

# BTDIN 45 RCBO Phase + Neutral up to 40A (2 modules)

Cat n° (s): GA8812A..., GA8812AC..., GA8813A..., GA8813AC...

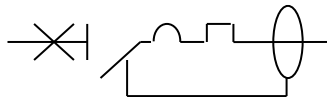


Content	PAGE
1. Description, use.....	1
2. Range.....	1
3. Overall dimensions.....	1
4. Preparation and connection .....	2
5. General characteristics .....	3-5
6. Compliance and approvals .....	5
7. Curves.....	6-9
8. Equipments and accessories .....	10
9. Safety.....	10

## 1. DESCRIPTION - USE

. Residual Current Operated Circuit Breaker (RCBO) with positive contact indication for control, protection against short circuits and overload and isolation of electrical circuits, protecting people from direct and indirect contacts and protecting installations from insulation faults.

### Symbol:



### Technology:

- . Energy limiting circuit-breaker
- . The Neutral contact closes before and opens after the Phase contact
- . The phase pole provides protection and isolation for the phase circuit
- . The neutral pole provides isolation for the neutral circuit

## 2. RANGE

### Polarity:

. 2 poles including 1 protected pole and 1 neutral pole. 2 modules wide (2 \* 17,8mm)

### Rated currents In:

. 2 / 3 / 4 / 6 / 10 / 13 / 16 / 20 / 25 / 32 / 40 A

### Instantaneous tripping characteristics according to IEC/EN 61009-1:

. C type (tripping threshold between 5 In and 10 In)

### Rated breaking capacity and rated voltage:

. 4500 A / 230 V~ according to IEC/EN 61009-1

### Rated frequency:

. 50 Hz

### Energy limitation class:

. 3

## 2. RANGE (continued)

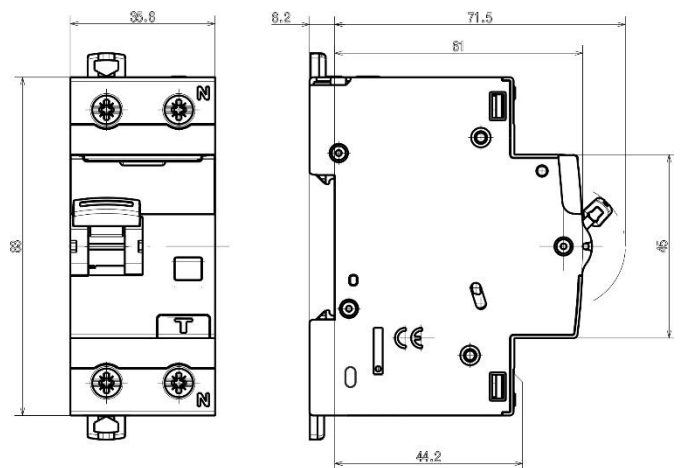
### Residual current Type:

- . AC (residual sinusoidal alternating currents)
- . A (residual sinusoidal alternating currents and residual pulsating direct currents)

### Residual current sensitivity:

- . 10 mA - instantaneous
- . 30 mA - instantaneous

## 3. OVERALL DIMENSIONS



## up to 40A (2 modules)

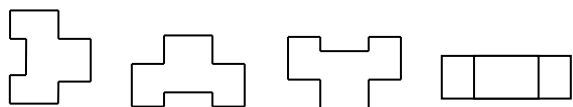
### 4. PREPARATION - CONNECTION

#### Mounting:

. On 35 mm symmetrical rail EN/IEC 60715

#### Operating position:

Vertical      Horizontal      Upside down      On the side



#### Power supply:

- . Either from the top or the bottom
- . Upper terminals: pin busbar
- . Lower terminals: pin or fork busbar

#### Maintenance:

. A RCBO may be replaced in the middle of a row supplied with busbars without disconnecting the other products

#### Connection:

- . Inputs and outputs via screw terminals
- . Terminals fitted with shutters preventing a cable being placed under the terminal, with the terminal partly open or closed

#### Terminal depth:

. 14 mm

#### Stripping length recommended:

. 11 mm

#### Screw head:

. Mixed, slotted and Pozidriv 2.

#### Tightening torque:

- . Recommended: 2.5 Nm.
- . Min: 1.2 Nm. Max: 3.5 Nm.

#### Tools required:

- . For the terminals: Pozidriv n° 2 or flat screwdriver 5.5 mm (6.5 mm maximum).
- . For fixing (din rail clamps): Pozidriv n° 2 or flat screwdriver 5.5 mm (6 mm maximum).

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

#### Connectable section:

	Copper cables	
	Without ferrule	With ferrule
Rigid cable	1 x 0.75 mm <sup>2</sup> to 50 mm <sup>2</sup> 2 x 0.75 mm <sup>2</sup> to 16 mm <sup>2</sup>	-
Flexible cable	1 x 0.75 mm <sup>2</sup> to 35 mm <sup>2</sup> 2 x 0.75 mm <sup>2</sup> to 16 mm <sup>2</sup>	1 x 0.75 mm <sup>2</sup> to 25 mm <sup>2</sup>

#### Manual actuation of the MCB:

- . Ergonomic 2-position handle
- . "I-ON": Device closed
- . "O-OFF": Device open

#### Locking:

. Padlocks possible in the open and closed positions with padlock support (Cat. No. F80BL) and Ø5 mm padlock or Ø6 mm padlock

#### Sealing:

- . Possible in the open and closed positions

#### Contact status display:

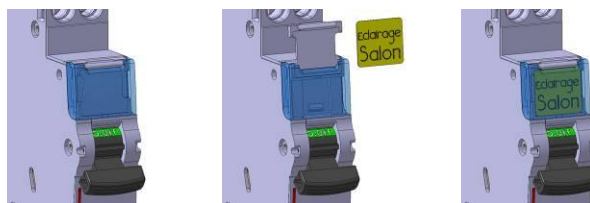
- . By marking of the handle
- "O-OFF" in white on a green background = contacts open
- "I-ON" in white on a red background = contacts closed

#### Residual current tripping display:

- . By a mechanical indicator.

#### Labelling:

- . Identification of the circuit by insertion of a label in the label holder.



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### 5. GENERAL CHARACTERISTICS

#### Marking on the front side:

. By permanent ink pad printing

#### Maximum operating voltage:

. 250 V AC

#### Short-circuit breaking capacity:

Alternate current 50Hz, single-phase network

. In accordance with standard:

Standard		Un	1P+N
IEC/EN 61009-1	Icn	230V~	4.5kA
	Ics	230V~	4.5kA

Standard		Un	1P+N
IEC/EN 60947-2	Icu	230V~	6kA
	Ics	230V~	4.5kA

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

. 3 kA at 230 V~ in accordance with IIT EN/IEC 60947-2 (double fault in IT network)

. 4,5 kA at 230 V~ in accordance with Icn1 EN60898-1

#### Rated residual breaking capacity:

. I $\Delta$ m = 4500A in accordance with EN/IEC 61009-1 (short-circuit to earth).

#### Time-current characteristic according to IEC/EN 61009-1:

. Reference temperature: 30° C

. Non-tripping current (I<sub>nt</sub>): 1,13 I<sub>n</sub>.

. Tripping current (I<sub>t</sub>): 1,45 I<sub>n</sub>.

#### Operating voltage ranges of the Test circuit:

I $\Delta$ n	10 mA	30 mA
U min.	110 V ~	180 V ~
U max.	264 V ~	264 V ~

#### Ambient operating temperature:

. Min. = -25° C. Max. = +60° C

#### Ambient storage temperature:

. Min. = -40° C. Max. = +70° C

### 5. GENERAL CHARACTERISTICS (continued)

#### Isolation:

. The RCBO is suitable for isolation in accordance with EN/IEC 61009-1 standard. The distance between contacts is greater than 5.5 mm when the handle is in open position.

#### Rated insulation voltage:

. U<sub>i</sub> = 250 V

#### Overvoltage category:

. 3

#### Rated impulse withstand voltage:

. U<sub>imp</sub> = 4 kV

#### Pollution degree:

. 2 according to IEC/EN 61009-1.

#### Dielectric strength at power frequency:

. 2500 V

#### Unwanted tripping withstand:

. 250 A to 8/20  $\mu$ s wave

. 200 A to 0.5  $\mu$ s / 100 kHz damped recurring wave

#### Closing and opening force via the handle:

. 10 N to close the RCBO

. 4 N to open the RCBO

#### Mechanical endurance:

. Compliant with standard EN/IEC 61009-1

. Tested with 20,000 operations with no load

#### Electrical endurance:

. Compliant with standard EN/IEC 61009-1

. Tested with 10,000 operations with load (I<sub>n</sub> x Cos  $\phi$  0.9)

. Tested with 2,000 residual current tripping operations using the test button or a fault current

#### Degree of protection:

. Degree of protection in the terminals area (wired device): IP 20, (in accordance with standards IEC/EN 61009-1 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/EN 60068-2-6:

. Axis: x, y, z.

. Frequency range: 10 ÷ 55 Hz

. Acceleration: 3g (g=9,81 m/s<sup>2</sup>)

## up to 40A (2 modules)

### 5. GENERAL CHARACTERISTICS (continued)

#### Resistance to tremors:

. In accordance with IEC 61009-1

#### Frequency:

. Operation at 400Hz: No  
 . Operation at 60Hz: can be used at 60Hz, except "A" types, with sensitivity 30mA

#### Enclosure material:

. Polyamide and P.B.T.

#### Enclosure heat and fire resistance:

. Glow-wire test at 960° C according to IEC/EN 61009-1 and IEC 60695-2-12  
 . Classification V2 in accordance with UL94 standard

#### Higher heating potential:

. The heat potential is assessed at: 2.1MJ

#### Volume when packed:

	Volume (dm <sup>3</sup> )	Packaging
2P	0,40	Per 1

#### Power dissipated per device (W):

. Type C RCBO

In	2 A	3 A	4 A	6 A	10 A	16 A	20 A	25 A	32 A	40 A
Ph	0,7	0,7	0,7	0,7	1,9	3,3	4,9	3,7	4,7	7,6
N	0	0	0,2	0,2	0,5	1,5	2,3	2,6	4,2	5,3

. Impedance ( $\Omega$ ) = P dissipated / In<sup>2</sup>

#### Derating of RCBOs according to ambient temperature:

. The nominal characteristics of a RCBO 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 IEC/EN 61009-1

In (A)	Ambient Temperature / In								
	- 25° C	- 10° C	0° C	10° C	20° C	30° C	40° C	50° C	60° C
2	2.5	2.4	2.3	2.2	2.1	2	1.9	1.9	1.8
3	3.75	3.6	3.45	3.3	3.15	3	2.91	2.82	2.73
4	5	4.8	4.6	4.4	4.2	4	3.9	3.8	3.6
6	7.5	7.2	6.9	6.6	6.3	6	5.82	5.64	5.46
10	12.5	12	11.5	11	10.5	10	9.7	9.4	9.1
13	16.25	15.6	14.95	14.3	13.65	13	12.61	12.22	11.83
16	20	19.2	18.4	17.6	16.8	16	15.52	15.04	14.56
20	25	24	23	22	21	20	19.4	18.8	18.2
25	31.25	30	28.75	27.5	26.25	25	24.25	23.5	22.75
32	40	38.4	36.8	35.2	33.6	32	31.04	30.08	29.12
40	50	48	46	44	42	40	38.8	37.6	36.4

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## 5. GENERAL CHARACTERISTICS *(continued)*

### Derating of RCBO 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 RCBOs.

At the time of the installation, it should take into account the maximum number of ballasts per RCBO that the manufacturers of lamps and ballasts indicate in their catalogues.

### Influence of the altitude:

	≤2000 m	3000 m	4000 m
Dielectric holding	<b>2 000 V</b>	<b>1 750 V</b>	<b>1 500 V</b>
Max operational Voltage	<b>250 V</b>	<b>250 V</b>	<b>250 V</b>
Derating at 30° C	<b>none</b>	<b>none</b>	<b>none</b>

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

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

Number of RCBOs side by side	Coefficient
2 - 3	<b>0.9</b>
4 - 5	<b>0.8</b>
6 - 9	<b>0.7</b>
≥ 10	<b>0.6</b>

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 (F80/05De).

## 6. CONFORMITIES AND APPROVALS

### Reference standards:

. EN / IEC 61009-1

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

Category C with a range test temperature -25 ° C / +70 ° 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.

Compliance with Directive 2002/95/EC of 27/01/03 known as "RoHS" which provides for a restriction on the use of dangerous substances such as lead, mercury, cadmium, hexavalent chromium and polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE) brominated flame retardants from 1<sup>st</sup> July 2006

. Compliance with the Directive 91/338/EEC of 18/06/91 and decree 94-647 of 27/07/04

### Plastic materials:

. Labelling of parts compliant with ISO 11469 and ISO 1043.  
. Halogen free plastic materials

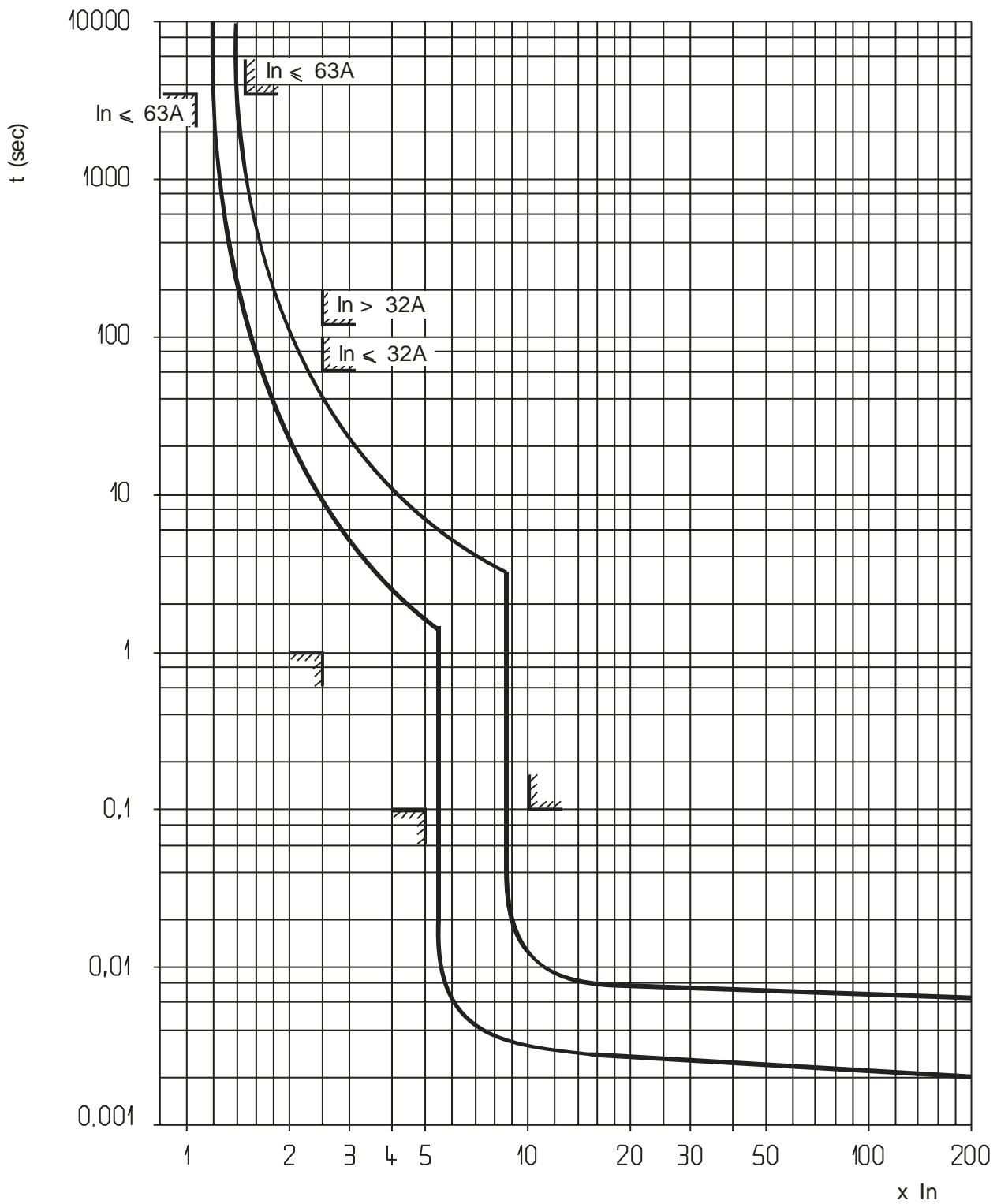
### Packaging:

. Design and manufacture of packaging compliant with decree 98-638 of 20/07/98 and Directive 94/62/EC

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**7. CURVES**

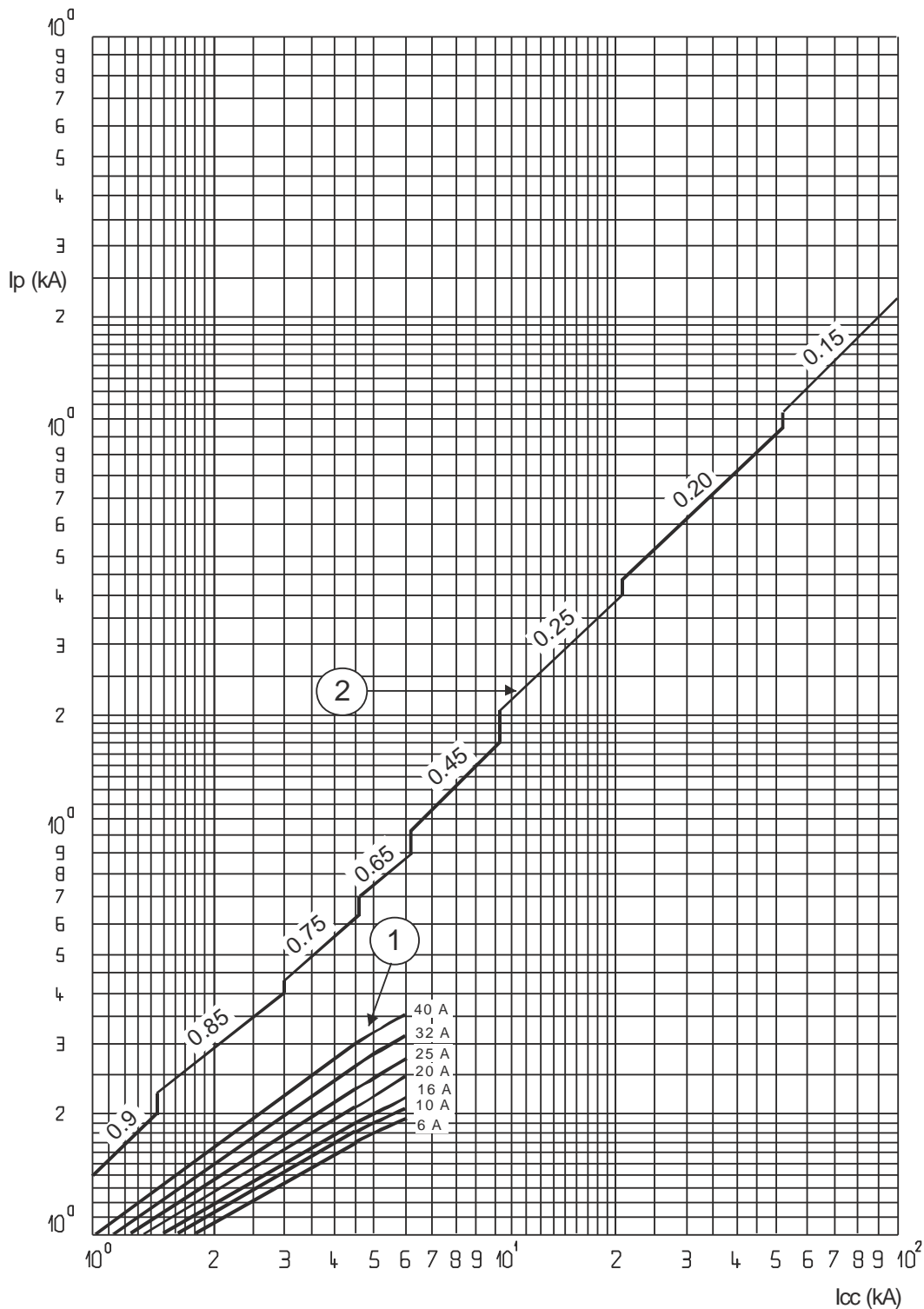
Typical thermal-magnetic tripping curve of RCBOs curve C:



up to 40A (2 modules)

7. CURVES (continued)

Limiting current curve:



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

.  $I_p$  = Max peak value ( kA )

. 1 = Short-circuit rms currents (max. peak)

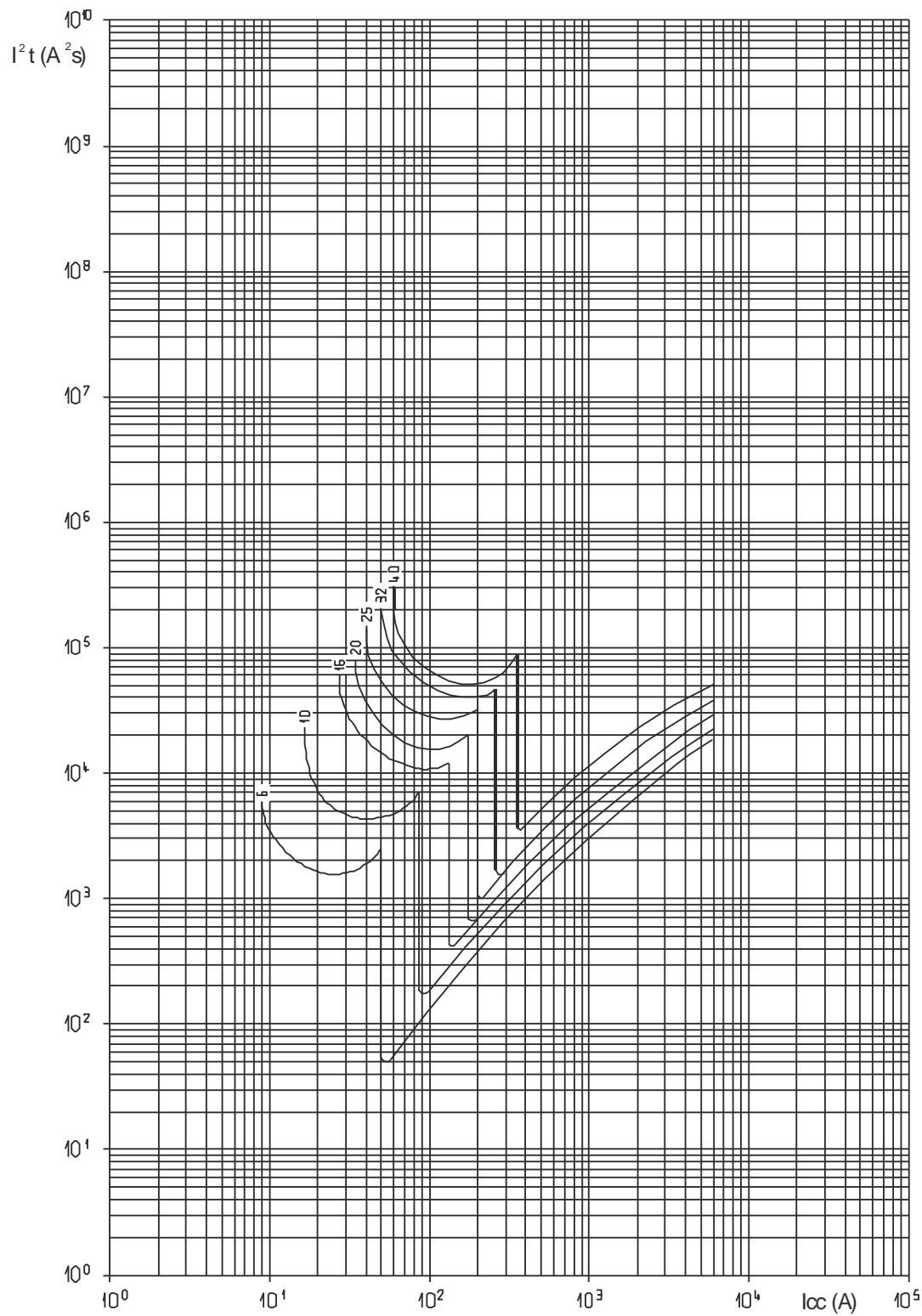
. 2 = Unlimited peak currents (max.), corresponding to power factors shown above (0,15 to 0,9)

**up to 40A (2 modules)**

**7. CURVES** *(continued)*

**Thermal stress limiting curves:**

. C curve 2P RCBOs (230V/50Hz)



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

. I²t = Thermal energy limited ( A²s ).

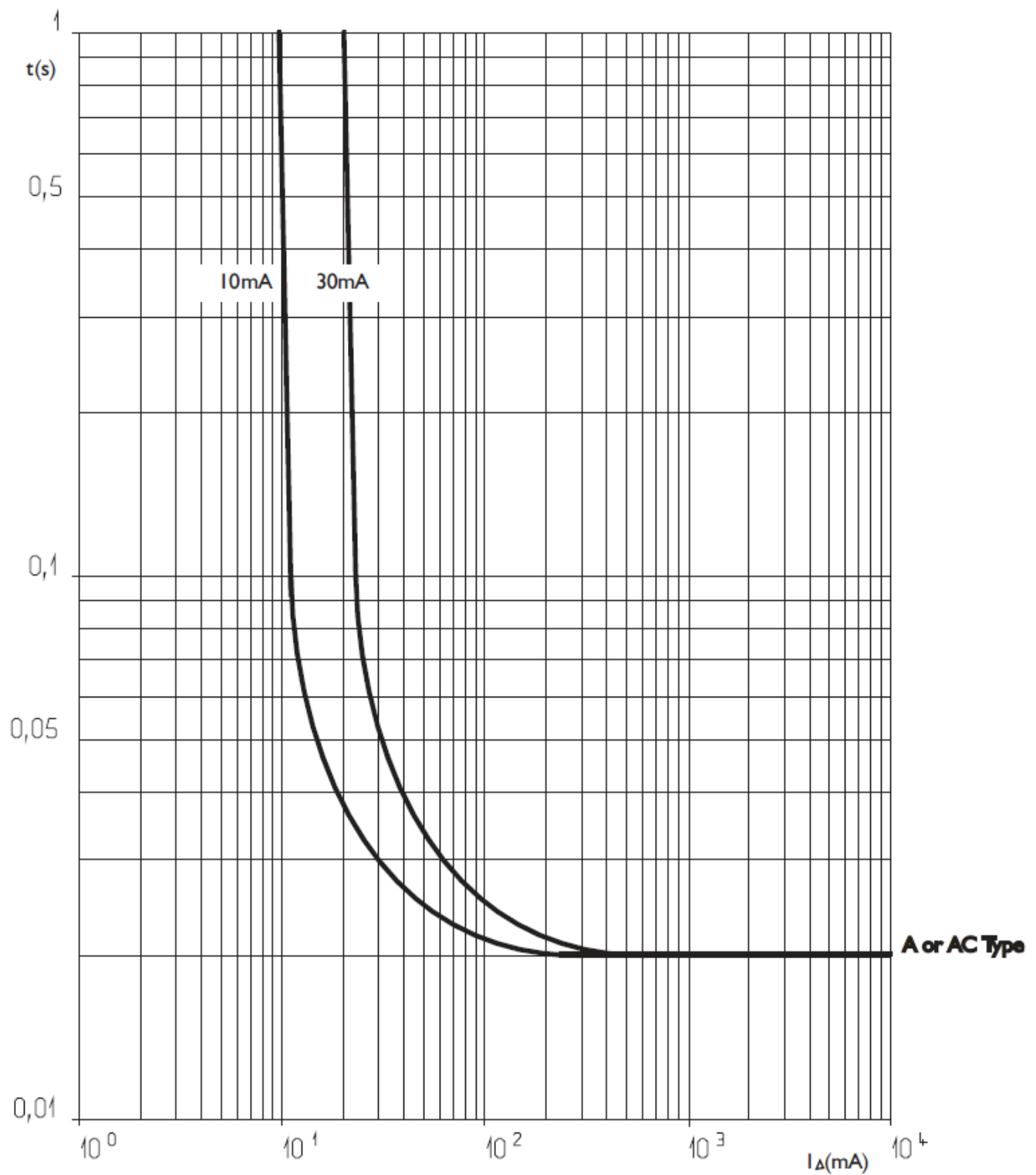


**up to 40A (2 modules)**

**7. CURVES** *(continued)*

**Residual current tripping curves:**

. AC – A types



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### 8. AUXILIARIES AND ACCESSORIES

#### Wiring accessories:

- . Fork busbar (on lower side only)
- . Pin busbar.
- . Sealable screwcover (cat. No. F80CV)
- . Insulating shields (cat. No. F80SEP)
- . For the connection of Aluminium cable, use the accessory cat. N° F80ALU (terminal for 10 mm<sup>2</sup> to 50 mm<sup>2</sup> aluminium cables).

#### Signalling auxiliaries:

- . Auxiliary contact (0.5 module, cat. No. F80CA05)
- . Fault signalling contact (0.5 module, cat. No. F80CR05)
- . Auxiliary contact that can be changed into fault signalling contact (0.5 module, cat. No. F80RC05)
- . Auxiliary contact + fault signalling contact that can be changed into 2 auxiliary contacts (1 module, cat. No. F80CR)

#### Control auxiliaries:

- . Shunt trip (1 module, cat. No. F80ST1 / F80ST2)
- . Under voltage release (1 module, cat. No. F80SV1 / F80SV2)
- . Autonomous shunt trip release for N/C push-button (1.5 module, cat. No. F80SVE2)
- . Power Overvoltage Protection (1 module, cat. No. F80SVP)

#### Motor driven control modules:

- . Motor-driven control module (1 module, cat. No. F80MC230)
- . Motor-driven control module with integrated automatic reset (2 modules, cat. No. F80MR24, F80MR230)

#### Automatic resetting:

- . Automatic resetting STOP & Go (cat. No. F80SG, F80SGB, F80SGPN).

#### Possible combinations of RCBO and auxiliaries:

- . Auxiliaries are clipped on the left of the RCBO
- . Maximum number of auxiliaries for one RCBO: 3.
- . Two signalling auxiliaries max. (cat. No. F80CA05, F80CR05, F80RC05, F80CR).
- . Only one control auxiliary (cat. No. F80ST1, F80ST2, F80SV1, F80SV2, F80SVE2, F80SVP).
- . One remote motor driven remote control or one STOP & GO automatic resetting.
- . If signalling and control auxiliaries are associated on the same circuit-breaker, the control auxiliary must be placed to the left of the signalling auxiliary

#### Front external rotary handle

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

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

#### Supply Invertor

- . Manual supply invertor (cat. No. F80KM2, F80KM3, F80KM4)

#### Sealing:

- . Possible in the open or closed positions

#### Locking options:

- . Padlock support (cat. No. F80BL)

### 9. SAFETY

- . For your safety your electrical installation is equipped with residual current protection and this must be tested periodically. In the absence of any national regulations on the time period required for this, Legrand recommends that this test be carried out every month: press the "T" test button, the device should trip. Please call an electrician immediately if this does not happen as the safety level of your installation has been reduced . The presence of residual current protection does not remove the need to observe all the precautions associated with using electrical energy.