

**Btdin 45 RS house logo "ITALY" up  
to 40A (1 module per pole)****Cat. N° (s)**

FC810NC10 / C40, FC820C10 / C40



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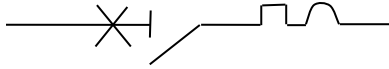
# Btdin 45 RS house logo "ITALY" up to 40A (1 module per pole)

Cat. N° (s)  
FC810NC10 / C40, FC820C10 / C40

## 1. DESCRIPTION - USE:

. Thermal-magnetic circuit breaker (MCB) with positive contact indication for control, protection against short-circuits and overloads, and isolation of electrical circuits.

### Symbol:



### Technology:

. Limiting device

## 2. RANGE

### Polarity:

. 1P + N / 2P

### Width:

. 1 module per pole. Each pole is 17,8 mm

### Rated currents, In:

10 / 16 / 20 / 25 / 32 / 40A C curve

### Magnetic tripping curves:

. Curve C (between 5 and 10 In)

### Thermal threshold according to IEC/EN 60898-1:

. Reference Temperature: 30° C  
- Non operating current (I<sub>nf</sub>): 1,13 In.  
. Operating current (I<sub>f</sub>): 1,45 In.

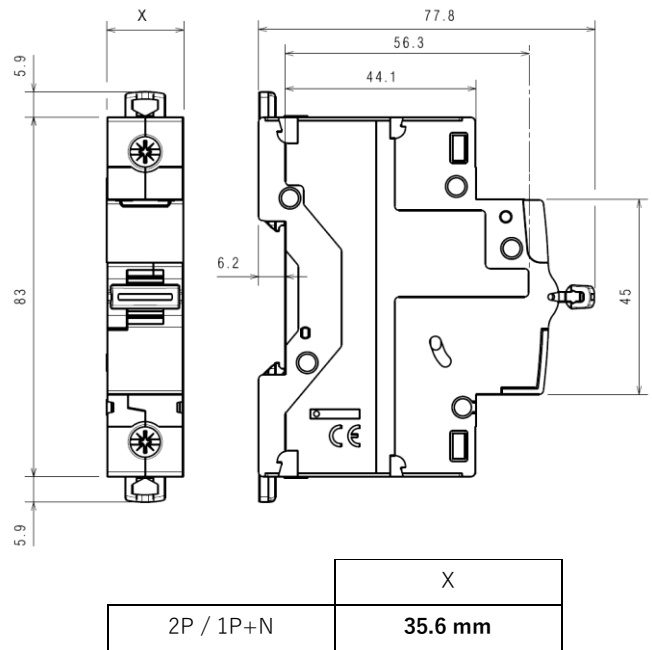
### Maximum operating voltage:

. 440 V ~ with possible derating of the breaking capacity

### Breaking capacity and Rated voltage (50/60 Hz):

. 4500 A in accordance with standard EN/IEC 60898-1  
230 V ~ / 400 V ~

## 3. OVERALL DIMENSIONS:



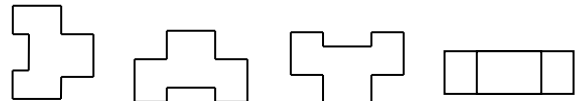
## 4. PREPARATION - CONNECTION

### Fixing:

. On symmetrical EN/IEC 60715 or DIN 35 rail.

### Operating positions:

. Vertical      Horizontal      Upside Down      On the side



### Power supply:

. From the top or the bottom.

### Connection:

. Inputs and outputs via screw terminals  
The location of the terminals allows supplying by traditional HX<sup>3</sup> pin busbar and fork busbar.

### Terminal depth:

. 14 mm

### Stripping length recommended:

. 11 mm

### Screw head:

. Mixed, slotted and Pozidriv 2.

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## 4. PREPARATION - CONNECTION *(continued)*

### Tightening torque:

- . Recommended: 2.5 Nm.
- . Mini: 2 Nm. Maxi: 3 Nm.

### Tools required:

- . For the terminals: Pozidriv n° 2 or flat screwdriver 5,5 mm (6 mm maximum).
- . For fixing: flat screwdriver 5,5 mm (6 mm maximum).

### Conductor type:

$I_n \leq 25A$	Copper cables	
	Without ferrule	With ferrule
Rigid cable	1 x 1,5 mm <sup>2</sup> a 25 mm <sup>2</sup> 2 x 1,5 mm <sup>2</sup> a 10 mm <sup>2</sup>	-
Flexible cable	1 x 1,5 mm <sup>2</sup> a 16 mm <sup>2</sup> 2 x 1,5 mm <sup>2</sup> a 10 mm <sup>2</sup>	1 x 1.5 mm <sup>2</sup> to 16 mm <sup>2</sup> 2 x 1.5 mm <sup>2</sup> to 10 mm <sup>2</sup>

$I_n \geq 32 \leq 40A$	Copper cables	
	Without ferrule	With ferrule
Rigid cable	1 x 1,5 mm <sup>2</sup> a 35 mm <sup>2</sup> 2 x 1,5 mm <sup>2</sup> a 16 mm <sup>2</sup>	-
Flexible cable	1 x 1,5 mm <sup>2</sup> a 25 mm <sup>2</sup> 2 x 1,5 mm <sup>2</sup> a 10 mm <sup>2</sup>	1 x 1.5 mm <sup>2</sup> to 25 mm <sup>2</sup> 2 x 1.5 mm <sup>2</sup> to 10 mm <sup>2</sup>

Aluminium cable with cross-section > 10 mm<sup>2</sup>: it is necessary to use the accessory with cat. F80ALU63

### Manual actuation of the MCB:

- . By the 2-position ergonomic handle:
  - "I – ON": Closed circuit.
  - "0 – OFF": Opened circuit.

### Contact status display:

- . By marking of the handle
  - "O-OFF" in white on a green background = contacts open
  - "I-ON" in white on a red background = contacts closed

### Sealing:

- . Possible in "Open" position (OFF) or "Close" position (ON).

### Locking:

- . By 5 mm padlock or 6 mm padlock with padlock support (cat. N° F80BL).

### Labelling:

- . Circuit identification by way of a label inserted in the label holder situated on the front of the product.



## 5. GENERAL CHARACTERISTICS:

### Marking on the front side:

- . By permanent ink pad printing:
  - Catalogue number
  - Trade name: Btdin 45
  - $I_{cn}$  in kA rated breaking capacity in accordance with IEC/EN 60898-1 (in a box)
  - Limiting class "3" (in a square) for the MCB C curve with rated current  $\leq 40$  A.
  - Breaking curve
  - Rated current (in A)
  - House logo
  - Mark: Bticino



### Marking on the lateral side:

- . Production information's and COPYTRACER:

The Copytracer number ensures that a product is traced and guarantees its production quality).

Info: <http://www.legrand-copytracer.com/>

### Short-circuit breaking capacity:

- . Alternate current 50/60Hz, single-phase or three-phase network, in accordance with standard: EN/IEC 60898-1

$U_n$		1P / 1P + N	2P
230V~	$I_{cn}$	4500 A	6000 A
400V~		-	4500 A

$U_n$		75% di $I_{cn}$	75% di $I_{cn}$
230V~	$I_{cs}$	75% di $I_{cn}$	75% di $I_{cn}$
400V~			

- . Alternate current 50/60Hz, single-phase or three-phase network, in accordance with standard: EN/IEC 60947-2

$U_n$		1P + N	2P
110V~	$I_{cu}$	10 kA	10 kA
230V~		6 kA	6 kA
400V~		-	6 kA

$U_n$		75% di $I_{cn}$	75% di $I_{cn}$
110V~	$I_{cs}$	75% di $I_{cn}$	75% di $I_{cn}$
230V~			
400V~			

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## 5. GENERAL CHARACTERISTICS (continued)

### Short-circuit breaking capacity on one pole:

. Three-phase network 400 V~

- in TN neutral system,  $I_{cn1} = 4,5 \text{ kA}$
- in IT distribution system,  $I_{it} = 1,5 \text{ kA}$

### Minimum operating voltage:

. 12 V a.c.

### Impulse rated voltage:

.  $U_{imp} = 4 \text{ kV}$

### Insulation rated voltage:

.  $U_i = 500 \text{ V}$

### Pollution degree:

. 2 in accordance with the standard EN/IEC 60898-1.

### Electric strength:

. 2000 V a.c.

### Operation at 400Hz:

. The magnetic thresholds increase by 45%.

### Load to close and to open a pole through the handle:

- . 0,1 Nm per pole to close.
- . 0,075 Nm per pole to open.

### Mechanical endurance:

- . 20000 operation without load.
- . 10000 operation with load (under  $I_n \cdot \cos \varphi = 0,9$ ).

### Enclosure material:

- . Polyamide,  $I_n \leq 25 \text{ A}$
- . Polyester,  $I_n 30 \div 63 \text{ A}$
- . Characteristics of these materials: self extinguishing, heat and fire resistant according to EN 60898-1, glow-wire test at 960° C for external parts made of insulating material necessary to retain in position current-carrying parts and parts of protective circuit (650° C for all other external parts made of insulating material).
- . Halogens-free

### Average weight per pole:

. 0,150 kg.

### Volume when packed:

	Volume (dm <sup>3</sup> )
Single pole	<b>0,163</b>
Single pole + neutral Double pole	<b>0,334</b>
Triple pole / Four pole	<b>0,680</b>

### Ambient temperatures:

- . Operation: from - 25°C to + 70°C
- . Storage: from - 40°C to + 70°C

## 5. GENERAL CHARACTERISTICS (continued)

### Degree of protection:

. Degree of protection in the terminals area:

IP 20, (in accordance with standards IEC/EN 60898-1 and IEC/EN 60529).

. Degree of protection of the remaining parts:

IP 40 (in accordance with standards IEC/EN 60529).

. Protection index against mechanical shocks:

IK 02 (in accordance with standards IEC/EN 62262).

### Sinusoidal vibration resistance in accordance with IEC 60068.2.6:

- . Axis: x, y, z.
- . Frequency range: 5 ÷ 100 Hz; duration 90 minutes
- . Displacement (5 ÷ 13,2 Hz): 1mm
- . Acceleration (13,2 ÷ 100 Hz): 0,7g ( $g=9,81 \text{ m/s}^2$ )

### Recognition:

. Recognition of the circuits by label in the "label holder" on the front-side of the MCB

### Power dissipated per pole (W):

. Circuit breaker C curves

$I_n$	10 A	16 A	20 A	25 A
1P ÷ 4P	<b>1.8</b>	<b>2</b>	<b>2.2</b>	<b>2.7</b>

$I_n$	32 A	40 A
1P ÷ 4P	<b>3.2</b>	<b>4</b>

. Impedance per pole ( $\Omega$ ) =  $\frac{P \text{ dissipated}}{I_n^2}$

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## 5. GENERAL CHARACTERISTICS *(continued)*:

### Derating of circuit-breakers according to ambient temperature:

. The nominal characteristics of a circuit breaker are modified according to the ambient temperature inside the cabinet or the enclosure where the circuit breaker is located.

. Reference temperature: 30° C in accordance with EN/IEC 60898-1

In (A)	Ambient Temperature / In									
	- 25° C	- 10° C	0° C	10° C	20° C	30° C	40° C	50° C	60° C	70° C
10	12.5	11.5	11.1	10.7	10.3	10.0	9.7	9.3	9.0	8.7
16	20.0	18.7	18.0	17.3	16.6	16.0	15.4	14.7	14.1	13.5
20	25.0	23.2	22.4	21.6	20.8	20.0	19.2	18.4	17.6	16.8
25	31.5	29.5	28.3	27.2	26.0	25.0	24.0	22.7	21.7	20.7
32	41.0	37.8	36.5	34.9	33.3	32.0	30.7	29.1	27.8	26.5
40	51.0	48.0	46.0	44.0	42.0	40.0	38.0	36.0	34.0	32.0

### Derating of MCB for use with fluorescent lights:

Ferromagnetic and electronic ballasts have a high inrush current for a short time. These currents can cause the tripping of circuit breakers. At the time of the installation, it should take into account the maximum number of ballasts per circuit breaker that the manufacturers of lamps and ballasts indicate in their catalogues.

### Influence of the altitude:

	≤2000 m	3000 m	4000 m
Dielectric holding	3000 V	2500 V	2000 V
Max operational Voltage	400 V	400 V	400 V
Derating at 30° C	none	none	none

### Derating of MCBs function of the number of devices side by side:

When several MCBs are juxtaposed and operate simultaneously, the thermal evacuation of the poles is limited. This results in an increase in operating temperature of the circuit breakers which can cause unwanted tripping. It is recommended to apply the following coefficients to the rated currents.

Number of circuit breakers side by side	Coefficient
2 - 3	0.9
4 - 5	0.8
6 - 9	0.7
≥ 10	0.6

These values are given by the recommendation of IEC 60439-1.

To avoid using these coefficients, it is necessary to allow a good ventilation and to separate the devices with 0.5 module spacing elements (cat. N° F80/05D).

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## 6. CONFORMITIES AND APPROVALS

### In accordance with standards:

- . IEC/EN 60898-1 with 4500 A breaking capacity
- . EU guidelines: 2014/35/EU + 2014/30/EU
- . Bticino circuit-breakers can be used under the conditions of use as defined by IEC/EN 60947.
- . The performance of circuit-breakers can be influenced by particular climatic condition: hot dry, cold dry, hot humid, salt fog atmosphere

### Classification according to Annex Q (standard IEC/EN 60947-1):

- . Category C with a range test temperature  $-25^{\circ}\text{C} / +70^{\circ}\text{C}$
- . Salt fog atmosphere according IEC 60068-2-52

### Environment respect – Compliance with EU directives:

- . Compliance with Directive 2011/65/EU of 08/06/11 (RoHS) and subsequent modifications and integrations.

### Precious metal:

- . Silver: 0,04 g per pole  $I_n \leq 16\text{ A}$ ; 0,08 g per pole  $I_n \geq 20\text{ A}$
- . No gold

### Packaging:

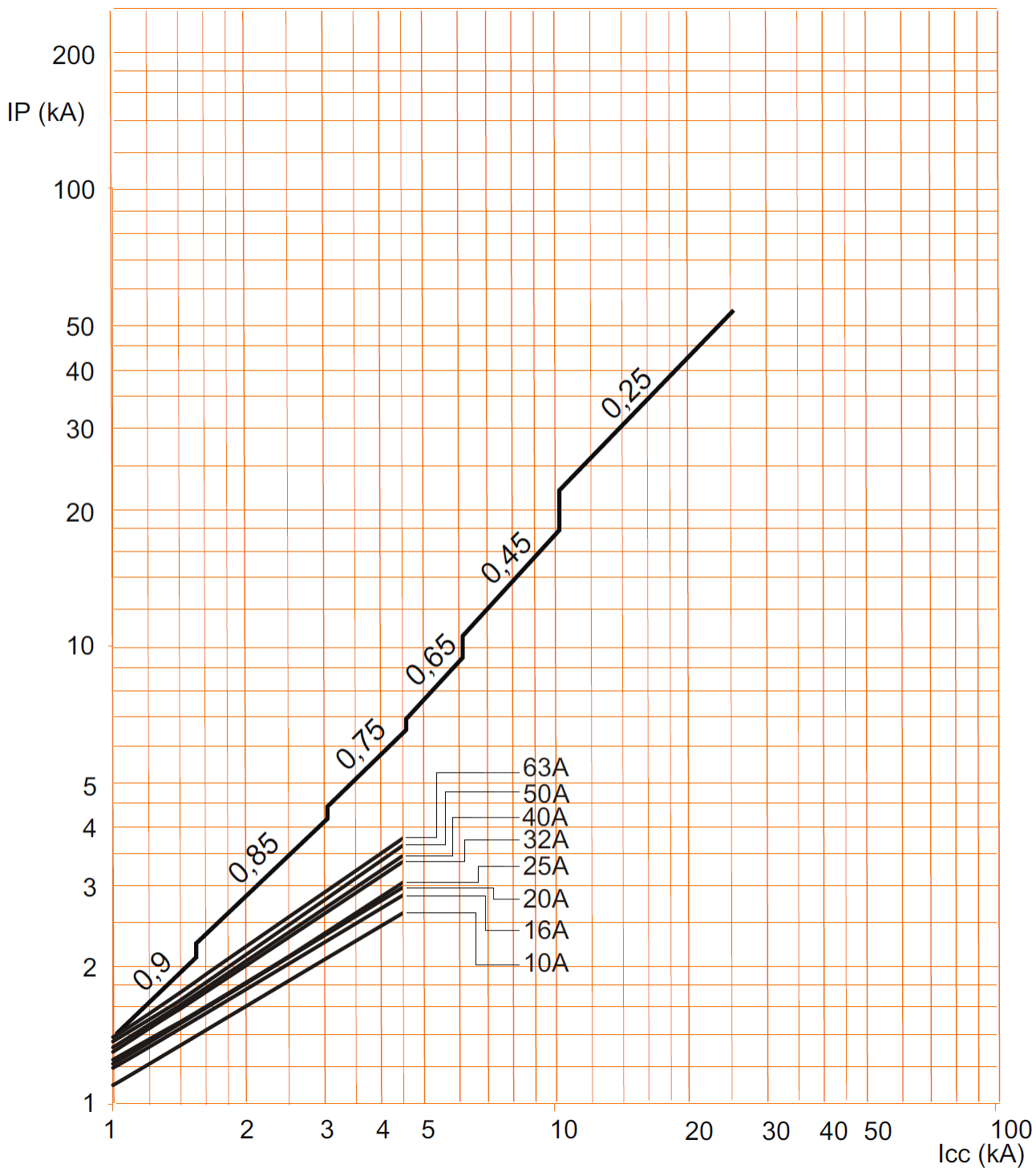
- . Design and manufacture of packaging in accordance with Directive 94/62/EC

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## 7. CHARACTERISTIC CURVES

Limiting current curve: circuit breakers C:



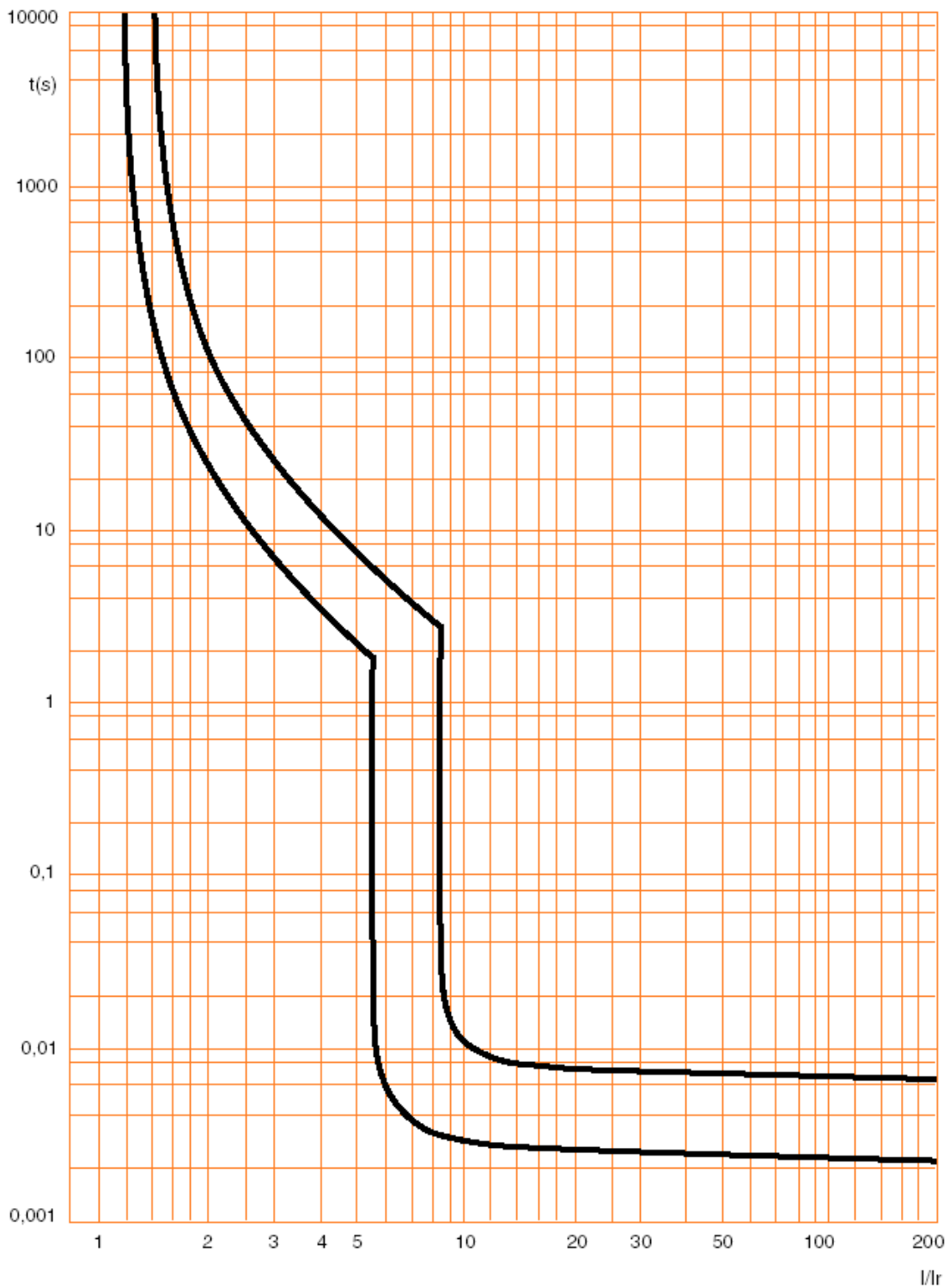
. Icc = Square value of symmetric component of the short circuit current (kA).  
. IP = Max peak value (kA)

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## 7. CHARACTERISTIC CURVES (continued)

Operating characteristic of circuit breakers C curve:





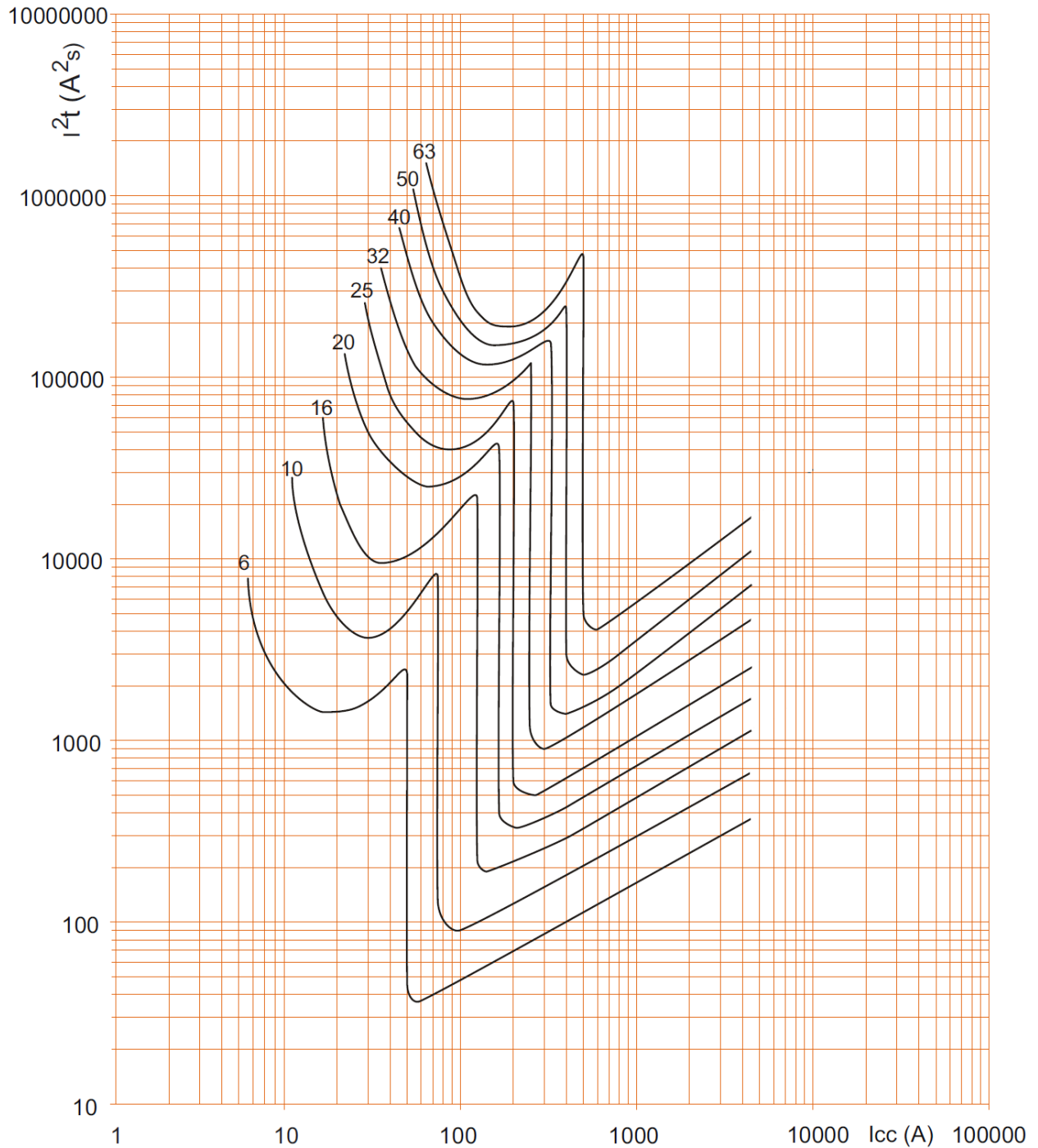
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## 7. CHARACTERISTIC CURVES (continued)

. Limiting thermal energy curve of circuit breakers C curve, 2P (230V~ / 50Hz):



.  $I_{cc}$  = Square value of symmetric component of the short circuit current (kA).

.  $I^2t$  = Thermal energy limited (A<sup>2</sup>s)

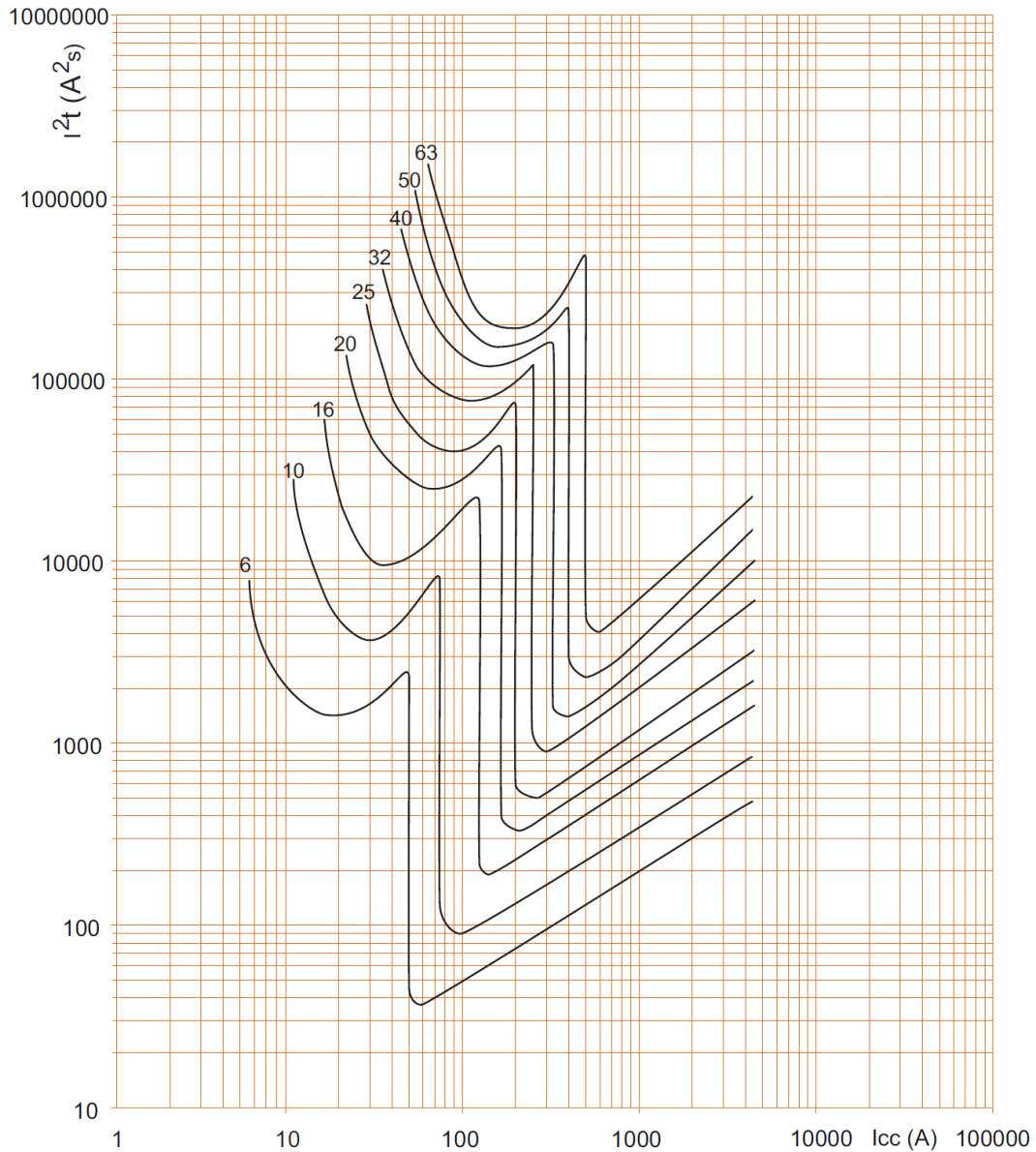
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## 7. CHARACTERISTIC CURVES (continued)

. Limiting thermal energy curve of circuit breakers C curve, 2P (400V~ / 50Hz):



.  $I_{cc}$  = Square value of symmetric component of the short circuit current (kA).

.  $I^2t$  = Thermal energy limited (A<sup>2</sup>s)

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## 8. AUXILIARIES AND ACCESSORIES

### Wiring accessories:

- . Sealable screw cover (cat n° F80CV).
- . Insulating shields (cat n° F80S)
- . Terminal for aluminium cable (10 mm<sup>2</sup> to 50 mm<sup>2</sup>) necessary use (cat n° F80ALU63).

### Front external rotary handle:

- . Black handle (cat. No. F80KMN)
- . Yellow and red handle (cat. No. F80KMR)

## 8. AUXILIARIES AND ACCESSORIES *(continued)*

### Front external rotary handle:

- . Black handle (cat. No. F80KMN)
- . Yellow and red handle (cat. No. F80KMR)

### Sealing:

- . Possible in "Open" position (OFF) or "Close" position (ON).

### Locking:

- . By 5 mm padlock or 6 mm padlock with padlock support (cat. N° F80BL).