

MK SENTRY

Residual Current Device (RCD)



Description

The MK Sentry range of RCDs offer a comprehensive selection of devices designed to meet most residential, commercial and light industrial requirements.

The range is a two and four pole, a.c. sensitive and d.c. sensitive devices with a selection of current ratings from 25A to 100A and is available in 30mA, 100mA and 300mA tripping sensitivities.

When in the OFF position a contact gap of 4mm is present, enabling MK Sentry RCDs to be used as isolating switches where appropriate.

The operating dolly may be locked in either the ON or OFF position without affecting the ability of the trip mechanism to operate, i.e. the RCD is 'trip-free'. It is not possible to hold the contacts closed when a fault condition exists.

All MK Sentry RCDs incorporate a filtering device to provide protection against transient surges in the supply to the unit, thus reducing the occurrence of unwanted tripping.

FEATURES

- Meet BS EN and IEE Wiring Regulation requirements
- Extensive range to suit all specifications
- Protect against unwanted tripping
- Positive contact status indication
- Suitable for most residential, commercial and light industrial applications
- Offer a high degree of protection against electrocution in accidental shock hazard situations
- Two module, double pole units available up to 100A
- Four module, floor pole units available up to 63A
- Indication of earth fault, via central dolly position

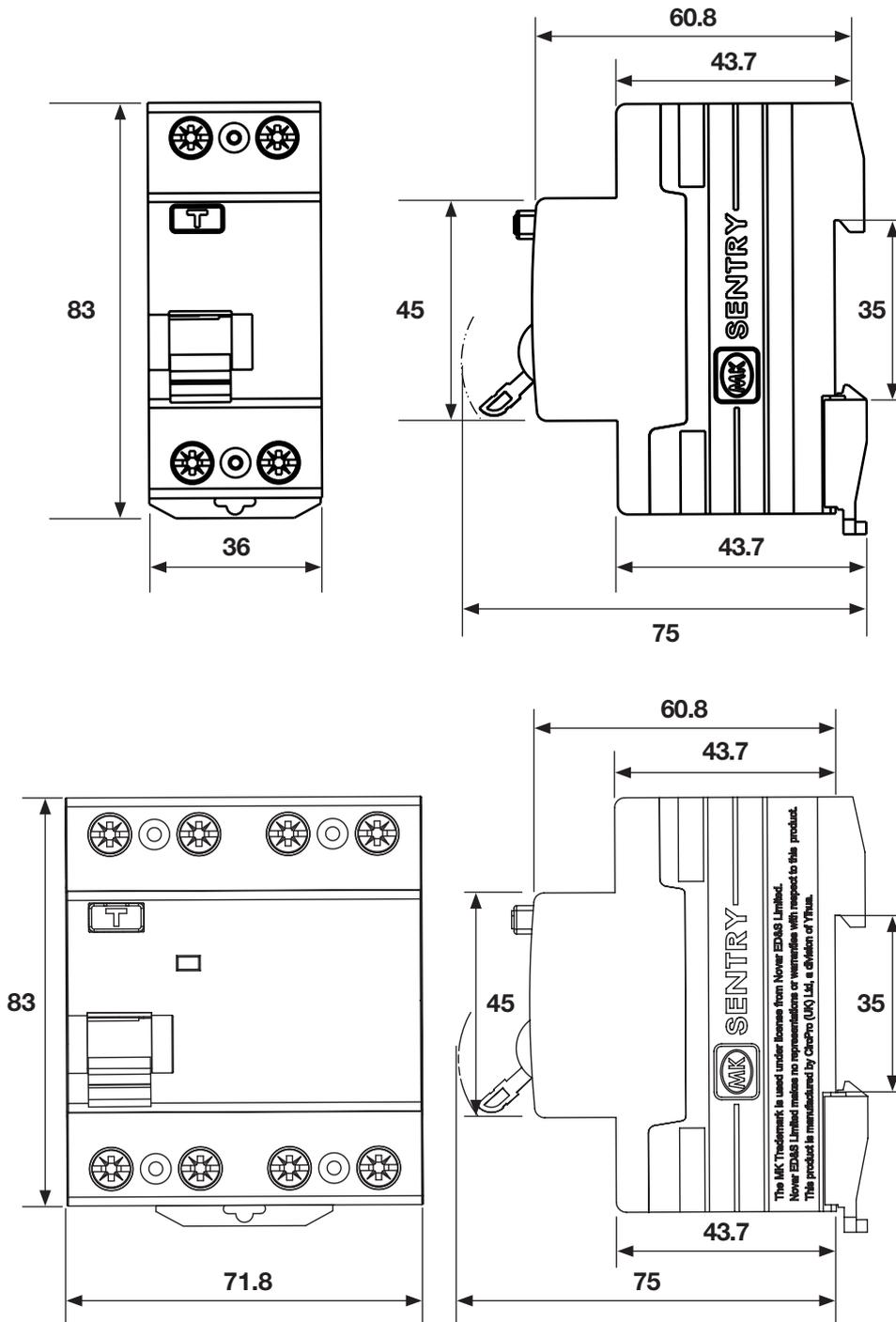
RANGE

H6325s	25A 230V 10mA TYPE AC 2 MODULE 2 POLE
H7825s	25A 230V 30mA TYPE AC 2 MODULE 2 POLE
H6125s	25A 230V 100mA TYPE AC 2 MODULE 2 POLE
H7840s	40A 230V 30mA TYPE AC 2 MODULE 2 POLE
H6140s	40A 230V 100mA TYPE AC 2 MODULE 2 POLE
H7860s	63A 230V 30mA TYPE AC 2 MODULE 2 POLE
H6160s	63A 230V 100mA TYPE AC 2 MODULE 2 POLE
H7880s	80A 230V 30mA TYPE AC 2 MODULE 2 POLE
H6180s	80A 230V 100mA TYPE AC 2 MODULE 2 POLE
H5880s	80A 230V 300mA TYPE AC 2 MODULE 2 POLE
H7800s	100A 230V 30mA TYPE AC 2 MODULE 2 POLE
H6100s	100A 230V 100mA TYPE AC 2 MODULE 2 POLE
H5800s	100A 230V 300mA TYPE AC 2 MODULE 2 POLE
H5325s	25A 230V 10mA TYPE A 2 MODULE 2 POLE
H5625s	25A 230V 30mA TYPE A 2 MODULE 2 POLE
H5725s	25A 230V 100mA TYPE A 2 MODULE 2 POLE
H9325s	25A 230V 300mA TYPE A 2 MODULE 2 POLE
H5640s	40A 230V 30mA TYPE A 2 MODULE 2 POLE
H5740s	40A 230V 100mA TYPE A 2 MODULE 2 POLE
H5660s	63A 230V 30mA TYPE A 2 MODULE 2 POLE
H5760s	63A 230V 100mA TYPE A 2 MODULE 2 POLE
H5680s	80A 230V 30mA TYPE A 2 MODULE 2 POLE
H5780s	80A 230V 100mA TYPE A 2 MODULE 2 POLE
H9380s	80A 230V 300mA TYPE A 2 MODULE 2 POLE
H5600s	100A 230V 30mA TYPE A 2 MODULE 2 POLE
H5700s	100A 230V 100mA TYPE A 2 MODULE 2 POLE
H9300s	100A 230V 300mA TYPE A 2 MODULE 2 POLE
H6900s	100A 230V 100mA TYPE A/S TIME DELAY 2 MODULE 2 POLE
H6425s	25A 230/400V 100mA TYPE AC 4 MODULE 4 POLE
H6525s	25A 230/400V 300mA TYPE AC 4 MODULE 4 POLE
H6440s	40A 230/400V 30mA TYPE AC 4 MODULE 4 POLE
H6540s	40A 230/400V 100mA TYPE AC 4 MODULE 4 POLE
H6463s	63A 230/400V 30mA TYPE AC 4 MODULE 4 POLE
H6363s	63A 230/400V 100mA TYPE AC 4 MODULE 4 POLE
H6625s	25A 230/400V 30mA TYPE A 4 MODULE 4 POLE
H9225s	25A 230/400V 100mA TYPE A 4 MODULE 4 POLE
H6640s	40A 230/400V 30mA TYPE A 4 MODULE 4 POLE
H9240s	40A 230/400V 100mA TYPE A 4 MODULE 4 POLE
H6663s	63A 230/400V 30mA TYPE A 4 MODULE 4 POLE
H9263s	63A 230/400V 100mA TYPE A 4 MODULE 4 POLE
H9463s	63A 230/400V 300mA TYPE A 4 MODULE 4 POLE

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Dimensions (mm)



TECHNICAL SPECIFICATION

ELECTRICAL

RATED MAKING AND BREAKING CAPACITY (IM)
1000A

RATED CONDITIONAL SHORT-CIRCUIT CURRENT / INC
10000A

RATED VOLTAGES
2 pole devices, 230V 50Hz
4 pole devices, 230V/440V 50Hz

OPERATING VOLTAGES
2 pole devices, 230V - 100V to 250V

TRIPPING TIME (TYPE A - AC)
0.5 x I_{An} no trip
1 x I_{An} ~300ms
5 x I_{An} ~40ms

RCD TYPES
A - AC - S

PHYSICAL

IP RATING
IP20
IP40 - mounted in enclosure

AMBIENT OPERATING TEMPERATURE -25°C to + 55°C

TERMINAL CAPACITY
2 module 25A-63A 25mm²
2 module 80A-100A 35mm²
4 module 25mm²

TIGHTENING TORQUE
3Nm

STANDARDS

BS EN 61008-1
IEC 61008-1

Degree of pollution : 2

MK SENTRY

Residual Current Device (RCD)

Operation

The RCD provides an indication of an earth fault and contact status as detailed below.

The operating dolly provides the following indication:

I = Switched ON

0 = Switched OFF

In the event of an Earth Fault in the installation or the operation of the test button, the dolly will move to the OFF position.

To re-connect the supply the dolly must be reset by moving to the off position before switching on.



Testing

If an RCD is installed for additional protection against indirect contact, it is a requirement of the IEE Regulations that the effectiveness of the RCD be verified. This must be achieved by a test simulating an appropriate fault condition and be independent of any test facility incorporated in the RCD. The test currents to be applied are as follows:

Test current	Condition
$0.5 \times I \Delta n$	RCD must not trip
$1.0 \times I \Delta n$	RCD must trip within 300mS
$5.0 \times I \Delta n$	RCD must trip within 40mS

Where $I \Delta n$ is the RCD's rated tripping current in accordance with wiring regulations and product standard BS EN 61008.

For time delay RCD $1.0 \times I \Delta n$ RCD must trip between 130-500mS.

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Residual Current Device (RCD)

Application

The choice of the most suitable RCD for a particular application should take into account the following considerations:

1. Sensitivity

10mA RCDs offer a high degree of protection against electrocution in an accidental shock hazard situation. They are of particular value in a high risk area where resistances external to the body are likely to restrict the earth fault current flowing through the body to less than 30mA and where 110V supply is being used.

30mA RCDs offer a high degree of protection in an accidental shock hazard situation and are by far the most popular sensitivity used in the United Kingdom. In a shock situation, the current flowing through the human body at 240V 50Hz could be between 80 and 240mA, depending on the resistance of the body in question. To ensure that there are no harmful physiological effects in such a situation, it is necessary for the RCD to operate within 300ms at 30mA and 40ms at 150mA. As the MK Sentry RCD typically operates well below these times, it clearly more than satisfies this requirement.

100mA RCDs may, in some circumstances, provide protection against electrocution in an accidental shock hazard situation. However, it is important to note that there is a likelihood that the earth fault current may be below the sensitivity of the RCD. This becomes increasingly likely if additional resistances to that of the human body are in the current path.

300mA RCDs provide protection against the risk of fire only. They do not provide protection against electrocution in an accidental shock hazard situation. A typical application would be lighting circuits where it is deemed that the risk of electric shock is small. It is important to note that a current of less than 500mA flowing in a high resistance path is sufficient to bring metallic parts to incandescence and, potentially, initiate a fire.

2. Requirements of the IEE Wiring Regulations BS 7671 RCDs may be used to provide additional protection against both fault protection and basic protection.

Installation

MK Sentry RCDs must never be used as the sole method of basic protection, but are invaluable in providing supplementary protection in high risk environments where damage may occur.

Fault Protection

Defined as protection against electric shock under single fault conditions.

Effective earthing in conjunction with automatic disconnection should always be employed to protect against the effects of fault protection. The provision of a low resistance path back to the supply from the fault should ensure that the overcurrent device operates before damage occurs. This is the earth fault loop impedance.

In circumstances where the earth fault loop impedance in the circuit is too high to ensure operation of the overcurrent device, then the IEE Wiring Regulations allow the installation of an RCD. To comply with the Regulations, the earth loop impedance of the circuit (in ohms), multiplied by the rated tripping current of the RCD (in amperes) must not produce a value greater than 50. With this in mind, the maximum values of earth loop impedance permissible when installing an MK Sentry RCD are as follows:

$$Z_s (\text{max}) = \frac{50}{I_{\Delta n}} = \frac{50}{0.03} = 1667 \text{ Ohms}$$

Rated Tripping Current of RCD	Maximum Permissible Earth Fault Loop Impedance
10mA	5000 Ohms
30mA	1667 Ohms
100mA	500 Ohms
300mA	166 Ohms

RCD's are further specified for fault protection on TT systems

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Application (continued)

Direct Contact

Defined as “contact of persons or livestock with live parts”.

The Regulations recognise four main means of providing protection against direct contact which include enclosures and the use of extra low voltage systems.

However, the use of RCDs is specified by the Regulations in the following instances:

- A socket outlet rated at 32A or less which may reasonably be expected to supply portable equipment for use outdoors shall be protected by an RCD.
- Where socket outlets are used to supply caravans on caravan sites, then they must be protected by an RCD.

Regulation 412-06-02 stipulates among other things that where supplementary protection is provided by residual current devices, their rated residual operating current must not exceed 30mA and that they must trip within 40ms at 5 times rated operating current.

Although RCDs must never be used as the sole method of direct contact protection, they are invaluable in providing supplementary protection in high risk environments where damage may occur. Typical applications include situations where equipment may be used outside or fed by trailing sockets, equipment accessible to children or equipment used in wet areas.

For these reasons RCDs are commonly found in schools, hospitals and residential installations.

3. Types of fault current

In an installation different types of fault current can occur. MK Sentry offer RCDs to suit these conditions.

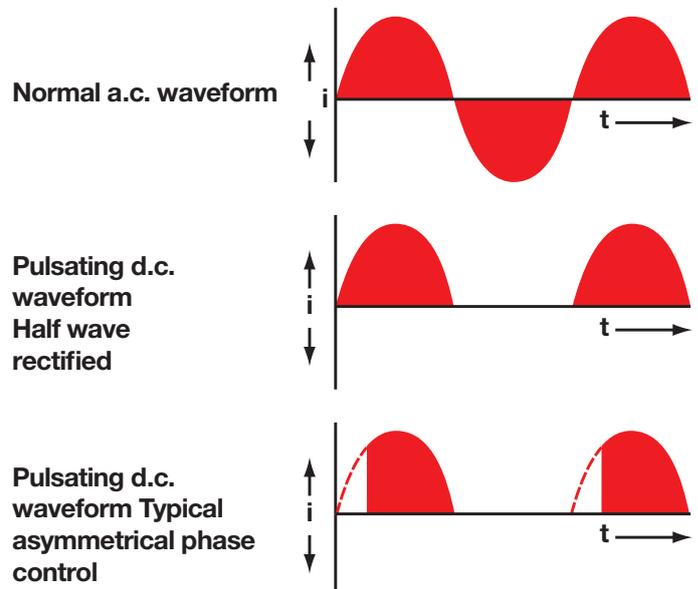
MK Sentry Type AC RCDs are suitable for situations where there are residual sinusoidal alternating currents, whether applied suddenly or rising slowly. This is the most commonly used type of RCD in the UK.

MK Sentry Type A RCDs (i.e. pulsating d.c. fault current sensitive) are suitable for situations where there are residual sinusoidal alternating currents, whether suddenly applied or slowly rising.

These situations can occur with the use of semiconductor devices in modern electrical and electronic equipment, such as computers, printers, plotters, televisions, video cassette recorders and hi-fi equipment, is growing.

Such devices may result in the normal sinusoidal a.c. waveform generated by the mains electrical supply being ‘modified’. For example, the waveform may be rectified or, as in asymmetric phase control devices, the waveform may be chopped.

The resulting waveforms are said to contain a pulsating d.c. component as illustrated below.



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Application (continued)

Pulsating d.c. fault current sensitive RCDs

Should a waveform containing a pulsating d.c. component develop an earth fault, then it is possible that it may not be detected by an “a.c. only” sensitive RCD. For this reason, the Sentry range contains RCDs designed to be sensitive to pulsating d.c. fault currents thus maintaining the intended degree of protection.

Type B RCDs are suitable for situations where there are residual sinusoidal alternating currents, residual pulsating direct currents and smooth d.c. and a.c. residual current of various frequencies, which would not trip Type AC or A RCDs.

These situations can occur in 50Hz a.c. installations with electronic equipment, e.g. frequency converters, UPS installations, power supply unit or high-frequency power converters.

The following symbols are used on the front plate of the device to indicate the type of RCD.

 – type AC RCD.

 – type A RCD.

 – type B RCD.

4. Temperature

All MK Sentry RCDs are suitable for use in the temperature range -25°C to $+55^{\circ}\text{C}$. This is indicated on the RCD by the  symbol .

5. Time Delayed RCDs s Type S (or selective)

When two or more MK Sentry RCDs are installed in series with one another, measures must be taken to ensure that they discriminate properly. In event of an earth fault, only the RCD immediately upstream from the fault should operate.

RCDs do not discriminate on rated tripping current alone, i.e. a 100mA rated RCD situated upstream from a 30mA rated RCD, will not offer inherent discrimination.

In order to ensure that discrimination is achieved, a MK Sentry Time Delayed RCD should be used. The in-built time delay period ensures that the downstream RCD opens the circuit before the upstream RCD starts to operate.

The maximum tripping time of a MK Sentry Time Delayed RCD is 500ms.

Please refer to the current edition of the Wiring Regulations BS 7671 for guidance on the use of these products.

6. 3 phase, 3 wire systems

MK Sentry 4 pole RCDs may be used to provide earth fault protection on 3 phase, 3 wire systems, as the current balance mechanism does not require a neutral to be connected in order to operate effectively.