

#### 18mm miniature circuit breakers (MCBs), technical data

Eaton's range of 10/15kA high performance miniature circuit breakers (MCBs) are manufactured and tested to IEC EN 60898, and IEC EN 60947-2, meeting the latest UK, European and international standards, with ratings from 1A to 63A as standard.

DIN rail mountable and suitable for use with both pin and comb type busbar systems, Eaton's MCBs are suitable for use on 230/400 VAC systems and are calibrated for use at 40°C. These devices suite with the other modular devices including RCBOs, RCCBs and isolators, for use within Eaton Memshield 3 Distribution boards and a wide range of other applications.

The Eaton MCBs are fitted with box clamp terminals suitable for use with cables up to 25mm<sup>2</sup>, and have a unique box clamp barrier to prevent incorrect cable insertion.

Eaton miniature circuit breakers are available with B, C and D characteristic curve as standard. Type C MCBs are most commonly used in commercial and general applications where there are lighting or motor loads involving high switching surges that may cause unwanted operation of type B devices. Type D devices are more commonly used on general industrial applications with much higher inrush surges.

IEC/EN 60898 Type	Instantaneous Trip Current (x I <sub>n</sub> )	Typical Application	Eaton 10/15A MCB type
B	3 to 5	General distribution	EMBH
C	5 to 10	Commercial Light industrial	EMCH
D	10 to 20	General Industrial	EMDH

**Type B:** Suitable for general, domestic and commercial installations having little or no switching surges.

**Type C:** Suitable for general use in commercial or industrial applications where the greater use of fluorescent lighting and small motors can produce switching surges, which may cause nuisance tripping of type B breakers.

**Type D:** Suitable for general industrial applications where there are a lot of high inrush switching surges associated with equipment such as transformers, large motors, welding and X ray equipment.

#### Earth fault loop impedances (Zs) to provide compliance with BS 7671

The wiring regulations BS 7671 makes specific reference to MCB types and the maximum earth loop impedance allowable to meet the required disconnection times.

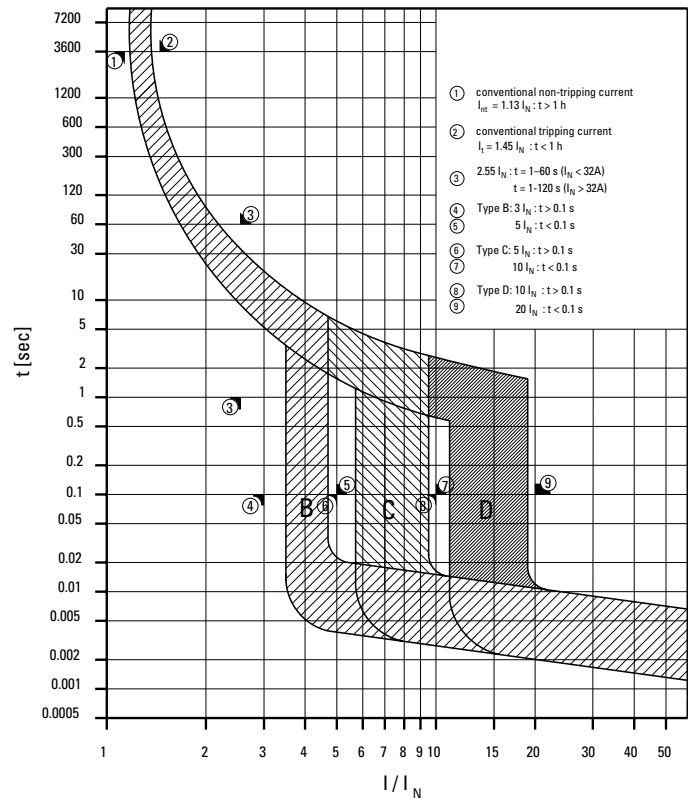
It can be seen that it is much easier to achieve adequate disconnection times with type B devices than it is with types C and indeed type D devices.

Maximum earth fault loop impedance i.e. Zs ohms for final circuits fed from miniature circuit breakers MCBs or RCBOs with U<sub>o</sub> of 230V, for instantaneous operation giving compliance with 0.4s disconnection time of Reg 411.3.2.2 and 5s disconnection time of 411.3.2.3

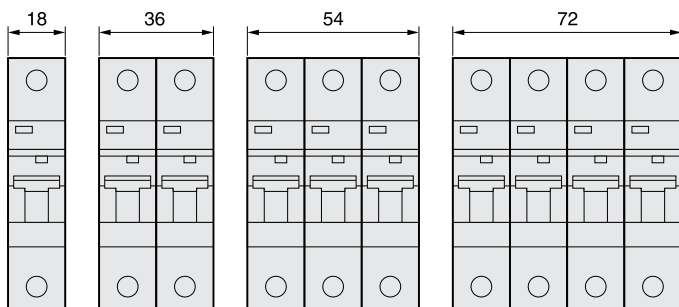
**Note:** A minimum Voltage factor C<sub>min</sub> = 0.95 has been introduced to take account of variations in supply voltage depending on time, place and transformer settings etc., in accordance with Electricity Safety, Quality and Continuity regulations 2002.

The effect of this is to reduce the previous BS7671 maximum earth loop impedance Zs values by 5%.

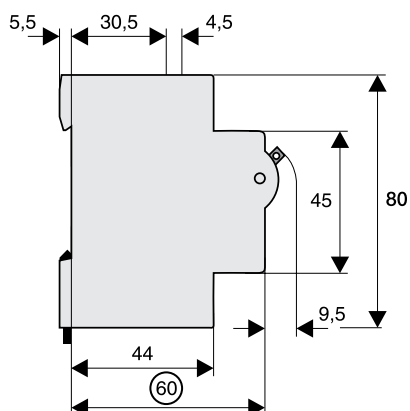
#### Tripping characteristic type B, C & D



### 10/15kA MCBs dimensional drawings



1-pole (1P)      2-pole (2P), 1-pole+N (1P+N)      3-pole (3P)      4-pole (4P)



### 10/15kA MCBs technical data

Product standard	IEC EN 60898 & IEC EN 60947-2
No of poles	1p, 1p&N, 2p, 3p, 4p
<b>Mechanical specification</b>	
Device width (pole)	17.7mm
Terminal type	Box clamp
Terminal capacity	1–25mm <sup>2</sup>
Terminal Screw	M5 combination
Terminal torque	2.0Nm – 2.4Nm max
Mounting	DIN rail
Degree of protection	IP 20
Positive contact indication	Red/Green flag indicator
<b>Electrical specification</b>	
Rated voltage	230/240 V AC 48V DC (per pole)
Current ratings	1, 2, 4, 6, 10, 13, 16, 20, 25, 32, 40, 50, 63 A
Rated impulse and withstand voltage	4kV (1.2/50) $\mu$ sec
Rated short circuit capacity	10kA to IEC EN 60898 and 15kA to IEC EN 60947-2
Selectivity class	3 to EN 60898
<b>Tripping characteristic</b>	
Instantaneous tripping current $I_{mt}$	Type B: $3 I_n < I_{mt} < 5 I_n$ Type C: $5 I_n < I_{mt} < 10 I_n$ Type D: $10 I_n < I_{mt} < 20 I_n$
Conventional non tripping current	$I_{nt} = 1.13 I_n$
Conventional tripping current	$I_t = 1.45 I_n$
Ref/Calibration temp	40 $\pm$ 0 C
Number of operating cycles elec	>4000
Number of operating cycles mech	>20000

### MCB Max Zs (Ohms) figures (Data in line with BS7671)

Range	In (A)	Disconnection 0.4s	Disconnection 5s
Type B (EMBH Series)	1	43.70	43.70
	2	21.85	21.85
	4	10.93	10.93
	6	7.28	7.28
	8	5.46	5.46
	10	4.37	4.37
	13	3.36	3.36
	16	2.73	2.73
	20	2.19	2.19
	25	1.75	1.75
	32	1.37	1.37
	40	1.09	1.09
	50	0.87	0.87
63	0.69	0.69	
Type C (EMCH Series)	1	21.85	21.85
	2	10.93	10.93
	4	5.46	5.46
	6	3.64	3.64
	8	2.73	2.73
	10	2.19	2.19
	13	1.68	1.68
	16	1.37	1.37
	20	1.09	1.09
	25	0.87	0.87
	32	0.68	0.68
	40	0.55	0.55
	50	0.44	0.44
63	0.35	0.35	
Type D (EMDH Series)	1	10.93	21.85
	2	5.46	10.93
	4	2.73	5.46
	6	1.82	3.64
	8	1.37	2.73
	10	1.09	2.19
	13	0.84	1.68
	16	0.68	1.37
	20	0.55	1.09
	25	0.44	0.87
	32	0.34	0.68
	40	0.27	0.55
	50	0.22	0.44
63	0.17	0.35	

Note : Values take account of minimum voltage factor  $C_{min}$  - in accordance with BS7671 Amendment 3