

RCCBs - Residual current circuit breakers EFI

Features of residual current circuit breakers EFI

→ Quality seal for tested reliability

→ Real contact position indication for easier contact status identification

→ Various quality marks

→ Test button enables user to check residual functionality

→ 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 (1kHz)
 → B+ - AC + A + smooth direct current + high frequency (20kHz)

→ RCCBs can be supplied with single phase and three phase busbars

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

→ Supply is possible both from top and bottom terminals



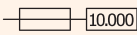




Residual current circuit breakers can be used in TN-S, TN-CS, TT and IT network systems, or with other words, in all systems where neutral and protective conductors are separated. Residual current circuit breakers EFI are used for protection against indirect contact (fault protection) and direct contact (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 $I_{\Delta n} = 30\text{mA}$.



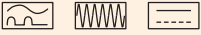
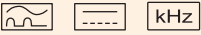
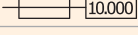




Types

- 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	Type A		
		Inst.	Inst.	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	Type A				Type B			Type B+		
		Inst.	Inst.	G/KV	S	Inst.	G/KV	S	Inst.	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 L I_L N PE I_F			✓	✓
2	Phase control L I_L N PE I_F		✓	✓	✓
3	Burst control L I_L N PE I_F		✓	✓	✓
4	Single phase rectifier L I_L N PE I_F			✓	✓
5	Two-pulse bridge L N I_L PE I_F			✓	✓
6	Two-pulse bridge, half controlled L N I_L PE I_F			✓	✓
7	Two-pulse bridge between phases L ₁ L ₂ N PE I_L I_F			✓	✓
8	Single phase with smoothing L I_L N PE I_F				✓
9	Three-phase star L ₁ L ₂ L ₃ N PE I_L I_F				✓
10	Six-pulse bridge between phases L ₁ L ₂ N PE I_L I_F				✓

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/MV-Short time delay	S-Selective			
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	-	-	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	-	-	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/MV-Short time delay	S-Selective			
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	-	-	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	-	-	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

New!

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

New!

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

New!

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

New!

Rated residual current 0,1 - 0,3 A	Rated current 25 - 63 A	Type B (S-Selective)
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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



RCBOs - Residual current circuit breakers with integral overcurrent protection KZS

Advantages of residual current circuit breakers with integral overcurrent protection KZS - 1M

→ Combining the features of miniature circuit breaker and a residual current circuit breaker, functionally dependent on line voltage (minimum supply voltage 90V)

→ Real contact position indication for easier identification, whether RCBO is in ON or OFF position



→ Energy limiting class 3: highest energy limiting performance for optimal protection of cable insulation and maximally reducing risk of fire and other damage

→ 1-module housing (18 mm), with switched neutral line



→ Clearly marked terminals to ensure appropriate connection

→ In case of overcurrent or differential current, the button moves to the "trip" (middle) position. In case of manual turn off, the button moves to the "off" (lowest) position.

→ Version with operating temperature down to -35°C also available



→ Added protection against any pulsating DC component that can be generated from electrical appliances



→ Sealing possibility

→ All necessary technical and installation information can be found on the front and side of the device



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

→ Advanced method of mounting enables an easy removal of single RCBO without disconnecting other units from the busbar

Residual current circuit breakers with integral overcurrent protection

Residual current circuit breaker with integral overcurrent protection KZS - 1M

Rated short-circuit capacity 6 kA	Rated current 6-25 A	Tripping characteristic B, C	Rated residual current 0,01 - 0,03 - 0,1 A
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**Recommended for use in installations with high level of additional protection required (bathrooms, hospitals, kindergartens etc).
Used for fault and additional protection.**

Description - KZS - 1M is a residual current circuit breaker with integral over-current protection, functionally dependent on line voltage.

KZS - 1M (Supply from the bottom)

I _n [A]	I _{Δn} [A]	Type A		Type AC		Weight [g]	Packaging [pcs]
		Code No. B	Code No. C	Code No. B	Code No. C		
6	0,01	002175411	002175421	002175611	002175621	115	1/12
10	0,01	002175412	002175422	002175612	002175622		
13	0,01	002175413	002175423	002175613	002175623		
16	0,01	002175414	002175424	002175614	002175624		
20	0,01	002175415	002175425	002175615	002175625		
25	0,01	002175416	002175426	002175616	002175626		
6	0,03	002175201	002175221	-	-	115	1/12
10	0,03	002175202	002175222	-	-		
13	0,03	002175203	002175223	-	-		
16	0,03	002175204	002175224	-	-		
20	0,03	002175205	002175225	-	-		
25	0,03	002175206	002175226	-	-		
6	0,1	002175431	002175441	002175631	002175681	115	1/12
10	0,1	002175432	002175442	002175632	002175682		
13	0,1	002175433	002175443	002175633	002175683		
16	0,1	002175434	002175444	002175634	002175684		
20	0,1	002175435	002175445	002175635	002175685		
25	0,1	002175436	002175446	002175636	002175686		


KZS - 1M SUP (Supply from the top)

I _n [A]	I _{Δn} [A]	Type A		Weight [g]	Packaging [pcs]
		Code No. B	Code No. C		
6	0,01	002175811	002175851	115	1/12
10	0,01	002175812	002175852		
13	0,01	002175813	002175853		
16	0,01	002175814	002175854		
20	0,01	002175815	002175855		
25	0,01	002175816	002175856		
6	0,03	002175701	002175721	115	1/12
10	0,03	002175702	002175722		
13	0,03	002175703	002175723		
16	0,03	002175704	002175724		
20	0,03	002175705	002175725		
25	0,03	002175706	002175726		
6	0,1	002175831	002175871	115	1/12
10	0,1	002175832	002175872		
13	0,1	002175833	002175873		
16	0,1	002175834	002175874		
20	0,1	002175835	002175875		
25	0,1	002175836	002175876		


KZS - 1M LT (Supply from the bottom)

I _n [A]	I _{Δn} [A]	Type A		Weight [g]	Packaging [pcs]
		Code No. B	Code No. C		
6	0,03	002175291	002175301	115	1/12
10	0,03	002175292	002175302	115	1/12
13	0,03	002175293	002175303	115	1/12
16	0,03	002175294	002175304	115	1/12
20	0,03	002175295	002175305	115	1/12
25	0,03	002175296	002175306	115	1/12

LT-suitable for temperatures down to -35°C

Residual current circuit breaker with integral overcurrent protection KZS-2M

Rated short-circuit capacity
10 kA

Rated current
6 - 40 A

Tripping characteristic
B, C

Rated residual current
0,01 - 0,5 A

Description: KZS (KZS-2M, KZS-4M) is a residual current circuit breaker combining the features of a miniature circuit breaker and a residual current circuit breaker and is functionally independent on line voltage. Used primarily in circuits with an increased requirements regarding touch voltage such as circuits of portable appliances, in kindergartens, schools, hospitals etc.



KZS-2M I _{Δn} = 10 mA				
I _n [A]	Type A		Weight [g]	Packaging [pcs]
	Code No. B	Code No. C		
6	002173211	002173231	225	1/54
10	002173212	002173232	225	1/54
13	002173213	002173233	225	1/54
16	002173214	002173234	225	1/54
20	002173215	002173235	225	1/54
25	002173216	002173236	225	1/54
32	002173217	002173237	225	1/54
40	002173218	002173238	225	1/54

KZS-2M I _{Δn} = 30 mA						
I _n [A]	Type A		Type AC		Weight [g]	Packaging [pcs]
	Code No. B	Code No. C	Code No. B	Code No. C		
6	002173201	002173221	002173101	002173121	225	1/54
10	002173202	002173222	002173102	002173122	225	1/54
13	002173203	002173223	002173103	002173123	225	1/54
16	002173204	002173224	002173104	002173124	225	1/54
20	002173205	002173225	002173105	002173125	225	1/54
25	002173206	002173226	002173106	002173126	225	1/54
32	002173207	002173227	002173107	002173127	225	1/54
40	002173208	002173228	002173108	002173128	225	1/54

KZS-2M I _{Δn} = 100 mA				
I _n [A]	Type A		Weight [g]	Packaging [pcs]
	Code No. B	Code No. C		
6	002173701	002173721	225	1/54
10	002173702	002173722	225	1/54
13	002173703	002173723	225	1/54
16	002173704	002173724	225	1/54
20	002173705	002173725	225	1/54
25	002173706	002173726	225	1/54
32	002173707	002173727	225	1/54
40	002173708	002173728	225	1/54

KZS-2M I _{Δn} = 300 mA						
I _n [A]	Type A		Type AC		Weight [g]	Packaging [pcs]
	Code No. B	Code No. C	Code No. B	Code No. C		
6	002173401	002173421	002173301	002173321	225	1/54
10	002173402	002173422	002173302	002173322	225	1/54
13	002173403	002173423	002173303	002173323	225	1/54
16	002173404	002173424	002173304	002173324	225	1/54
20	002173405	002173425	002173305	002173325	225	1/54
25	002173406	002173426	002173306	002173326	225	1/54
32	002173407	002173427	002173307	002173327	225	1/54
40	002173408	002173428	002173308	002173328	225	1/54

Residual current circuit breakers with integral overcurrent protection

KZS-2M $I_{\Delta n} = 500 \text{ mA}$

I_n [A]	Type A		Weight [g]	Packaging [pcs]
	Code No. B	Code No. C		
6	002173901	002173921	225	1/54
10	002173902	002173922	225	1/54
13	002173903	002173923	225	1/54
16	002173904	002173924	225	1/54
20	002173905	002173925	225	1/54
25	002173906	002173926	225	1/54
32	002173907	002173927	225	1/54
40	002173908	002173928	225	1/54

Residual current circuit breaker with integral overcurrent protection KZS-2M 2p

 Rated short-circuit capacity
10 kA

 Rated current
6 - 25 A

 Tripping characteristic
B, C

 Rated residual current
0,03 A

New!

KZS-2M 2p $I_{\Delta n} = 30 \text{ mA}$

I_n [A]	Type A		Weight [g]	Packaging [pcs]
	Code No. B	Code No. C		
6	002172501	002172521	210	1/54
10	002172502	002172522	210	1/54
13	002172503	002172523	210	1/54
15	002172504	002172524	210	1/54
16	002172505	002172525	210	1/54
20	002172506	002172526	210	1/54
25	002172507	002172527	210	1/54


Residual current circuit breaker with integral overcurrent protection with LED status signalisation KZS 2M2p EDI

 Rated short-circuit capacity
10 kA

 Rated current
6 - 25 A

 Tripping characteristic
B, C

 Rated residual current
0,03 A
KZS-2M 2p EDI $I_{\Delta n} = 30 \text{ mA}$

I_n [A]	Type A		Weight [g]	Packaging [pcs]
	Code No. B	Code No. C		
6	002172401	002172411	205	1/54
10	002172402	002172412	205	1/54
13	002172403	002172413	205	1/54
15	002172404	002172414	205	1/54
16	002172406	002172416	205	1/54
20	002172407	002172417	205	1/54
25	002172408	002172418	205	1/54

