

## Miniature Circuit Breakers (MCBs)

### Standards and approvals

Sentry MCBs are designed to fully comply with the relevant requirements of BS EN 60898: 2003.

They all feature positive contact status indication in accordance with the 17th Edition IEE Wiring Regulations (537.2.2.1 and 537.3.2.2).

### Technical specification

#### Electrical

Voltage rating:  
230V/400V a.c.

Operating frequency:  
50Hz

Rated short circuit capacity  $I_{cn}$ :  
6000A

Service short circuit capacity  $I_{cs}$ :  
6000A

When backed up by a BS 1361, 100A fuse, then the breaking capacity of the MCB is increased to 16,000A.

Energy limiting class: **3**

#### Physical

Ambient operating temperature:  
-5°C to +40°C

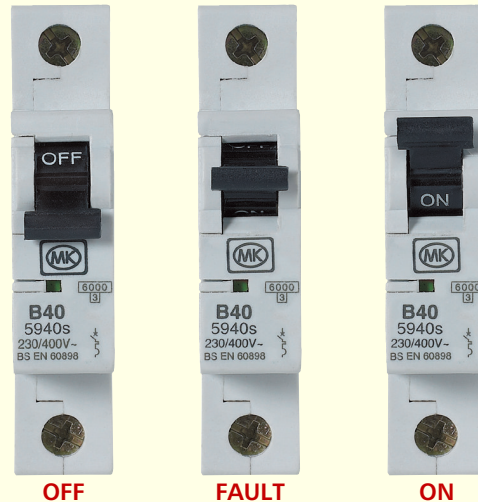
Calibration temperature:  
+30°C

IP rating:  
Front face IP4X, screw IP2X

Terminal capacity:  
35mm<sup>2</sup>

Tightening torque:  
3Nm Max.

Max. installation altitude:  
2000 metres



### Description

Sentry MCBs are of the thermo-magnetic, current limiting type and are available with either Type B or Type C operating characteristics.

The operating dolly may be locked in either the ON or OFF position without affecting the ability of the trip mechanism to operate. The contacts themselves are manufactured from carefully chosen materials, selected specifically for their low electrical resistance and low propensity to weld under fault conditions.

#### Positive contact status indication

When the green indicator is visible, then a contact gap of 4mm has been achieved. Sentry MCBs may therefore be used as single pole isolating switches where appropriate.

#### Mid-trip fault indicator

The Sentry MCB has a mid-trip fault indicator. If there is a short circuit or current overboard, the dolly moves to the mid-position to indicate a fault.

Note: To reset, switch off the MCB, then switch on again.

#### Terminals

The Sentry MCB features tunnel terminals of 35mm<sup>2</sup> capacity on all ratings. Each terminal has a protective shutter to prevent cable being installed incorrectly. The terminal screws are touch proof to IP2X, captive and feature combination heads.

#### Modes of operation

The mechanism of the Sentry MCB has been carefully designed and engineered using thermal and magnetic elements to detect overcurrents due to both overload and fault currents. The MCB will operate and interrupt the supply to prevent damage to the installation.

The thermal component is a carefully calibrated, thermally operated bi-metal element.

Larger overloads and fault current situations are dealt with using the magnetic tripping mode of the MCB. This acts very quickly, overriding the thermal operation.

BS EN 60898 requires the tripping to occur within 100 milliseconds and the design of the Sentry MCB allows fault currents of up to 6000A (M6) to be safely interrupted well within this time scale.

## Miniature Circuit Breakers (MCBs)

### Description (continued)

#### Operating characteristics

##### TYPE B

The magnetic operating limits are between 3 and 5 times the current rating of the MCB. Under these conditions the mechanism of a 10A MCB will operate between 30A and 50A in an overcurrent situation.

##### TYPE C

In the case of Type C MCBs, the magnetic operating limits are between 5 and 10 times the current rating of the MCB. Under these conditions the mechanism of a 10A MCB will operate between 50A and 100A in an overcurrent situation.

Type C devices are capable of supplying the majority of inductive and capacitive loads such as motors, transformers and tungsten or fluorescent lighting.

Time/Current and Energy let through characteristics of Sentry MCBs are shown graphically on the Time current characteristics chart (See separate document).

##### TYPE D

The Type D MCB is suitable for applications involving equipment generating very high inrush currents, e.g. x-ray equipment, transmitters and computer power supplies. The magnetic operating limits are between 10 and 50 times the current rating of the MCB. **(For Modular Combi use only)**

Type B Single pole	Rating
5903s	3A
5906s	6A
5910s	10A
5916s	16A
5920s	20A
5932s	32A
5940s	40A
5945s	45A
5950s	50A
Type C Single pole	Rating
8703s	3A
8706s	6A
8710s	10A
8716s	16A
8720s	20A
8732s	32A
8740s	40A
8750s	50A

#### Features

- Meet BS EN and IEE Wiring Regulation requirements
- 'Trip-free' mechanism
- Positive contact status indicator
- Tunnel type, touch-proof, captive terminals
- Generous terminal capacity
- Can be used as single pole isolating switch
- Protective shutter
- Mid-trip fault indicator

#### Installation

Selection of the most suitable MCB should take into account the following considerations:

##### 1. Operating voltage and frequencies

It is possible to use the Sentry MCB on other voltages than 230/400V a.c. 50Hz, but it should be noted that this takes the MCB outside the scope of BS EN 60898.

##### 2. Type of load

##### RESISTIVE

No derating is required in the case of resistive loads.

##### INDUCTIVE

In the case of inductive loads from direct-on-line motors, the surge on energisation can produce up to 5 times full load current, which may be present for several seconds. It is therefore recommended that Type C MCBs are used for such circuits.

When using assisted start motors, the usually quoted figures are 2.5 times the full load current, for periods generally longer than those for direct-on-line starters. It is thus important to establish the degree of inrush current in order to select a suitable MCB. In all instances, reference should be made to both the motor manufacturer's curves and MK's circuit breaker curves in order to select the compatible miniature circuit breaker.

##### CAPACITIVE

Surges on energisation, for example with discharge lighting, may well reach 25 times the rated current of the device, but only for very short duration. Type B devices will often be adequate, but for more specialised circuits, a Type C may be required. The lighting fitting manufacturer's recommendations should be observed.

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### 3. Fault breaking capacity

All Sentry MCBs have a short circuit breaking capacity of 6,000A (M6).

For applications where the prospective fault current is in excess of this, a BS 1361, 100A (maximum) fuse should be used upstream of the MCB to provide a system breaking capacity of 16,000A (in accordance with BS EN 60439-3).

### 4. Discrimination

A Sentry MCB consumer unit will normally be supplied via an HRC fuse. The HRC in such instances will be the major device and remain unaffected by any fault current which causes the MCB to operate.

The level of fault current up to which this can be assured is determined by comparing the  $I^2t$  characteristics of the two devices. Discrimination will theoretically occur up to the level at which the value of the total operating  $I^2t$  of the MCB is below the minimum pre-arcing  $I^2t$  of the fuse, although in practice, discrimination will be achieved at higher levels than this.

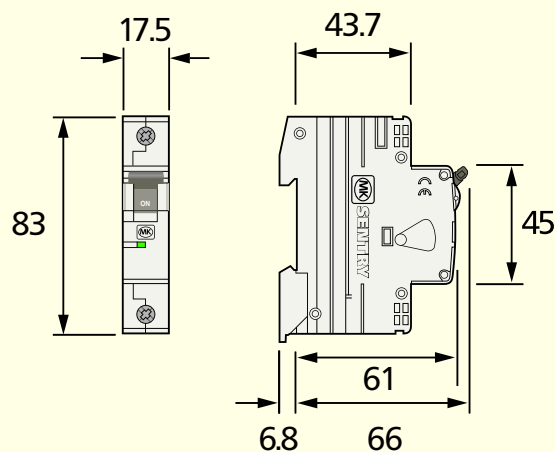
### 5. Cable protection

The current carrying capacity of the cable should always exceed the current rating of the MCB to prevent damage.

However, should this not be the case, a further calculation may show that the MCB can still interrupt the current in a sufficiently short time to prevent overheating of the cable insulation. Although this will prevent mechanical damage to the cables, further overload protection should be provided by a separate device, e.g. a motor overload relay.

In case of doubt please contact the MK Technical Sales and Service Department.

### Dimensions (mm)



## Tripping Characteristics Curve

Limit specified in BS EN 60898 1: 2003

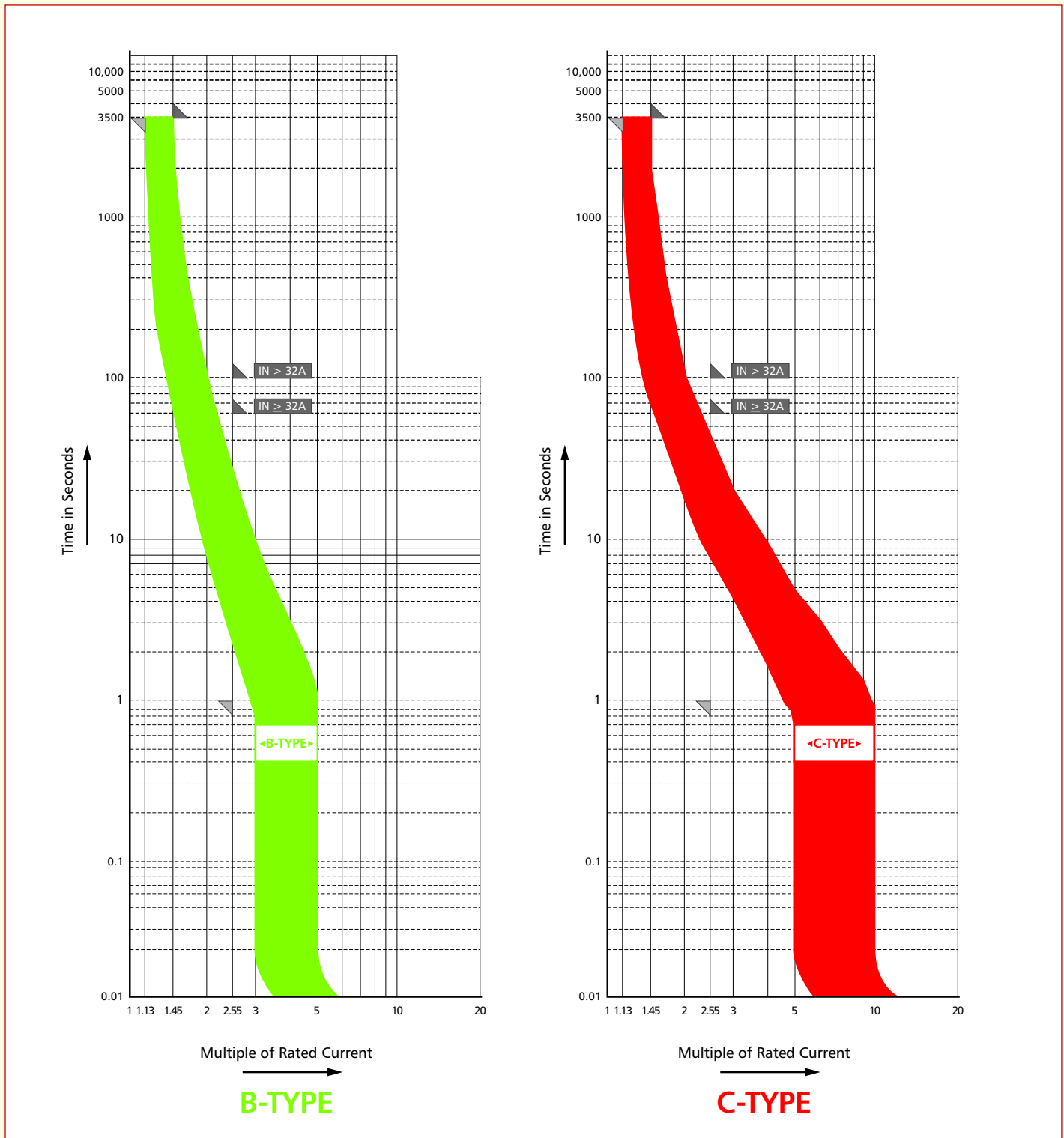
In: Rated Current

B TYPE: 3A to 50A

C TYPE: 3A to 50A

Reference calbi. temp. 30°C

Lower Limit as per Standard  
 Upper Limit as per Standard



## I<sup>2</sup>t curves

