002064648	335	1/27
63	0,3	4	002064649	340	1/27

B type residual current circuit breaker EFI-4 B G/KV-Short time delay

Rated residual current **0,03 - 0,3 A** Rated current **25 - 63 A** Type **B (G/KV-Short time delay)**



EFI-4 B G/KV-Short time delay					
I_n [A]	$I_{\Delta n}$ [A]	Number of poles	Code No	Weight [g]	Packaging [pcs]
25	0,03	4	002062652	340	1/27
40	0,03	4	002062653	340	1/27
63	0,03	4	002062654	345	1/27
25	0,1	4	002063652	340	1/27
40	0,1	4	002063653	340	1/27
63	0,1	4	002063654	345	1/27
25	0,3	4	002064652	340	1/27
40	0,3	4	002064653	340	1/27
63	0,3	4	002064654	345	1/27

Residual current circuit breakers

B type residual current circuit breaker EFI-4 B S-Selective

 Rated residual current
0,1 - 0,3 A

 Rated current
25 - 63 A

 Type
B (S-Selective)
EFI-4 B S-Selective

I_n [A]	$I_{\Delta n}$ [A]	Number of poles	Code No	Weight [g]	Packaging [pcs]
25	0,1	4	002063662	340	1/27
40	0,1	4	002063663	340	1/27
63	0,1	4	002063664	345	1/27
25	0,3	4	002064662	335	1/27
40	0,3	4	002064663	335	1/27
63	0,3	4	002064664	340	1/27


Accessories for residual current circuit breakers EFI (16 - 80 A)

The PS EFI is fixed to EFI series switches. The width of the device is 9 mm, other dimensions are in compliance with EFI switches. The auxiliary switch PS EFI is used for the remote signalling of the state of contact's condition (closed/open) of EFI switches. During fitting, the EFI must be switched off. PS EFI and DA EFI can not be mounted both together, because both can only be mounted on the right side of EFI.

Auxiliary Switch PS EFI

Type	Contact	Code No.	Weight [g]	Packaging [pcs]
PS EFI - MD	b-contact/a-contact	002069001	50	1/12
PS EFI - 2M	2 x b-contact	002069002	50	1/12
PS EFI - 2D	2 x a-contact	002069003	50	1/12

a - contact = make contact (NO)

b - contact = break contact (NC)

Sealing piece EFI-2

Code No.	Weight [g]	Packaging [pcs]
002069011	2	2

Sealing piece EFI-4

Code No.	Weight [g]	Packaging [pcs]
002069012	3	2

Shunt trip release DA EFI

Type	Code No.	Weight [g]	Packaging [pcs]
DA EFI	002069004	45	1/12

