

# Residual Current Circuit Breaker with Integral Overcurrent Protection KZS-4M 2p B type

A type protection +  
Smooth DC +  
High Frequency AC  
Sensitivity



The only 2-pole  
compact version of  
RCBO B type on the  
market

ETI

# Features and advantages of KZS-4M 2p 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)**

## Standards

IEC/EN 61009-1

basic standard for RCBOs AC and A type

IEC/EN 62423

additional requirements for type B

## Mode of operation

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

Smooth d.c. current sensitivity:

B voltage dependent

Minimum operating voltage:





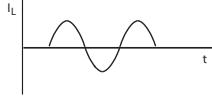
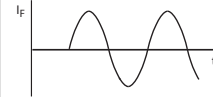
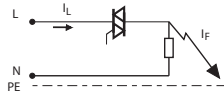
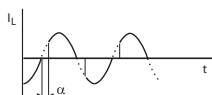
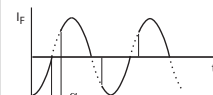
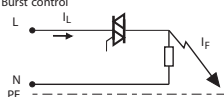
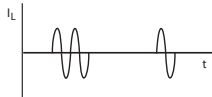
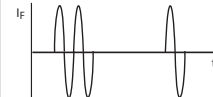
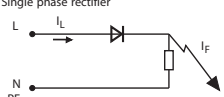
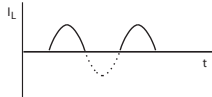
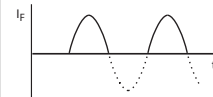
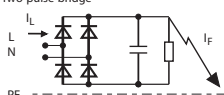
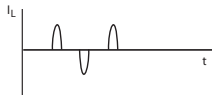
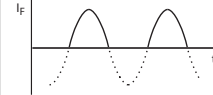
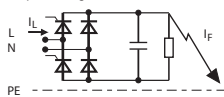
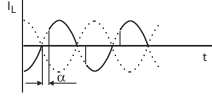
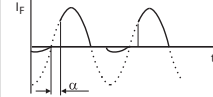
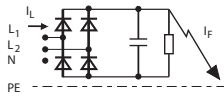
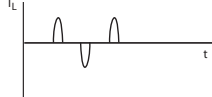
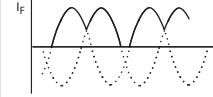
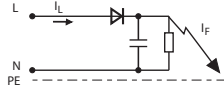


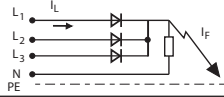
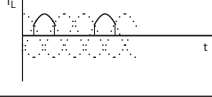
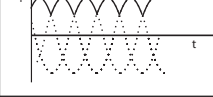
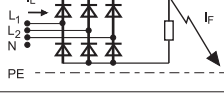
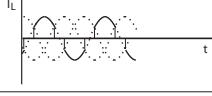
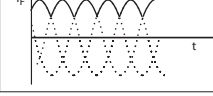
50V

## Typical applications

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

- ✘ 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.

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

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

# Technical features

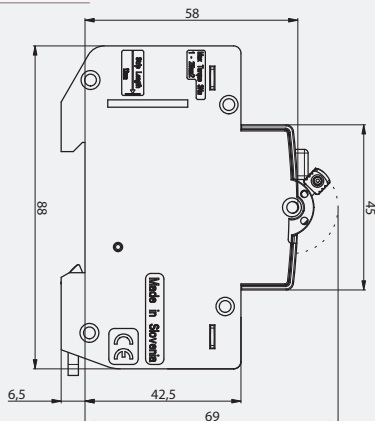
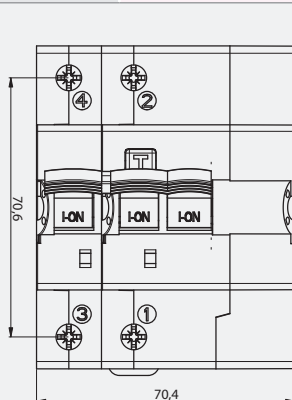
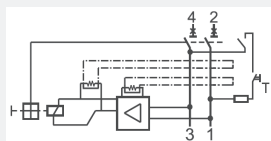
## Technical data

### Electrical

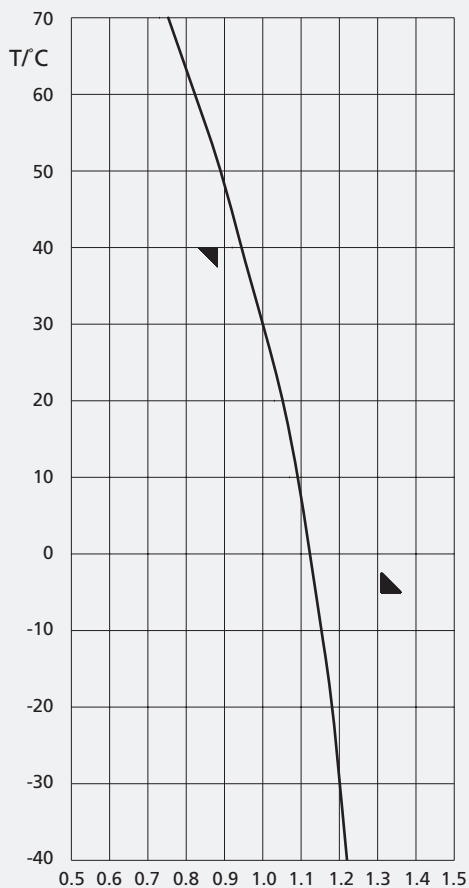
|   |                                  |
|---|----------------------------------|
| Rated voltage $U_n$                       | 230 V AC                         |
| Rated current $I_n$                       | 6, 10, 13, 16, 20, 25, 32, 40 A  |
| Rated Insulation voltage $U_i$            | 440 V                            |
| Peak withstand current                    | 3kA (8/20ms) surge current proof |
| Electrical isolation                      | > 4mm contact space              |
| Rated residual operating current $I_{dn}$ | 30, 100, 300mA                   |
| Rated short-circuit capacity              | 10kA                             |
| Maximum back-up fuse                      | 100A gG                          |
| Isolation class                           | B                                |
| Standard                                  | IEC/EN 61009-1, IEC/EN 62423     |
| Mechanical endurance                      | 20.000                           |
| Electrical endurance                      | 10.000                           |

### Mechanical

|                                   |                             |
|-----------------------------------|-----------------------------|
| Frame size                        | 45mm                        |
| Device height                     | 69 mm                       |
| Device width                      | 70 mm                       |
| Degree of protection              | IP20                        |
| Upper and lower terminals         | open mounted/lift terminals |
| Terminal capacity                 | 1-25 mm <sup>2</sup>        |
| Terminal screw                    | M5 (Pozidrive PZ2)          |
| Terminal torque                   | max 3,0 Nm                  |
| Operating temperature             | -25°C ... +60°C             |
| Storage and transport temperature | -40°C ... +70°C             |
| Resistance to climatic conditions | IEC/EN 61009                |
| Contact position indicator        | mechanical red/green        |
| Supply possibility                | Top or bottom               |



## Effect of the ambient temperature on the tripping characteristic



Correction factor is valid for current with times over 30 s  
 $I(x^{\circ}\text{C})$  - test current at  $x^{\circ}\text{C}$  ambient temperature  
 $I(30^{\circ}\text{C})$  - test current at  $30^{\circ}\text{C}$  ambient temperature

$$k = \frac{I(x^{\circ}\text{C})}{I(30^{\circ}\text{C})}$$

| $I_n$<br>[A] | Ambient temperature $T/^{\circ}\text{C}$ |      |      |      |      |      |      |    |      |      |      |      |
|--------------|--|------|------|------|------|------|------|----|------|------|------|------|
|              | -40                                      | -30  | -20  | -10  | 0    | 10   | 20   | 30 | 40   | 50   | 60   | 70   |
| 6            | 7,32                                     | 7,2  | 7,09 | 6,91 | 6,73 | 6,54 | 6,31 | 6  | 5,66 | 5,33 | 4,94 | 4,5  |
| 10           | 12,2                                     | 12   | 11,8 | 11,5 | 11,2 | 10,9 | 10,5 | 10 | 9,44 | 8,89 | 8,23 | 7,5  |
| 13           | 15,9                                     | 15,6 | 15,4 | 14,9 | 14,5 | 14,1 | 13,6 | 13 | 12,2 | 11,5 | 10,7 | 9,75 |
| 16           | 19,5                                     | 19,2 | 18,9 | 18,4 | 17,9 | 17,4 | 16,8 | 16 | 15,1 | 14,2 | 13,2 | 12   |
| 20           | 24,4                                     | 24   | 23,6 | 23   | 22,4 | 21,8 | 21   | 21 | 18,8 | 17,7 | 16,5 | 15   |
| 25           | 30,5                                     | 30   | 2,5  | 28,8 | 28   | 27,2 | 26,3 | 25 | 23,6 | 22,2 | 20,6 | 18,8 |
| 32           | 39                                       | 38,4 | 37,8 | 36,9 | 35,9 | 34,9 | 33,6 | 32 | 30,2 | 28,4 | 26,3 | 24   |
| 40           | 48,8                                     | 48   | 47,8 | 46,1 | 44,9 | 43,6 | 42   | 40 | 37,7 | 35,5 | 32,9 | 30   |

| Conductor cross-section<br>[mm <sup>2</sup> ] | Number of single conductors, rigid, single-wire CU conductor |   |   |   |   |
|---|--|---|---|---|---|
|   | 1  | 2 | 3 | 4 | 5 |
| 1,5   | ✓  | ✓ | ✓ | ✓ | ✗ |
| 2,5   | ✓  | ✓ | ✓ | ✗ | ✗ |
| 4   | ✓  | ✓ | ✓ | ✗ | ✗ |
| 6   | ✓  | ✓ | ✗ | ✗ | ✗ |
| 10  | ✓  | ✓ | ✗ | ✗ | ✗ |
| 16  | ✓  | ✗ | ✗ | ✗ | ✗ |
| 25  | ✓  | ✗ | ✗ | ✗ | ✗ |

Remark: When you use more than 2 cables you have to be careful how those cables are inserted, due to insure proper pressure on each cable

| Conductor cross-section<br>[mm <sup>2</sup> ] | Number of single conductors, flexible Cu conductors without cable ferrule |   |   |   |   |   |
|---|---|---|---|---|---|---|
|   | 1   | 2 | 3 | 4 | 5 | 6 |
| 1,5   | ✓   | ✓ | ✓ | ✓ | ✓ | ✓ |
| 2,5   | ✓   | ✓ | ✓ | ✓ | ✓ | ✓ |
| 4   | ✓   | ✓ | ✓ | ✓ | ✓ | ✓ |
| 6   | ✓   | ✓ | ✓ | ✗ | ✗ | ✗ |
| 10  | ✓   | ✓ | ✗ | ✗ | ✗ | ✗ |
| 16  | ✓   | ✗ | ✗ | ✗ | ✗ | ✗ |
| 25  | ✓   | ✗ | ✗ | ✗ | ✗ | ✗ |

Combination of rigid single-wire and flexible multi-wire Cu conductors is not allowed

| Characteristic | I <sub>n</sub><br>[A] | R<br>[mW] | Power loss/pole<br>[W] |
|----------------|-----------------------|-----------|------------------------|
| B, C           | 6                     | 59,3      | 2,1                    |
|                | 10                    | 15,2      | 1,5                    |
|                | 13                    | 11,7      | 2,0                    |
|                | 16                    | 8,5       | 2,2                    |
|                | 20                    | 7,8       | 3,1                    |
|                | 25                    | 6,2       | 3,9                    |
|                | 32                    | 5,0       | 5,2                    |
|                | 40                    | 3,7       | 5,9                    |

## Commercial information

### KZS-4M 2p B $I_{\Delta n} = 30 \text{ mA}$

| $I_n$<br>[A] | Code No. B | Code No. C | Weight<br>[g] | Pack.<br>[pcs] |
|--------------|------------|------------|---------------|----------------|
| 6            | 002174511  | 002174531  | 369           | 1/27           |
| 10           | 002174512  | 002174532  | 369           |                |
| 13           | 002174513  | 002174533  | 369           |                |
| 16           | 002174514  | 002174534  | 369           |                |
| 20           | 002174515  | 002174535  | 369           |                |
| 25           | 002174516  | 002174536  | 369           |                |
| 32           | 002174517  | 002174537  | 369           |                |
| 40           | 002174518  | 002174538  | 390           |                |

### KZS-4M 2p B $I_{\Delta n} = 100 \text{ mA}$

| $I_n$<br>[A] | Code No. B | Code No. C | Weight<br>[g] | Pack.<br>[pcs] |
|--------------|------------|------------|---------------|----------------|
| 6            | 002174611  | 002174631  | 369           | 1/27           |
| 10           | 002174612  | 002174632  | 369           |                |
| 13           | 002174613  | 002174633  | 369           |                |
| 16           | 002174614  | 002174634  | 369           |                |
| 20           | 002174615  | 002174635  | 369           |                |
| 25           | 002174616  | 002174636  | 369           |                |
| 32           | 002174617  | 002174637  | 369           |                |
| 40           | 002174618  | 002174638  | 390           |                |

**KZS-4M 2p B  $I_{\Delta n} = 300 \text{ mA}$** 

| $I_n$<br>[A] | Code No. B | Code No. C | Weight<br>[g] | Pack.<br>[pcs] |
|--------------|------------|------------|---------------|----------------|
| 6            | 002174811  | 002174831  | 369           | 1/27           |
| 10           | 002174812  | 002174832  | 369           |                |
| 13           | 002174813  | 002174833  | 369           |                |
| 16           | 002174814  | 002174834  | 369           |                |
| 20           | 002174815  | 002174835  | 369           |                |
| 25           | 002174816  | 002174836  | 369           |                |
| 32           | 002174817  | 002174837  | 369           |                |
| 40           | 002174818  | 002174838  | 390           |                |







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[www.etigroup.eu](http://www.etigroup.eu)

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