Technical advice

Principle of catalogue numbers

iID, iC60, Vigi iC60, Reflex iC60, switches

A9 R 15 2 63

Range
Acti 9 (A9)

Family	Code
iID	R
Vigi iC60	V
iC60	F
Auxiliaries and accessories	A
Switches	S
Reflex iC60	C

Internal code

Poles	Code
0	0
1P	1
2P	2
3P	3
4P	4
1N	5
1P+N	6
3P+N	7

Rating (A)	Code
0	00
0.5	70
0.75	71
1	01
1.6	72
2	02
2.5	73
3	03
4	04
6	06
6.3	76
8	08
10	10
12.5	82
13	13
16	16
20	20
25	25
32	32
40	40
50	50
63	63
80	80
100	91
125	92

Comb busbar and comb busbar accessories

A9 X P H 4 12

Range	Family	Code
Acti 9 (A9)	Comb busbar	X

Type	
Comb busbar	
Fork teeth	F
Pin teeth	P
Auxiliarisable	A
Accessories	
End-piece	E
Tooth cover	T
Connector	C

Type of installation	
Horizontal	H
Double terminals	D
Single terminal	M

Number of poles	
1P	1
2P	2
3P	3
4P	4
4P balanced, with neutral	5
3P balanced for single-poles	6

Dimensioning	
Comb busbar	Number of 18 mm modules (approximately)
Accessories	Number of pieces per cat. no.

Dissipated power, Impedance and Voltage drop

Acti 9 products

The following table indicates the average dissipated power per pole in W for a current equal to the rating of the device and at the operating voltage.

Rating (A)		0.5	1	1.6	2	2.5	3	4	6	6.3	10	12.5	13	16	20	25	32	40	50	63	80	100	125
Circuit breakers																							
iC60		2.3	2.3		1.9		2.2	2.4	1.3		2		2	2.1	2.2	2.7	2.8	3.6	4	5.6			
iC60L-MA				0.7		0.2		0.6		0.9	1.1	1.5		1.6		0.8		2					
			2.3		1.9		2.2	2.4	2.7		1.8			2.5	3	3.1	3.5	3.6	4	5.6			
RCCB																							
iID	2P													0.8		0.9		2.6		2.6	3	5	
	4P															0.7		1.9		1.5	2.6	4.3	
																2.7		3.6		5.6			
Add-on residual current devices																							
Vigi iC60	10 mA															3							
	30 mA															1.4		1.1		2.3			
	100 mA															1.1				2.3			
	300 mA															1.3		0.9		2.3			
	500 mA															1.1		0.9		2.3			
	1000 mA																			2.3			
Contactors																							
iCT/iCT+	Power circuit													0.6	0.9	1.4		1.5		3.4		4	
	Control circuit	See module CA904007																					
Impulse relays																							
iTL/iTL+	Power circuit													0.6			1.5						
	Control circuit	See module CA904008																					
Push-buttons																							
iPB															0.6								
Selector switches																							
iSSW															0.8								
iCMA/iCMB/iCMC/ iCMD/iCMV											0.4												
Switch-disconnectors																							
iSW															0.8		1.3	1.1		1.8		3.4	4.2
iSW-NA	2P																	0.7		1.8		3	5
	4P																	0.6		1.5		2.5	4.1

Indication auxiliaries	
iOF, iSD, iOF/SD+OF	See module CA908028
Déclencheurs auxiliaires	
iMN, iMNs, iMNx, iMX+OF, iMX, iMSU	See module CA908029
Indicator lights	
iIL	0.3

Note: When the enclosure's thermal balance, consider the 4P devices load is only on 3 phases

Impedance calculation:
$Z = P / I^2$
Z: impedance in Ohms
P: dissipated power in Watts (table values)
I: rating in Amperes

Voltage drop calculation:
$U = P / I$
U: voltage drop in Volts
P: dissipated power in Watts (table values)
I: rating in Amperes

Dissipated power, Impedance and Voltage drop (cont.)

Multi 9 products

The following table indicates the average dissipated power per pole in W for a current equal to the rating of the device and at the operating voltage.

Rating (A)	0.5	1	1.6	2	2.5	3	4	6	6.3	10	12.5	13	16	20	25	32	40	50	63	80	100	125
Circuit breakers																						
DPN		2.5		1.9		2.1	2.6	2.7		2.7		3.3	3.2	4.7	4.7	4.6	5.8					
C60/C60H-DC	2.2	2.3		2.6		2.2	2.4	2.7		1.8		2.5	2.5	3	3.1	3.5	4.3	4.8	6.1			
C120										1.3			2.1	2.3	2.5	3.2	3.1	3.2	3	3.2	2	4.1
NG125										1.7			2.4	2.7	2.7	3.8	3.8	4.2	3.8	4.8	4.3	7.9
C60L-MA			2.4		2.5		2.4		3	2	2.5		2.6		3		4.6					
NG125L-MA							3		2	2	3.1		2.5		3.2		4		5.5	6		
RCCB																						
ID Type A/AC															1.4		3.6		4.4	7.2	18	28
ID Type B															1.2		2.9		7.2	12	18	28
Contactors																						
CT/CT+ Power circuit													0.9				1.4					
Control circuit	See module 92020																					
Impulse relays																						
TL/TL+ Power circuit													0.9			1.4						
Control circuit	See module 92011																					
Push-buttons																						
PB														0.6								
Selector switches																						
CM														0.8								
CMA/CMB/CMC/CMD/ CMV										0.4												
Switch-disconnectors																						
I														0.8		1.3	1.1		1.8		3.4	4.2
I-NA																	3.2		3.2			
NG125NA																			5.5	6	7	9

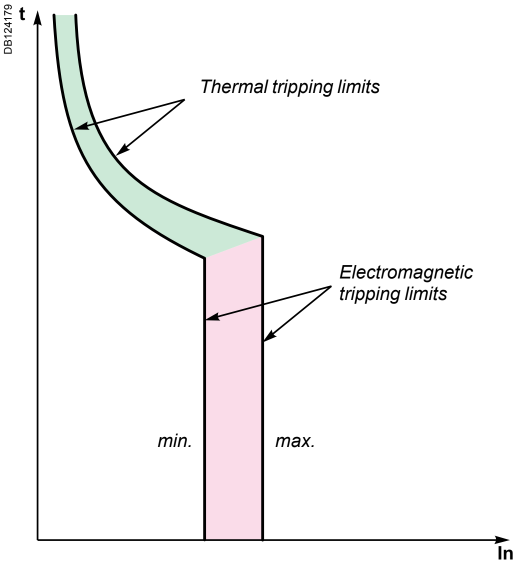
Indication auxiliaries	
OF, SD, OF/SD+OF	See module 92605
Tripping auxiliaries	
MN, MNs, MNx, MX+OF, MX, MSU	See module 92605
Indicator lights	
V	0.3

Note: When the enclosure's thermal balance, consider the 4P devices load is only on 3 phases

Impedance calculation:
$Z = P / I^2$
Z: impedance in Ohms
P: dissipated power in Watts (table values)
I: rating in Amperes

Voltage drop calculation:
$U = P / I$
U: voltage drop in Volts
P: dissipated power in Watts (table values)
I: rating in Amperes

Tripping curves



The following curves show the total fault current breaking time, depending on its amperage. For example: based on the curve on page 3, an iC60 circuit breaker of curve C, 20 A rating, will interrupt a current of 100 A (5 times the rated current In) in:
- 0.45 seconds at least
- 6 seconds at most.

The circuit breakers' tripping curves consist of two parts:
- tripping of overload protection (thermal tripping device): the higher the current, the shorter the tripping time
- tripping of short-circuit protection (magnetic tripping device): if the current exceeds the threshold of this protection device, the breaking time is less than 10 milliseconds.

For short-circuit currents exceeding 20 times the rated current, the time-current curves do not give a sufficiently precise representation. The breaking of high short-circuit currents is characterized by the current limiting curves, in peak current and in energy. The total breaking time can be estimated at 5 times the value of the ratio $(I^2t)/(\hat{I})^2$.

Verification of the discrimination between two circuit breakers

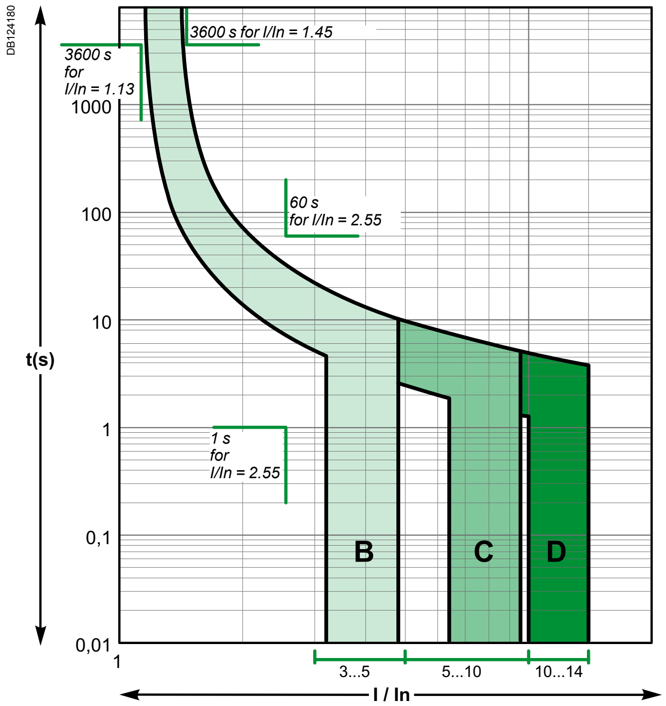
By superimposing the curve of a circuit breaker on that of the circuit breaker installed upstream, one can check whether this combination will be discriminating in cases of overload (discrimination for all current values, up to the magnetic threshold of the upstream circuit breaker). This verification is useful when one of the two circuit breakers has adjustable thresholds; for fixed-threshold devices, this information is provided directly by the discrimination tables.
To check discrimination on short circuit, the energy characteristics of the two devices must be compared.

Tripping curves
According to IEC/EN 60898-1 standards

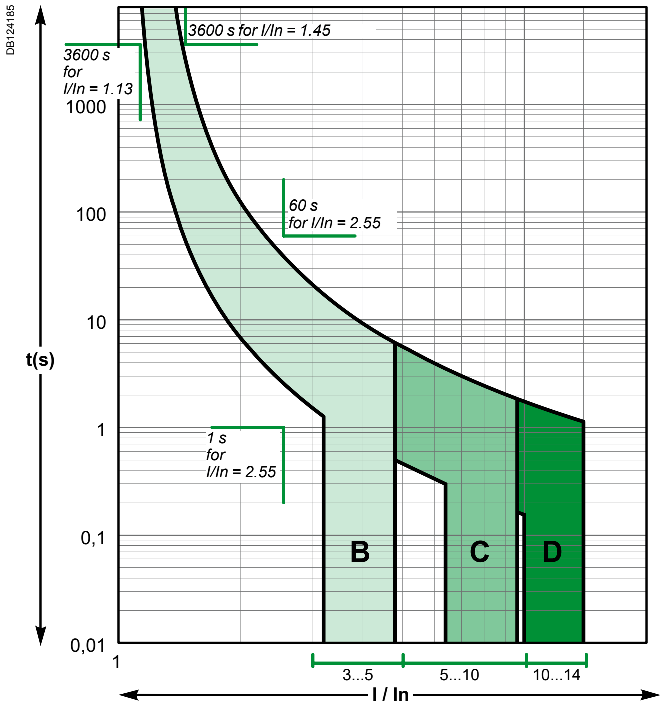
Alternative current 50/60 Hz

iC60
According to IEC/EN 60898-1 (reference temperature 30°C)

Curves B, C, D rating up to 4 A

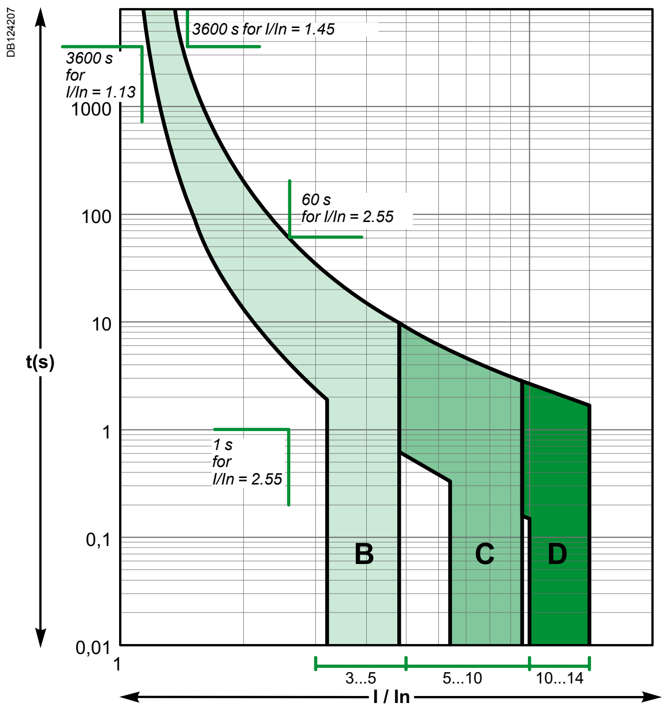


Curves B, C, D rating 6 A to 63 A



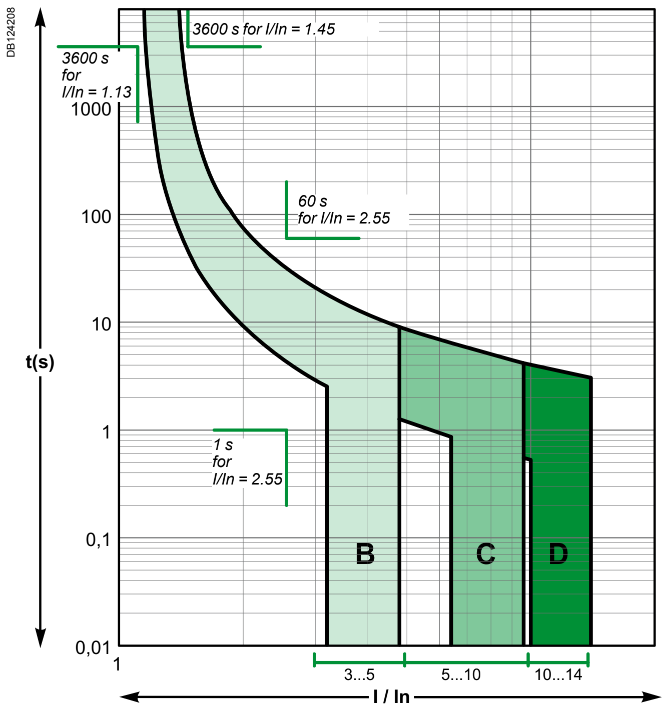
C120N/H
According to IEC/EN 60898-1 (reference temperature 30°C)

Curves B, C, D



DPN, DPN N (circuit-breaker and residual current device)
According to IEC/EN 60898-1 (reference temperature 30°C)

Curves B, C, D



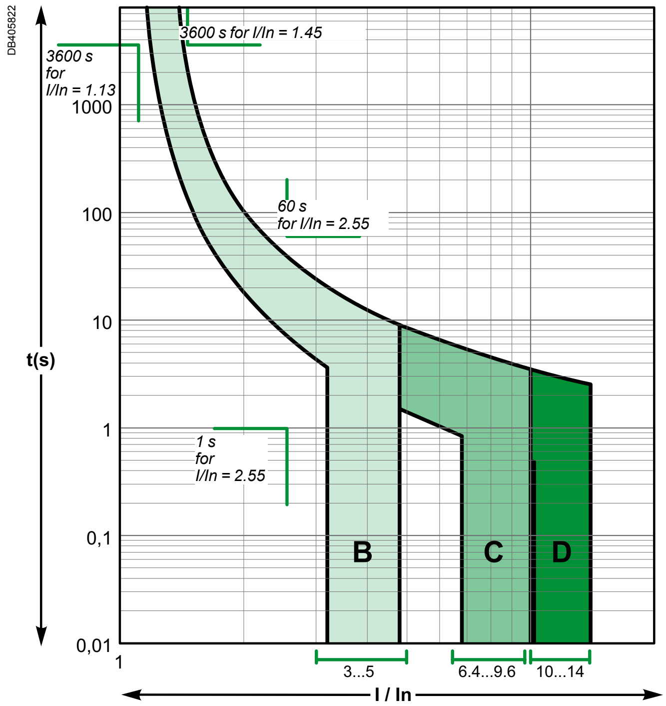
Tripping curves
According to IEC/EN 60898-1 standards

Alternative current 50/60 Hz

C60

According to IEC/EN 60898-1 (reference temperature 30°C)

Curves B, C, D



Tripping curves

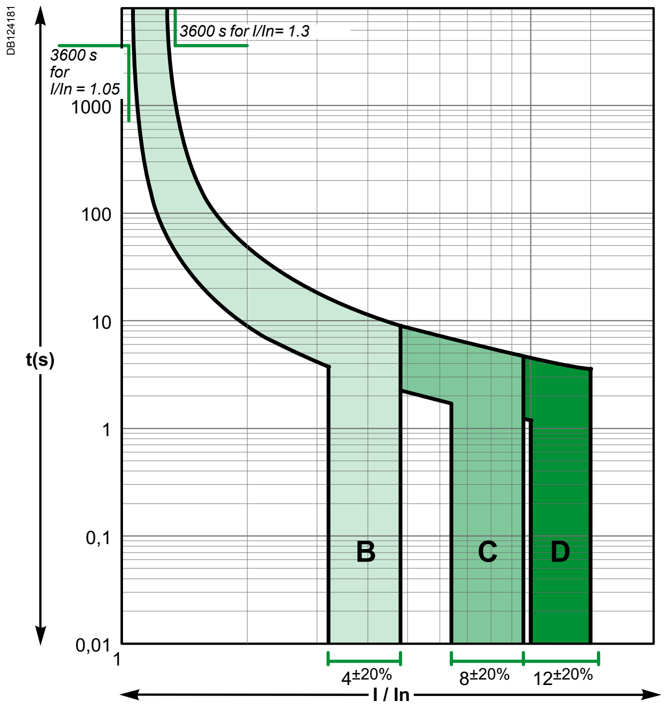
According to IEC/EN 60947-2 standards

Alternative current 50/60 Hz

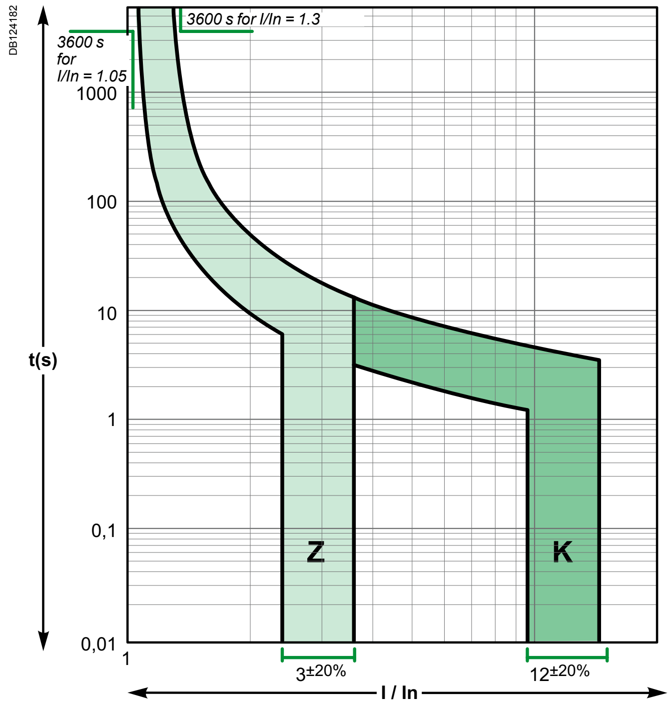
iC60

According to IEC/EN 60947-2 (reference temperature 50°C)

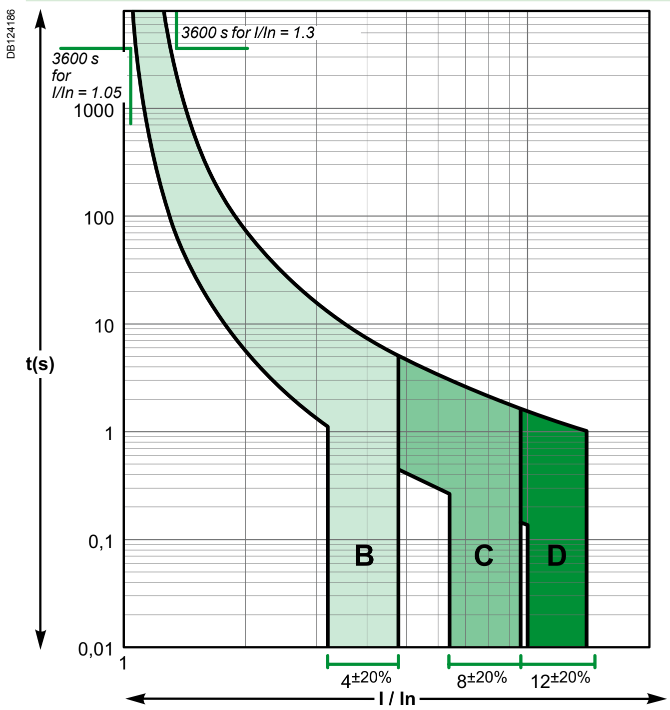
Curves B, C, D rating up to 4 A



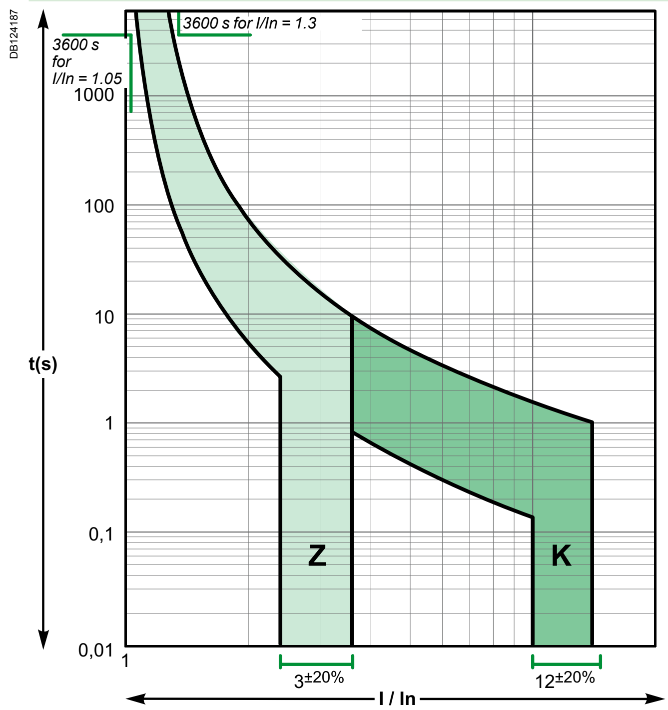
Curves Z, K rating up to 4 A



Curves B, C, D rating 6 A to 63 A



Curves Z, K rating 6 A to 63 A

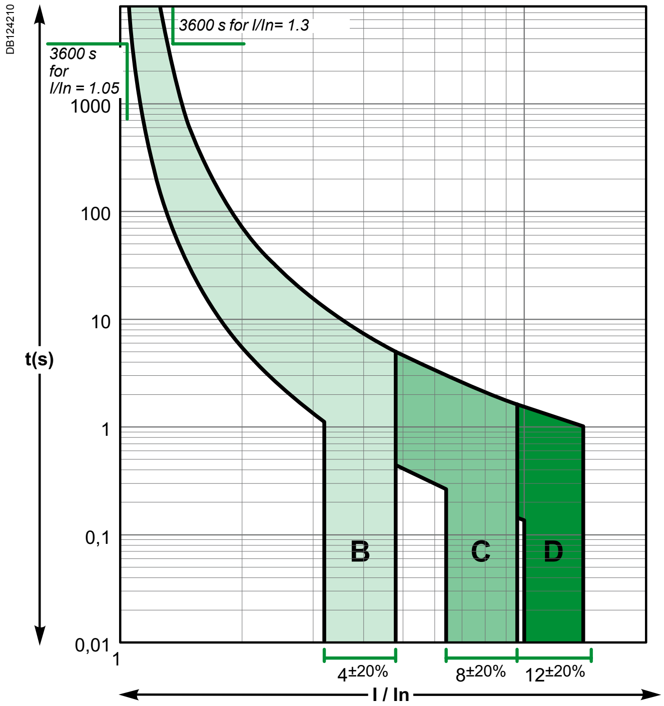


Tripping curves
According to IEC/EN 60947-2 standards

Alternative current 50/60 Hz

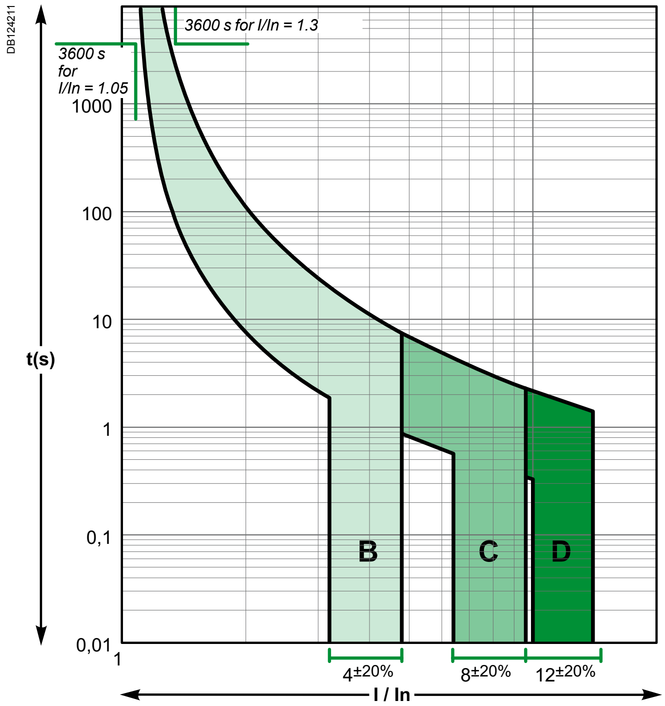
Reflex iC60N/H
According to IEC/EN 60947-2 (reference temperature 50°C)

Curves B, C, D



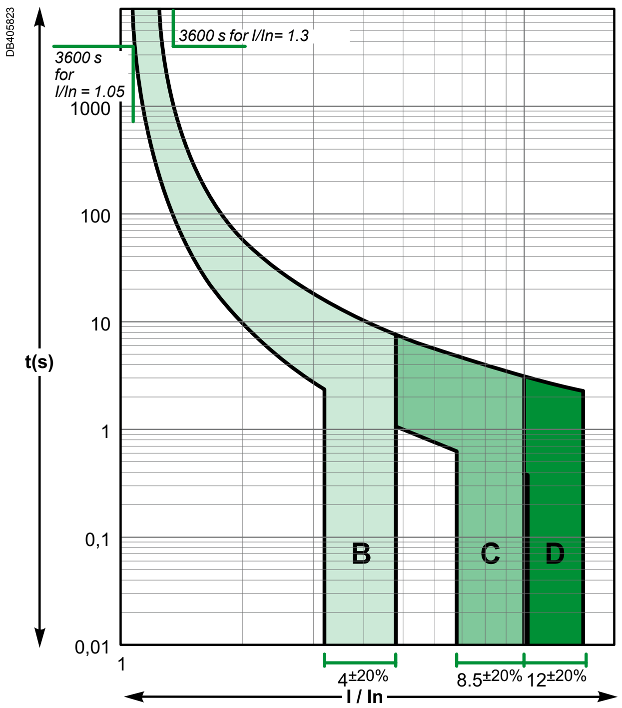
NG125a/N/H/L
According to IEC/EN 60947-2 (reference temperature 40°C)

Curves B, C, D



C60
According to IEC/EN 60947-2 (reference temperature 50°C)

Curves B, C, D



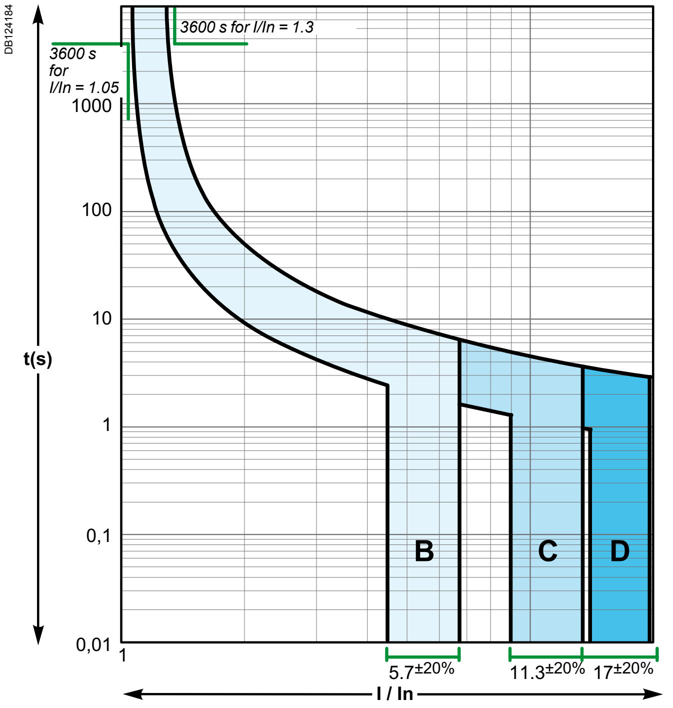
Tripping curves
According to IEC/EN 60947-2 standards

Direct current

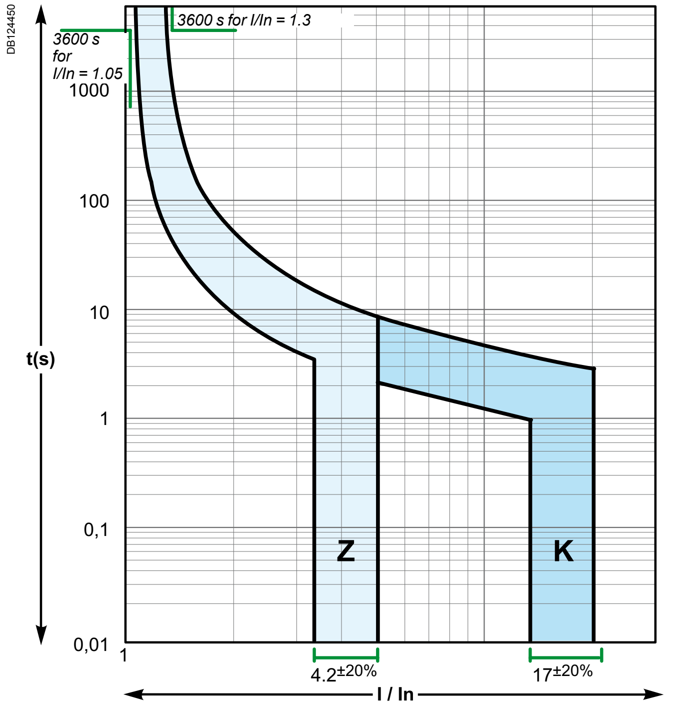
iC60N/H/L

According to IEC/EN 60947-2 (reference temperature 50°C)

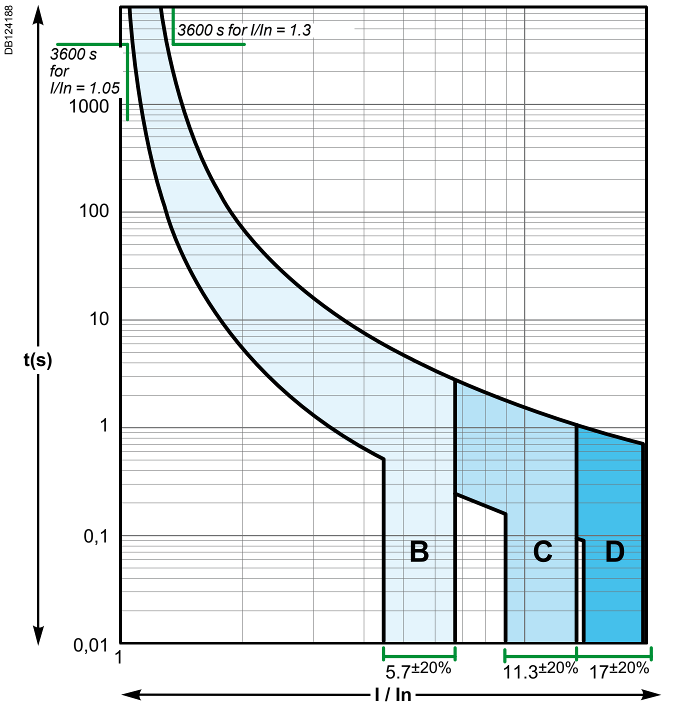
Curves B, C, D rating up to 4 A



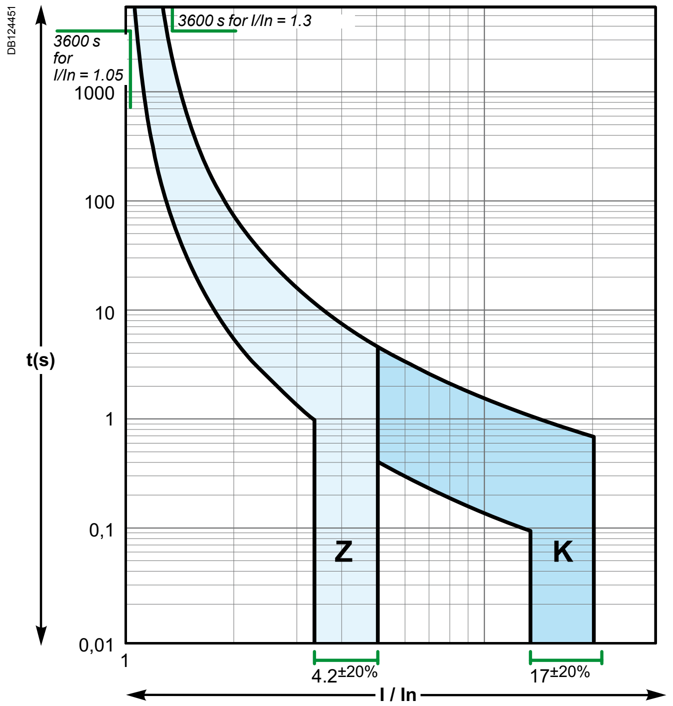
Curves Z, K rating up to 4 A



Curves B, C, D rating 6 A to 63 A



Curves Z, K rating 6 A to 63 A



Tripping curves

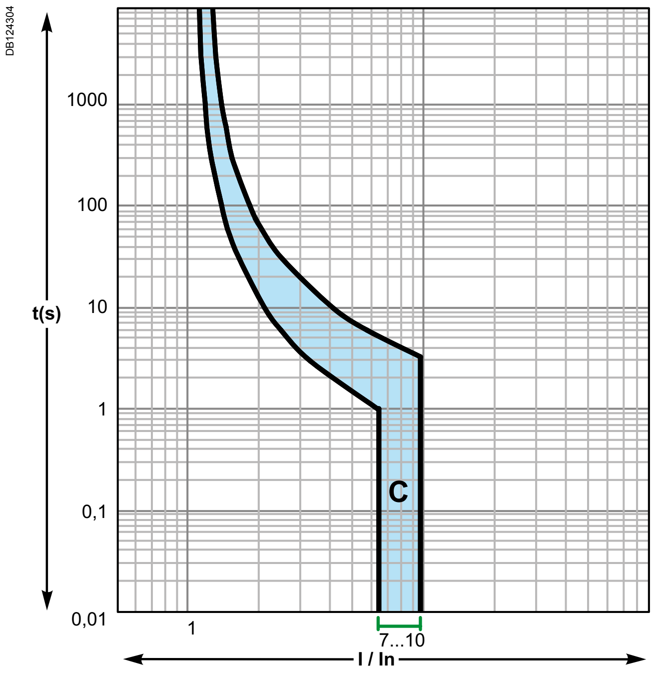
According to IEC/EN 60947-2 standards

Direct current

C60H-DC

According to IEC/EN 60947-2 (reference temperature 25°C)

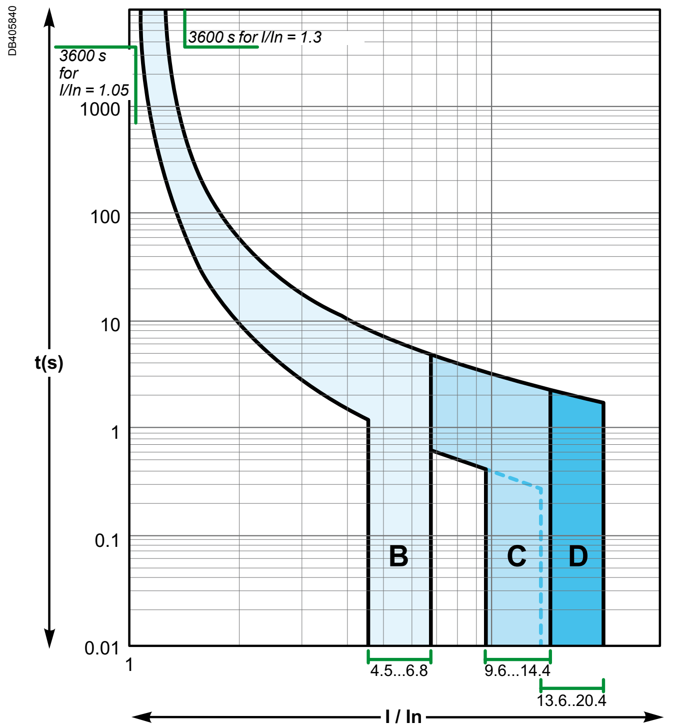
Curve C



C60

According to IEC/EN 60947-2 (reference temperature 50°C)

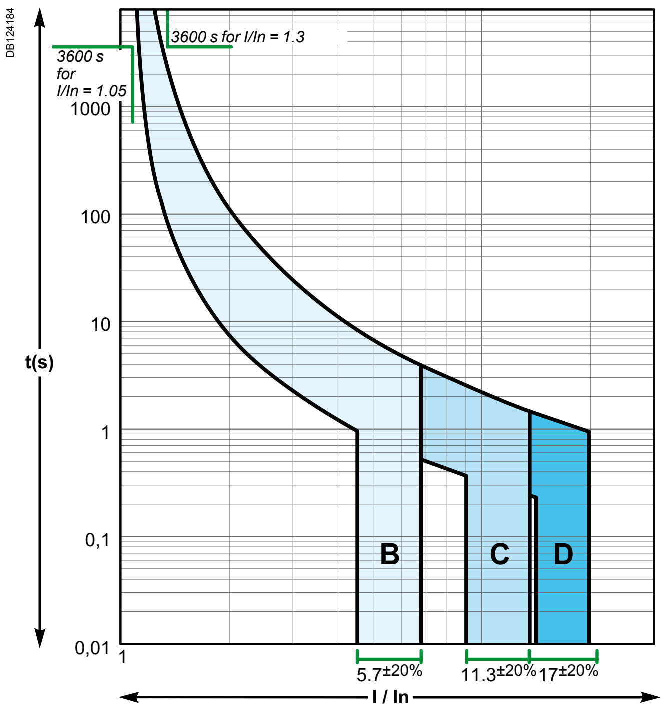
Curves B, C, D



NG125a/N/H/L

According to IEC/EN 60947-2 (reference temperature 40°C)

Curves B, C, D



Influence of ambient temperature

Influence of temperature on the operation

Devices		Characteristics influenced by temperature	Temperature	
			Min.	Max.
DPN, C60H-DC, C60, C120, NG125, C60PV-DC circuit breakers		Tripping on overload	-30°C	+70°C
		Tripping on overload	-25°C	+60°C
iC60N circuit breakers		Tripping on overload	-35°C	+70°C
Circuit breakers	With Vigi (AC)	Tripping on overload	-5°C	+60°C
	With Vigi (A, ***SI***)		-25°C	+60°C
Reflex iC60		Tripping on overload	-25°C	+60°C
C60H RCBO,		Tripping on overload	-15°C	+60°C
C60NA-DC, SW60PV-DC switch-disconnectors		Maximum operating current	-25°C	+70°C
		Maximum operating current	-5°C	+60°C
iID residual current circuit breakers	AC	Maximum operating current	-5°C	+60°C
	A, ***SI***		-25°C	+60°C
Switches	iSW	Maximum operating current	-20°C	+50°C
	iSW-NA		-35°C	+70°C
Protection auxiliaries		None	-35°C	+70°C
RCA, ARA control auxiliaries		None	-25°C	+60°C
iCT contactors		Installation conditions	-5°C	+60°C
iTL impulse relays		None	-20°C	+50°C
iCT, iTL auxiliaries		None	-20°C	+50°C
Distribloc		Maximum operating current	-25°C	+60°C
Multiclip		Maximum operating current	-25°C	+60°C

Note: the temperature considered is the temperature viewed through the device.

Circuit breakers

High temperatures

■ A rise in temperature causes lowering of the thermal threshold (tripping on overload).
■ Protection is still ensured: the tripping threshold remains lower than the current acceptable by the cable (I_z)
■ To prevent nuisance tripping, it should be checked that this threshold remains higher than the maximum operating current (I_B) of the circuit, defined by:
□ the rated load currents,
□ the coefficients of expansion and simultaneity of use.
If the temperature is sufficiently high for the tripping threshold to become lower than the operating current I_B, switchboard ventilation should be provided for.

Low temperatures

■ A fall in temperature increases the thermal tripping threshold of the circuit breaker.
■ There is no risk of nuisance tripping: the threshold remains higher than the maximum operating current of the circuit (I_B) demanded by the loads.
■ It should be checked that the cable remains suitably protected, i.e. that its acceptable current (I_z) is higher than the values shown in the following tables (in amperes).

When the ambient temperature could vary within a broad range, both these aspects must be taken into account:
■ the difference between the maximum operating current of the circuit (I_B) and the tripping threshold of the circuit breaker for the minimum ambient temperature,
■ the difference between the strength of the cable (I_z) and the maximum tripping threshold of the circuit breaker for the maximum ambient temperature.

Influence of ambient temperature (cont.)

Maximum permissible current

■ The maximum current allowed to flow through the device depends on the ambient temperature in which it is placed.
■ The ambient temperature is the temperature inside the enclosure or switchboard in which the devices are installed.
■ The reference temperature is in a halftone colour for the different devices.

■ When several devices operating simultaneously are mounted side by side in a small enclosure, a temperature rise in the enclosure results in a reduction in the operating current. A reduction coefficient of 0.8 will then have to be assigned to the rating (already derated, if applicable, depending on the ambient temperature).

■ Example:
Depending on the ambient temperature and the method of installation, the table below shows how to determine, for an iC60, the operating currents not to be exceeded for ratings 25 A, 32 A and 40 A (reference temperature 50°C).

Operating current not to be exceeded (A)

Installation conditions (IEC 60947-2)		iC60 alone			Several iC60 in the same enclosure (calculate with the reduction coefficient indicated below)		
Ambient temperature (°C)		35°C	50°C	65°C	35°C	50°C	65°C
Type	Nominal rating (A)	Actual rating (A)					
iC60	25	26.35	25	23.57	26.35 x 0.8 = 21	25 x 0.8 = 20	23.57 x 0.8 = 19
	32	34	32	29.9	34 x 0.8 = 27	32 x 0.8 = 25.6	29.9 x 0.8 = 24
	40	42.5	40	37.34	42.5 x 0.8 = 34	40 x 0.8 = 32	37.34 x 0.8 = 30

Influence of ambient temperature (cont.)

IEC 60898-1

C120 derating table (IEC 60898-1)

C120	Ambient temperature (°C)																				
Rating	-30	-25	-20	-15	-10	-5	0	+5	+10	+15	+20	+25	+30	+35	+40	+45	+50	+55	+60	+65	+70
10 A	12.9	12.7	12.5	12.2	12	11.8	11.5	11.3	11	10.8	10.5	10.3	**10**	9.7	9.4	9.1	8.8	8.5	8.2	7.9	7.5
16 A	19.4	19.1	18.8	18.6	18.3	18	17.8	17.5	17.2	16.9	16.6	16.3	**16**	15.7	15.4	15.1	14.7	14.4	14	13.7	13.3
20 A	24.6	24.2	23.9	23.5	23.2	22.8	22.4	22	21.6	21.2	20.8	20.4	**20**	19.6	19.1	18.7	18.2	17.7	17.3	16.8	16.2
25 A	30.9	30.5	30	29.5	29.1	28.6	28.1	27.6	27.1	26.6	26.1	25.5	**25**	24.4	23.9	23.3	22.7	22.1	21.5	20.8	20.1
32 A	38.9	38.4	37.9	37.3	36.8	36.2	35.6	35	34.5	33.9	33.3	32.6	**32**	31.4	30.7	30	29.3	28.6	27.9	27.2	26.4
40 A	49.8	49.1	48.3	47.6	46.8	46	45.2	44.4	43.5	42.7	41.8	40.9	**40**	39.1	38.1	37.1	36.1	35.1	34.1	33	31.8
50 A	62.2	61.3	60.4	59.4	58.4	57.5	56.5	55.4	54.4	53.3	52.2	51.1	**50**	48.8	47.7	46.4	45.2	43.9	42.6	41.2	39.8
63 A	78.6	77.5	76.3	75	73.8	72.5	71.3	69.9	68.6	67.3	65.9	64.5	**63**	61.5	60	58.4	56.8	55.2	53.5	51.7	49.9
80 A	98.4	97	95.6	94.2	92.7	91.2	89.7	88.1	86.6	85	83.4	81.7	**80**	78.3	76.5	74.7	72.8	70.9	69	67	64.9
100 A	124.5	122.6	120.7	118.8	116.9	114.9	112.9	110.9	108.8	106.6	104.5	102.3	**100**	97.7	95.3	92.9	90.4	87.8	85.2	82.5	79.6
125 A	157	154.6	152.2	149.7	147.1	144.6	141.9	139.2	136.5	133.7	130.9	128	**125**	122	118.8	115.6	112.3	108.9	105.4	101.8	98

Influence of ambient temperature (cont.)

Tertiary/Industry (IEC 60947-2)

DPN derating table (IEC 60947-2)

DPN		Ambient temperature (°C)																				
Rating	Curve	-30	-25	-20	-15	-10	-5	0	+5	+10	+15	+20	+25	+30	+35	+40	+45	+50	+55	+60	+65	+70
1 A	B, C, D	1.69	1.66	1.62	1.59	1.55	1.51	1.47	1.43	1.39	1.35	1.3	1.26	1.21	1.16	1.11	1.06	**1**	0.94	0.88	0.81	0.73
2 A	B, C, D	2.68	2.64	2.6	2.56	2.52	2.48	2.44	2.4	2.36	2.32	2.28	2.23	2.19	2.14	2.1	2.05	**2**	1.95	1.9	1.85	1.79
3 A	B, C, D	4.03	3.97	3.91	3.86	3.8	3.74	3.68	3.61	3.55	3.49	3.42	3.36	3.29	3.22	3.15	3.07	**3**	2.92	2.85	2.77	2.68
4 A	B, C, D	5.26	5.19	5.12	5.05	4.98	4.9	4.83	4.75	4.67	4.6	4.52	4.43	4.35	4.27	4.18	4.09	**4**	3.91	3.81	3.72	3.62
6 A	B, C, D	7.51	7.42	7.34	7.25	7.16	7.07	6.98	6.89	6.8	6.7	6.61	6.51	6.41	6.31	6.21	6.11	**6**	5.89	5.78	5.67	5.56
10 A	B	12.5	12.3	12.2	12.1	11.9	11.8	11.6	11.5	11.3	11.2	11	10.8	10.7	10.5	10.3	10.2	**10**	9.8	9.7	9.5	9.3
10 A	C, D	13	12.9	12.7	12.5	12.3	12.2	12	11.8	11.6	11.4	11.2	11	10.8	10.6	10.4	10.2	**10**	9.8	9.6	9.3	9.1
13 A	B	17	16.7	16.5	16.3	16.1	15.8	15.6	15.4	15.1	14.9	14.6	14.4	14.1	13.8	13.6	13.3	**13**	12.7	12.4	12.1	11.8
13 A	C, D	17.2	16.9	16.7	16.5	16.2	16	15.7	15.5	15.2	15	14.7	14.4	14.2	13.9	13.6	13.3	**13**	12.7	12.4	12.1	11.7
16 A	B, C	20.6	20.4	20.1	19.8	19.6	19.3	19	18.7	18.5	18.2	17.9	17.6	17.3	17	16.7	16.3	**16**	15.7	15.3	15	14.6
16 A	D	20.8	20.5	20.2	20	19.7	19.4	19.1	18.8	18.5	18.2	17.9	17.6	17.3	17	16.7	16.3	**16**	15.7	15.3	14.9	14.6
20 A	B	25.7	25.3	25	24.7	24.4	24	23.7	23.4	23	22.7	22.3	21.9	21.6	21.2	20.8	20.4	**20**	19.6	19.2	18.8	18.3
20 A	C, D	26	25.7	25.3	25	24.6	24.3	23.9	23.6	23.2	22.8	22.4	22	21.7	21.3	20.8	20.4	**20**	19.6	19.1	18.7	18.2
25 A	B, C, D	32	31.6	31.2	30.8	30.4	30	29.6	29.2	28.7	28.3	27.8	27.4	26.9	26.5	26	25.5	**25**	24.5	24	23.5	22.9
32 A	B, C, D	41.6	41.1	40.5	40	39.4	38.9	38.3	37.7	37.1	36.5	35.9	35.3	34.7	34	33.4	32.7	**32**	31.3	30.6	29.9	29.1
40 A	B, C, D	52.7	52	51.3	50.6	49.8	49.1	48.3	47.6	46.8	46	45.2	44.4	43.5	42.7	41.8	40.9	**40**	39.1	38.1	37.1	36.1

iC60, Reflex iC60 derating table (IEC 60947-2)

iC60	Ambient temperature (°C)																					
Rating	-35	-30	-25	-20	-15	-10	-5	0	+5	+10	+15	+20	+25	+30	+35	+40	+45	+50	+55	+60	+65	+70
0.5 A	0.66	0.65	0.64	0.63	0.63	0.62	0.61	0.6	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51	**0.5**	0.49	0.48	0.47	0.45
1 A	1.32	1.3	1.28	1.27	1.25	1.23	1.21	1.2	1.18	1.16	1.14	1.12	1.1	1.08	1.06	1.04	1.02	**1**	0.98	0.96	0.93	0.91
2 A	2.79	2.75	2.71	2.67	2.63	2.58	2.54	2.5	2.45	2.4	2.36	2.31	2.26	2.21	2.16	2.11	2.05	**2**	1.94	1.89	1.83	1.76
3 A	4.21	4.15	4.08	4.02	3.96	3.89	3.83	3.76	3.69	3.62	3.55	3.48	3.4	3.32	3.25	3.17	3.08	**3**	2.91	2.82	2.73	2.64
4 A	5.62	5.54	5.46	5.37	5.29	5.2	5.11	5.02	4.93	4.83	4.74	4.64	4.54	4.44	4.33	4.22	4.11	**4**	3.88	3.76	3.64	3.51
6 A	8.55	8.42	8.29	8.16	8.03	7.89	7.75	7.61	7.46	7.31	7.16	7.01	6.85	6.69	6.52	6.35	6.18	**6**	5.81	5.62	5.43	5.22
10 A	13.3	13.2	13	12.8	12.6	12.5	12.3	12.1	11.9	11.7	11.5	11.3	11.1	10.9	10.7	10.5	10.2	**10**	9.8	9.5	9.3	9
13 A	17.1	16.9	16.7	16.4	16.2	16	15.8	15.5	15.3	15.1	14.8	14.6	14.3	14.1	13.8	13.6	13.3	**13**	12.7	12.4	12.1	11.8
16 A	21.1	20.8	20.6	20.3	20	19.7	19.5	19.2	18.9	18.6	18.3	18	17.7	17.3	17	16.7	16.3	**16**	15.7	15.3	14.9	14.5
20 A	26	25.7	25.4	25	24.7	24.4	24.1	23.7	23.4	23	22.7	22.3	21.9	21.6	21.2	20.8	20.4	**20**	19.6	19.2	18.7	18.3
25 A	31.9	31.6	31.2	30.8	30.4	30.1	29.7	29.3	28.9	28.5	28.1	27.6	27.2	26.8	26.4	25.9	25.5	**25**	24.5	24.1	23.6	23.1
32 A	42	41.5	41	40.5	39.9	39.4	38.8	38.2	37.7	37.1	36.5	35.9	35.3	34.6	34	33.3	32.7	**32**	31.3	30.6	29.9	29.1
40 A	52.6	51.9	51.3	50.6	49.9	49.2	48.5	47.8	47.1	46.4	45.6	44.9	44.1	43.3	42.5	41.7	40.9	**40**	39.1	38.2	37.3	36.4
50 A	67.1	66.3	65.4	64.5	63.5	62.6	61.6	60.7	59.7	58.7	57.7	56.7	55.6	54.5	53.4	52.3	51.2	**50**	48.8	47.6	46.3	45
63 A	86.3	85.1	83.9	82.7	81.4	80.1	78.9	77.6	76.2	74.9	73.5	72.1	70.7	69.2	67.7	66.2	64.6	**63**	61.4	59.7	57.9	56.1

Reflex iC60

C60 derating table (IEC 60947-2)

C60	Ambient temperature (°C)																				
Rating	-30	-25	-20	-15	-10	-5	0	+5	+10	+15	+20	+25	+30	+35	+40	+45	+50	+55	+60	+65	+70
0.5 A	0.68	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.6	0.59	0.58	0.56	0.55	0.54	0.53	0.51	**0.5**	0.49	0.47	0.46	0.44
0.75 A	0.93	0.92	0.91	0.9	0.89	0.88	0.87	0.86	0.85	0.83	0.82	0.81	0.8	0.79	0.78	0.76	**0.75**	0.74	0.72	0.7	0.68
1 A	1.31	1.3	1.28	1.27	1.25	1.23	1.21	1.19	1.17	1.15	1.13	1.11	1.09	1.07	1.05	1.02	**1**	0.98	0.95	0.93	0.91
2 A	2.55	2.59	2.56	2.52	2.49	2.45	2.41	2.37	2.34	2.3	2.26	2.22	2.17	2.13	2.09	2.04	**2**	1.95	1.91	1.88	1.84
3 A	3.81	4.04	3.98	3.92	3.85	3.79	3.73	3.66	3.59	3.52	3.45	3.38	3.31	3.23	3.16	3.08	**3**	2.92	2.83	2.82	2.76
4 A	4.9	4.86	4.81	4.76	4.7	4.65	4.59	4.54	4.48	4.42	4.37	4.31	4.25	4.19	4.13	4.06	**4**	3.94	3.87	3.81	3.74
6 A	7.93	7.82	7.71	7.6	7.49	7.38	7.27	7.15	7.03	6.91	6.79	6.66	6.54	6.41	6.27	6.14	**6**	5.86	5.71	5.56	5.42
8 A	10.37	10.23	10.09	9.96	9.82	9.68	9.54	9.4	9.25	9.11	8.96	8.81	8.65	8.49	8.33	8.17	**8**	7.83	7.65	7.47	7.31
10 A	13.3	13.2	13	12.8	12.6	12.4	12.2	12	11.8	11.6	11.4	11.2	10.9	10.7	10.5	10.2	**10**	9.8	9.5	9.2	9
13 A	17	16.9	16.6	16.4	16.2	15.9	15.7	15.4	15.2	14.9	14.7	14.4	14.1	13.9	13.6	13.3	**13**	12.7	12.4	12.1	11.8
16 A	20	19.8	19.5	19.3	19.1	18.8	18.6	18.4	18.1	17.9	17.6	17.3	17.1	16.8	16.6	16.3	**16**	15.7	15.4	15.1	14.8
20 A	26.9	26.6	26.2	25.8	25.4	25	24.6	24.2	23.7	23.3	22.9	22.4	22	21.5	21	20.5	**20**	19.5	18.9	18.4	17.9
25 A	32.9	32.5	32.1	31.6	31.1	30.7	30.2	29.7	29.2	28.7	28.2	27.7	27.2	26.7	26.1	25.6	**25**	24.4	23.8	23.2	22.6
32 A	41.5	41.1	40.5	40	39.4	38.9	38.3	37.7	37.1	36.5	35.9	35.3	34.7	34	33.4	32.7	**32**	31.3	30.6	29.9	29.1
40 A	53.7	52.9	52.2	51.4	50.6	49.8	49	48.2	47.3	46.5	45.6	44.7	43.8	42.9	42	41	**40**	39	37.9	36.9	35.8
45 A	60.8	60.1	59.2	58.3	57.4	56.5	55.5	54.6	53.6	52.6	51.6	50.5	49.5	48.4	47.3	46.2	**45**	43.8	42.6	41.4	40.1
50 A	65	64.3	63.5	62.6	61.7	60.8	59.9	59	58.1	57.1	56.2	55.2	54.2	53.2	52.1	51.1	**50**	48.9	47.8	46.7	45.5
63 A	85.5	84.6	83.3	82	80.7	79.4	78	76.7	75.3	73.9	72.4	70.9	69.4	67.9	66.3	64.7	**63**	61.3	59.5	57.8	56

Influence of ambient temperature (cont.)

Tertiary/Industry (IEC 60947-2) (cont.)

C60H-DC derating table (IEC 60947-2)

C60H-DC	Ambient temperature (°C)																				
Rating	-30	-25	-20	-15	-10	-5	0	+5	+10	+15	+20	+25	+30	+35	+40	+45	+50	+55	+60	+65	+70
0.5 A	0.63	0.62	0.61	0.6	0.59	0.58	0.56	0.55	0.54	0.53	0.51	0.5	0.49	0.47	0.46	0.44	0.43	0.41	0.39	0.38	0.36
1 A	1.18	1.17	1.15	1.14	1.12	1.1	1.09	1.07	1.05	1.04	1.02	1	0.98	0.96	0.94	0.92	0.9	0.88	0.86	0.84	0.82
2 A	2.54	2.5	2.45	2.41	2.36	2.31	2.26	2.21	2.16	2.11	2.06	2	1.94	1.88	1.82	1.76	1.7	1.63	1.56	1.48	1.41
3 A	3.78	3.71	3.65	3.58	3.51	3.45	3.38	3.3	3.23	3.16	3.08	3	2.92	2.84	2.75	2.66	2.57	2.48	2.38	2.27	2.17
4 A	5.08	4.99	4.9	4.81	4.71	4.62	4.52	4.42	4.32	4.22	4.11	4	3.89	3.77	3.65	3.53	3.4	3.27	3.13	2.98	2.83
5 A	6	5.92	5.83	5.74	5.66	5.57	5.48	5.39	5.29	5.2	5.1	5	4.9	4.8	4.69	4.58	4.47	4.36	4.24	4.12	4
6 A	7.26	7.15	7.04	6.94	6.83	6.71	6.6	6.48	6.37	6.25	6.12	6	5.87	5.74	5.61	5.47	5.33	5.19	5.04	4.89	4.73
10 A	12.6	12.4	12.2	11.9	11.7	11.5	11.3	11	10.8	10.5	10.3	10	9.7	9.5	9.2	8.9	8.6	8.3	7.9	7.6	7.2
13 A	15.5	15.3	15.1	14.9	14.6	14.4	14.2	14	13.7	13.5	13.3	13	12.8	12.5	12.2	12	11.7	11.4	11.1	10.8	10.5
15 A	18.6	18.3	18	17.7	17.4	17.1	16.7	16.4	16.1	15.7	15.4	15	14.6	14.3	13.9	13.5	13	12.6	12.2	11.7	11.2
16 A	19.4	19.1	18.9	18.6	18.3	18	17.6	17.3	17	16.7	16.3	16	15.7	15.3	14.9	14.6	14.2	13.8	13.4	13	12.5
20 A	24.1	23.7	23.4	23	22.7	22.3	21.9	21.6	21.2	20.8	20.4	20	19.6	19.2	18.7	18.3	17.9	17.4	16.9	16.4	15.9
25 A	30.4	29.9	29.5	29	28.5	28.1	27.6	27.1	26.6	26.1	25.5	25	24.5	23.9	23.3	22.7	22.1	21.5	20.9	20.2	19.6
30 A	37.4	36.7	36.1	35.5	34.9	34.2	33.5	32.9	32.2	31.5	30.7	30	29.2	28.5	27.7	26.8	26	25.1	24.2	23.2	22.3
32 A	38.5	37.9	37.4	36.8	36.2	35.7	35.1	34.5	33.9	33.3	32.6	32	31.4	30.7	30	29.3	28.6	27.9	27.1	26.3	25.5
40 A	48.9	48.2	47.4	46.7	45.9	45.1	44.3	43.5	42.6	41.8	40.9	40	39.1	38.2	37.2	36.2	35.2	34.2	33.1	32	30.8
50 A	59.9	59.1	58.3	57.4	56.5	55.6	54.7	53.8	52.9	52	51	50	49	48	46.9	45.9	44.8	43.6	42.5	41.3	40.1
63 A	78.2	76.9	75.6	74.3	73	71.7	70.3	68.9	67.5	66	64.5	63	61.4	59.8	58.2	56.5	54.7	52.9	51.1	49.1	47.1

C60PV-DC derating table (IEC 60947-2)

C60PV-DC	Ambient temperature (°C)																				
Rating	-30	-25	-20	-15	-10	-5	0	+5	+10	+15	+20	+25	+30	+35	+40	+45	+50	+55	+60	+65	+70
1 A	1.18	1.17	1.15	1.14	1.12	1.1	1.09	1.07	1.05	1.04	1.02	1	0.98	0.96	0.94	0.92	0.9	0.88	0.86	0.84	0.82
2 A	2.54	2.5	2.45	2.41	2.36	2.31	2.26	2.21	2.16	2.11	2.06	2	1.94	1.88	1.82	1.76	1.7	1.63	1.56	1.48	1.41
3 A	3.78	3.71	3.65	3.58	3.51	3.45	3.38	3.3	3.23	3.16	3.08	3	2.92	2.84	2.75	2.66	2.57	2.48	2.38	2.27	2.17
5 A	6	5.92	5.83	5.74	5.66	5.57	5.48	5.39	5.29	5.2	5.1	5	4.9	4.8	4.69	4.58	4.47	4.36	4.24	4.12	4
8 A	9.64	9.5	9.36	9.22	9.08	8.93	8.78	8.63	8.48	8.32	8.16	8	7.83	7.67	7.49	7.31	7.13	6.95	6.76	6.56	6.36
10 A	12.6	12.4	12.2	11.9	11.7	11.5	11.2	11	11.8	10.5	10.3	10	9.7	9.4	9.2	9.9	8.6	8.2	7.9	7.6	7.2
13 A	15.5	15.3	15.1	14.8	14.6	14.4	14.2	14	13.7	13.5	13.2	13	12.7	12.5	12.2	12	11.7	11.4	11.1	10.8	10.5
15 A	18.6	18.3	18	17.7	17.4	17.1	16.7	16.4	16.1	16.7	15.4	15	14.6	14.3	13.9	13.5	13	12.6	12.2	11.7	11.2
16 A	19.4	19.1	18.9	18.6	18.3	18	17.6	17.3	17	16.7	16.3	16	15.7	15.3	14.9	14.6	14.2	13.8	13.4	13	12.5
20 A	24.1	23.7	23.4	23	22.7	22.3	21.9	21.6	21.2	20.8	20.4	20	19.6	19.2	18.7	18.3	17.9	17.4	16.9	16.4	15.9
25 A	30.4	29.9	29.5	29	28.5	28.1	27.6	27.1	26.6	26.1	25.5	25	24.5	23.9	23.3	22.7	22.1	21.5	20.9	20.2	19.6
30 A	37.4	36.7	36.1	35.5	34.9	34.2	33.5	32.9	32.2	31.5	30.7	30	29.2	28.5	27.7	26.8	26	25.1	24.2	23.2	22.3

C120 derating table (IEC 60947-2)

C120	Ambient temperature (°C)																				
Rating	-30	-25	-20	-15	-10	-5	0	+5	+10	+15	+20	+25	+30	+35	+40	+45	+50	+55	+60	+65	+70
10 A	14.5	14.3	14	13.8	13.5	13.3	13	12.7	12.5	12.2	11.9	11.6	11.3	11	10.7	10.3	10	9.7	9.3	8.9	8.5
16 A	21.2	21	20.7	20.4	20.1	19.8	19.4	19.1	18.8	18.5	18.2	17.8	17.5	17.1	16.8	16.4	16	15.6	15.2	14.8	14.4
20 A	27	26.6	26.3	25.9	25.5	25	24.6	24.2	23.8	23.3	22.9	22.4	22	21.5	21	20.5	20	19.5	18.9	18.4	17.8
25 A	33.7	33.3	32.8	32.3	31.8	31.3	30.8	30.2	29.7	29.1	28.6	28	27.5	26.9	26.3	25.6	25	24.4	23.7	23	22.3
32 A	42.7	42.1	41.5	40.9	40.3	39.7	39	38.4	37.7	37.1	36.4	35.7	35	34.3	33.5	32.8	32	31.2	30.4	29.6	28.7
40 A	54.8	54	53.2	52.4	51.5	50.7	49.8	48.9	48	47.1	46.1	45.2	44.2	43.2	42.1	41.1	40	38.9	37.7	36.6	35.3
50 A	69.1	68.1	67	65.9	64.8	63.7	62.6	61.5	60.3	59.1	57.9	56.7	55.4	54.1	52.8	51.4	50	48.6	47.1	45.5	43.9
63 A	87.1	85.8	84.5	83.1	81.8	80.4	78.9	77.5	76	74.5	73	71.4	69.8	68.2	66.5	64.8	63	61.2	59.3	57.4	55.4
80 A	103.7	102.4	101	99.7	98.3	96.9	95.5	94.1	92.6	91.1	89.6	88.1	86.5	84.9	83.3	81.7	80	78.3	76.5	74.7	72.9
100 A	137.6	135.5	133.5	131.4	129.2	127.1	124.8	122.6	120.3	118	115.6	113.1	110.6	108.1	105.5	102.8	100	97.2	94.2	91.2	88.1
125 A	174.6	171.9	169.2	166.4	163.6	160.7	157.8	154.9	151.8	148.7	145.6	142.4	139.1	135.7	132.2	128.7	125	121.2	117.3	113.3	109.1

Influence of ambient temperature (cont.)

Tertiary/Industry (IEC 60947-2) (cont.)

NG125 derating table (IEC 60947-2)

NG125	Ambient temperature (°C)																				
Rating	-30	-25	-20	-15	-10	-5	0	+5	+10	+15	+20	+25	+30	+35	+40	+45	+50	+55	+60	+65	+70
10 A	13.7	13.5	13.2	13	12.8	12.5	12.3	12	11.7	11.5	11.2	10.9	10.6	10.3	**10**	9.7	9.4	9	8.7	8.3	7.9
16 A	20.3	20.1	19.8	19.5	19.2	18.9	18.6	18.3	18	17.7	17.4	17	16.7	16.4	**16**	15.7	15.3	14.9	14.5	14.1	13.7
20 A	26	25.6	25.3	24.9	24.5	24	23.6	23.2	22.8	22.3	21.9	21.4	21	20.5	**20**	19.5	19	18.5	17.9	17.4	16.8
25 A	33.8	33.2	32.7	32.1	31.5	30.9	30.3	29.7	29.1	28.4	27.8	27.1	26.4	25.7	**25**	24.3	23.5	22.7	21.9	21	20.1
32 A	41.2	40.6	40	39.4	38.8	38.2	37.5	36.9	36.2	35.6	34.9	34.2	33.5	32.7	**32**	31.2	30.5	29.7	28.8	28	27.1
40 A	53.5	52.7	51.8	51	50.1	49.1	48.2	47.3	46.3	45.3	44.3	43.3	42.2	41.1	**40**	38.9	37.7	36.5	35.2	33.9	32.5
50 A	66.3	65.2	64.2	63.1	62.1	61	59.8	58.7	57.5	56.4	55.1	53.9	52.6	51.3	**50**	48.6	47.2	45.8	44.3	42.7	41.1
63 A	83.4	82.1	80.8	79.5	78.1	76.8	75.4	73.9	72.5	71	69.5	67.9	66.3	64.7	**63**	61.3	59.5	57.7	55.8	53.9	51.8
80 A	100.4	99.1	97.8	96.4	95	93.6	92.2	90.8	89.3	87.8	86.3	84.8	83.2	81.6	**80**	78.3	76.6	74.9	73.1	71.3	69.4
100 A	133.4	131.3	129.1	127	124.8	122.5	120.2	117.9	115.5	113.1	110.6	108	105.4	102.7	**100**	97.2	94.3	91.3	88.2	85	81.6
125 A	165.2	162.7	160.1	157.5	154.8	152.1	149.3	146.5	143.6	140.7	137.7	134.6	131.5	128.3	**125**	121.6	118.1	114.6	110.9	107	103.1

Tertiary/Industry (IEC 60947-3)

SW60-DC derating table (IEC 60947-3)

SW60PV-DC	Ambient temperature (°C)											
Rating	+5	+10	+15	+20	+25	+30	+35	+40	+45	+50	+60	+70
50 A	63	61	60	58	56	54	52	**50**	48	46	41	35

C60H RCBO derating table (IEC 61009-1)

C60H RCBO	Ambient temperature (°C)															
Rating	-15	-10	-5	0	+5	+10	+15	+20	+25	+30	+35	+40	+45	+50	+55	+60
6 A	8.3	8.15	7.99	7.83	7.67	7.50	7.33	7.16	6.98	6.79	6.6	6.41	6.21	**6**	5.78	5.56
10 A	12.9	12.7	12.5	12.3	12.1	11.9	11.6	11.4	11.2	11	10.7	10.5	10.3	**10**	9.7	9.5
16 A	20.9	20.6	20.3	19.9	19.6	19.2	18.8	18.4	18.1	17.7	17.3	16.9	16.4	**16**	15.6	15.1
20 A	26.3	25.9	25.4	25	24.5	24.1	23.6	23.1	22.6	22.1	21.6	21.1	20.6	**20**	19.4	18.8
25 A	31.5	31	30.6	30.1	29.6	29.2	28.7	28.2	27.7	27.2	26.6	26.1	25.6	**25**	24.4	23.8
32 A	39.2	38.7	38.2	37.7	37.2	36.6	36.1	35.5	35	34.4	33.8	33.2	32.6	**32**	31.4	30.7
40 A	50.2	49.5	48.8	48	47.3	46.5	45.8	45	44.2	43.4	42.6	41.7	40.9	**40**	39.1	38.2
45 A	55.5	54.7	54	53.2	52.5	51.7	50.9	50.1	49.3	48.5	47.6	46.8	45.9	**45**	41.9	41

Influence of ambient temperature (cont.)

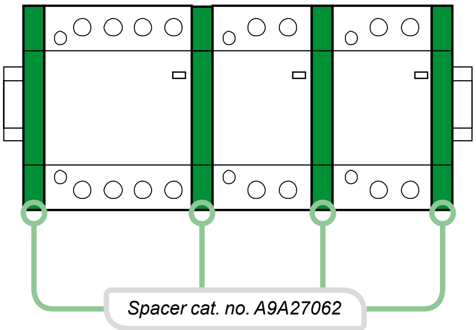
Switches

■ In all cases, the switches are correctly protected against overloads by a circuit breaker with a lower or equal rating, operating at the same ambient temperature.

iCT contactors

In the case of contactor mounting in an enclosure for which the interior temperature is in a range between 50°C and 60°C, it is necessary to use a spacer, cat. no. A9A27062, between each contactor.

DB123331

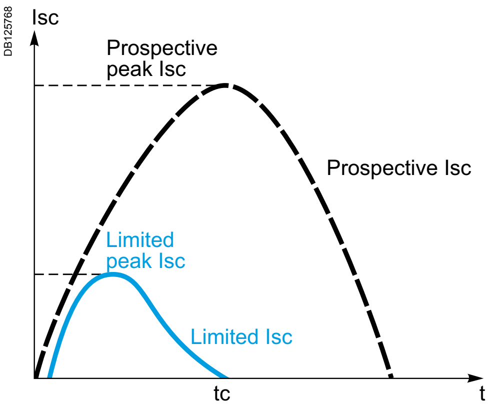


Splitter blocks

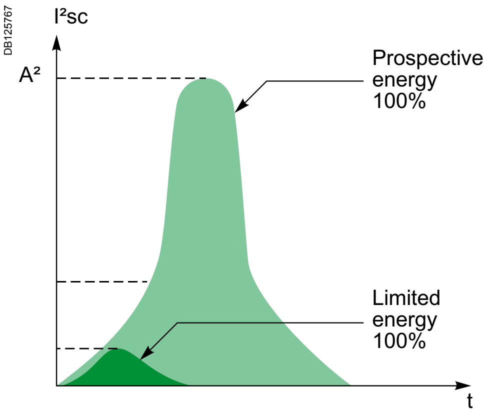
In the event of a temperature higher than 40°C, the maximum acceptable current is limited to the values in the table below:

Type	Temperature				
	40°C	45°C	50°C	55°C	60°C
Multiclip 80 A	80	76	73	69	66
Distribloc 63 A	63	60	58	55	53

Short-circuit current limiting



Prospective current and real limit current.



Definition

The limiting capacity of a circuit breaker is its ability to lessen the effects of a short circuit on an electrical installation by reducing the current amplitude and the dissipated power.

Benefits of limiting

Long installation service life

Thermal effects
Lower temperature rise at the conductor level, hence increased service life for cables and all components that are not self-protected (e.g. switches, contactors, etc.)
Mechanical effects
Lower electrodynamic repulsion forces, hence less risk of deformation or breakage of electrical contacts and busbars.
Electromagnetic effects
Less interference on sensitive equipment located in the vicinity of an electric circuit.

Savings through cascading

Cascading is a technique derived directly from current limiting: downstream of a current-limiting circuit breaker it is possible to use circuit breakers of breaking capacity lower than the prospective short-circuit current (in line with the cascading tables). The breaking capacity is heightened thanks to current limiting by the upstream device. Substantial savings can be achieved in this way on switchgear and enclosures.

Discrimination of protection devices

The circuit breakers' current limiting capacity improves discrimination with the protection devices located upstream: this is because the required energy passing through the upstream protection device is greatly reduced and can be not enough to cause it to trip. Discrimination can thus be natural without having to install a time-delayed protection device upstream.

Acti 9 circuit breaker current limiting

Profiting from Schneider Electric's experience and expertise in the field of short-circuit current breaking, the circuit breakers of the Acti 9 range have a top-level current limiting characteristic for modular devices.
This assures them of optimal protection of the entire power distribution system.

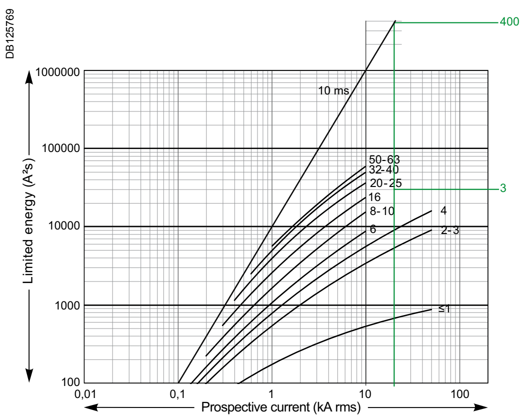
Short-circuit current limiting (cont.)

Representation: Current limiting curves

The current limiting capacity of a circuit breaker is reflected by 2 curves which give, as a function of the prospective short-circuit current (current which would flow in the absence of a protection device):

- the real peak current (limited)
- the thermal stress (in A²s), this value, multiplied by the resistance of any element through which the short-circuit current passes, gives the power dissipated by this element.

The straight line "10 ms" representing the energy A²s of a prospective short-circuit current of a half-period (10 ms) indicates the energy that would be dissipated by the short-circuit current in the absence of limiting by the protection device (see example).



Example

What is the energy limited by an iC60N 25 A circuit breaker for a prospective short-circuit current of 10 kA rms. What is the quality of current limiting?

> as shown in the graph opposite:

- this short-circuit current (10 kA rms) is likely to dissipate up to 1,000 kA²s
- the iC60N circuit breaker reduces this thermal stress to: 35 kA²s, which is 22 times less.

Example of use: Stresses acceptable by the cables

The following table shows the thermal stresses acceptable by the cables depending on their insulation, their composition (Cu or Al) and their cross section. Cross-section values are expressed in mm² and stresses in A²s.

S (mm²)		1.5	2.5	4	6	10
PVC	Cu	2.97×10^4	8.26×10^4	2.12×10^5	4.76×10^5	1.32×10^6
	Al					5.41×10^5
PRC	Cu	4.10×10^4	1.39×10^5	2.92×10^5	6.56×10^5	1.82×10^6
	Al					7.52×10^5
S (mm²)		**16**	**25**	**35**	**50**	
PVC	Cu	3.4×10^6	8.26×10^6	1.62×10^7	3.21×10^7	
	Al	1.39×10^6	3.38×10^6	6.64×10^6	1.35×10^7	
PRC	Cu	4.69×10^6	1.39×10^7	2.23×10^7	4.56×10^7	
	Al	1.93×10^6	4.70×10^6	9.23×10^6	1.88×10^7	

Example

Is a Cu/PVC cable of cross section 10 mm² protected by a NG125L device?

The above table shows that the acceptable stress is 1.32×10^6 A²s. Any short-circuit current at the point where a NG125L device (Icu = 25 kA) is installed will be limited, with a thermal stress of less than 2.2×10^5 A²s. (Curve on page <?>).
The cable is therefore always protected up to the breaking capacity of the circuit breaker.

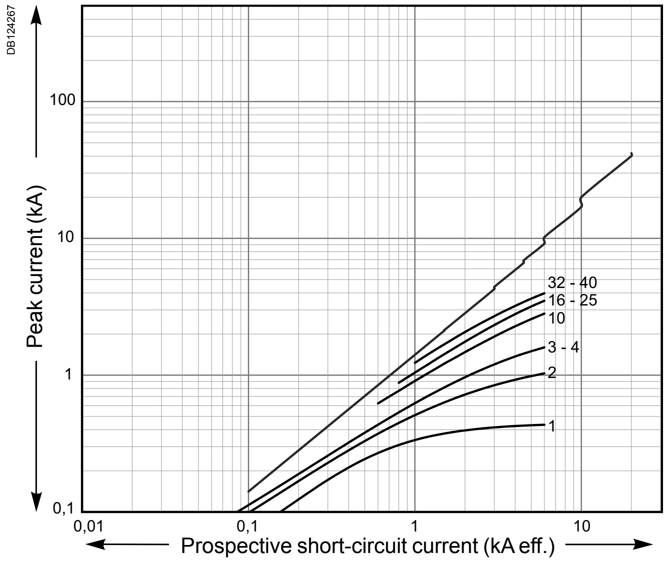
Short-circuit current limiting (cont.)

Limitation curves for network
Ue: 380-415 V AC (Ph/N 220-240 V AC)

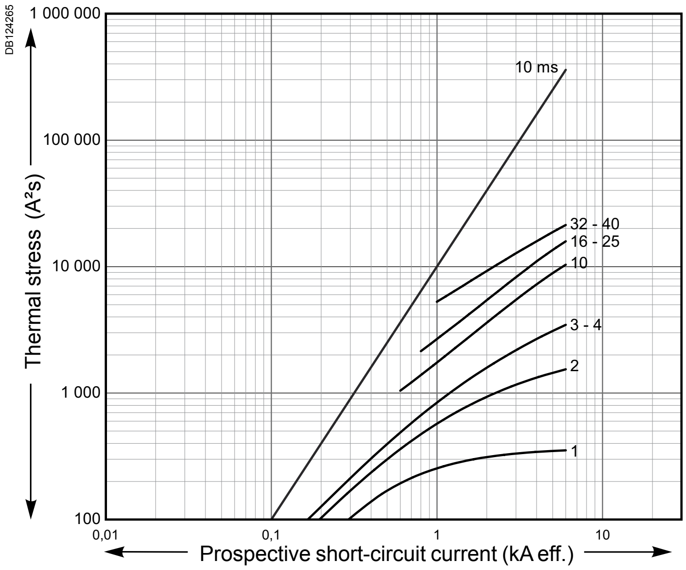
DPN (MCB and RCBO)

1P+N / 3P / 3P+N

Peak current



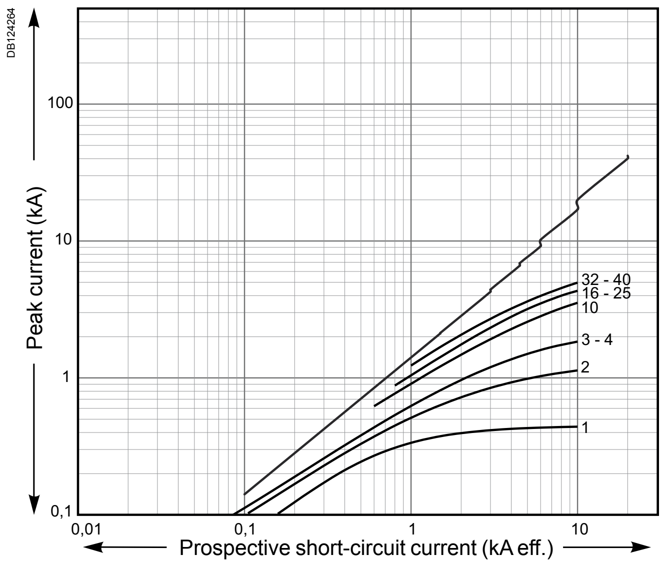
Thermal stress



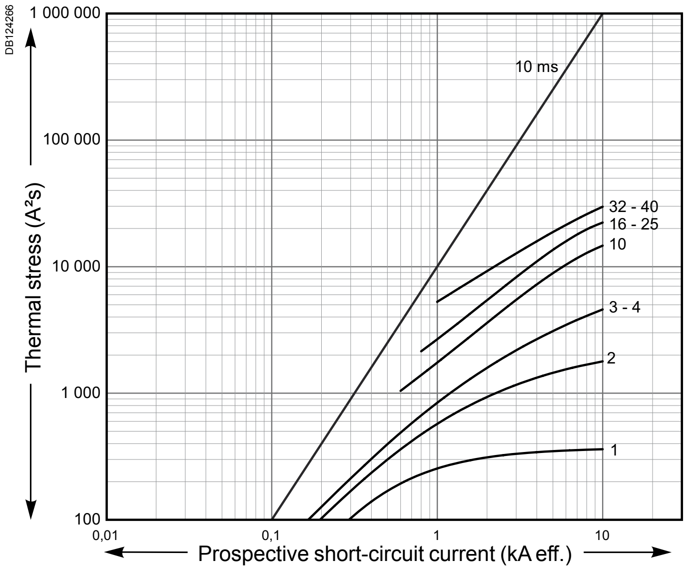
DPN N (MCB and RCBO)

1P+N / 3P / 3P+N

Peak current



Thermal stress



Short-circuit current limiting (cont.)

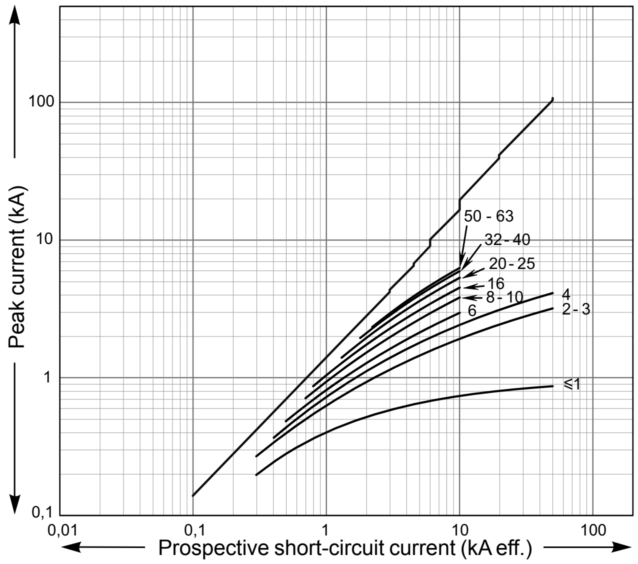
Limitation curves for network
Ue: 380-415 V AC (Ph/N 220-240 V AC)

iC60N

1P / 1P+N / 2P / 3P / 4P

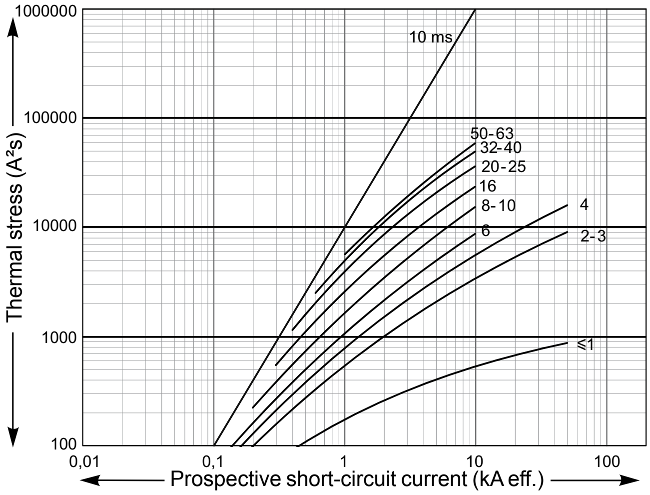
Peak current

DB124280



Thermal stress

DB124281

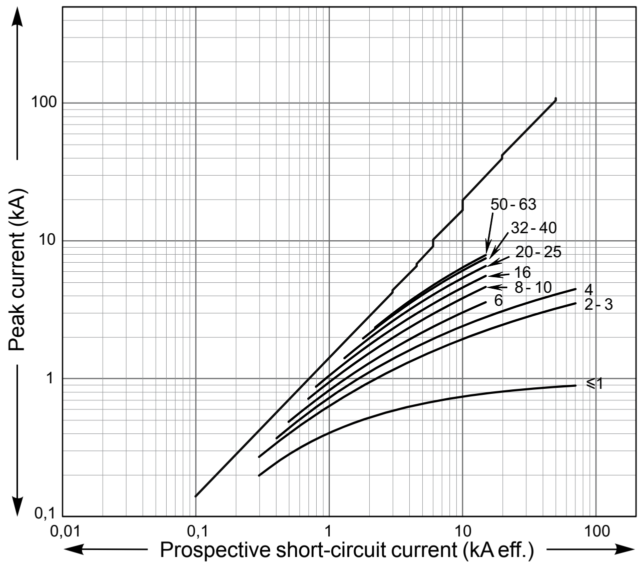


iC60H

1P / 1P+N / 2P / 3P / 4P

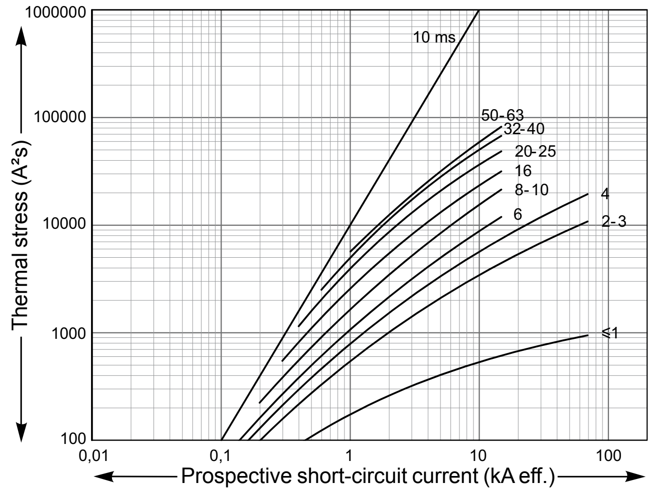
Peak current

DB124284



Thermal stress

DB124285



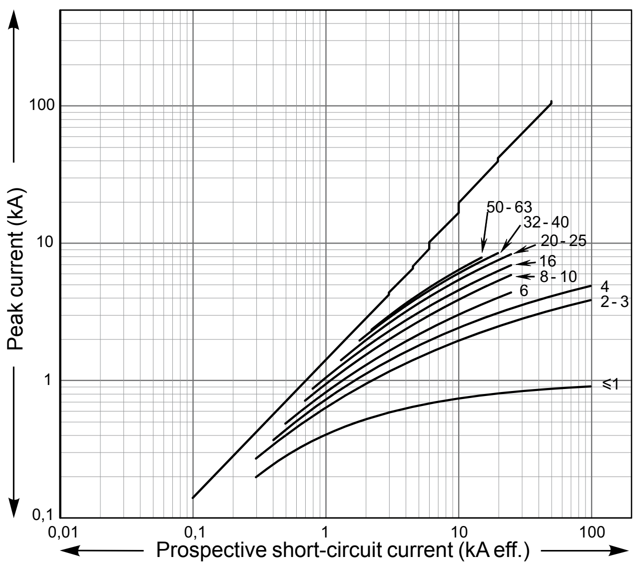
Short-circuit current limiting (cont.)

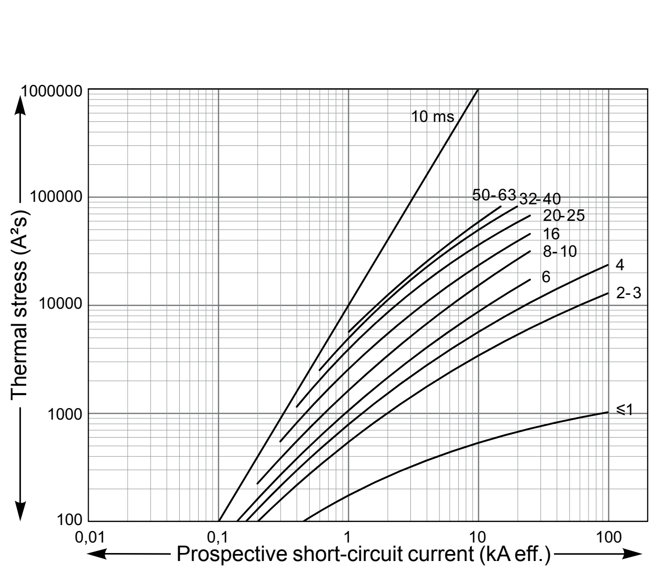
Limitation curves for network
Ue: 380-415 V AC (Ph/N 220-240 V AC)

iC60L

1P / 2P / 3P / 4P

Peak current	Thermal stress





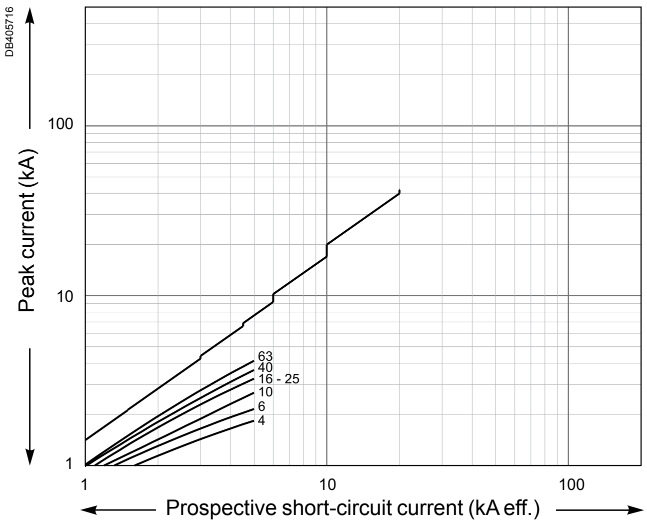
Short-circuit current limiting (cont.)

Limitation curves for network
Ue: 380-415 V AC (Ph/N 220-240 V AC)

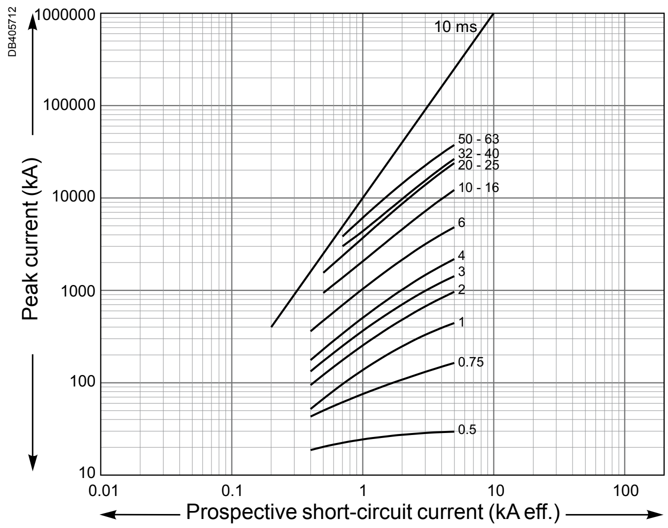
C60a

1P / 2P / 3P / 3P+N / 4P

Peak current



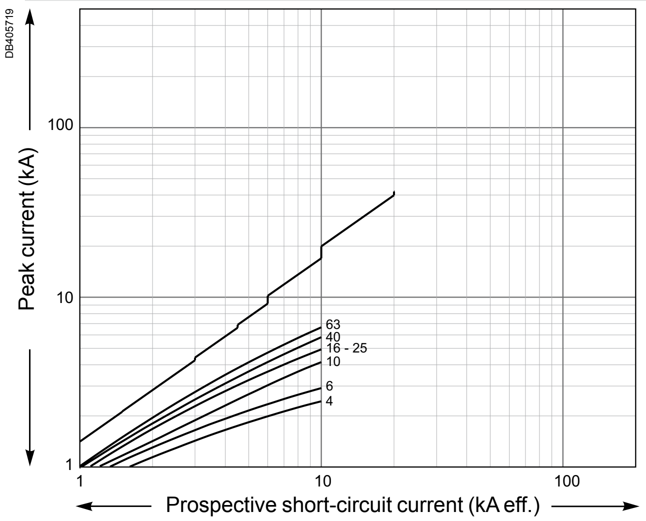
Thermal stress



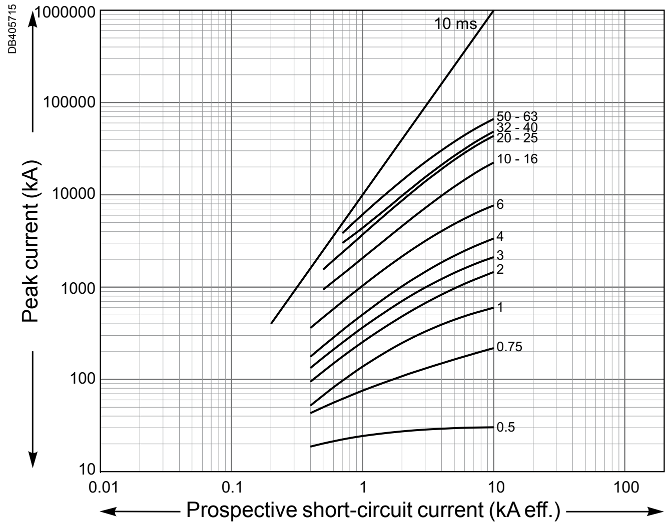
C60N

1P / 1P+N / 2P / 3P / 3P+N / 4P

Peak current



Thermal stress



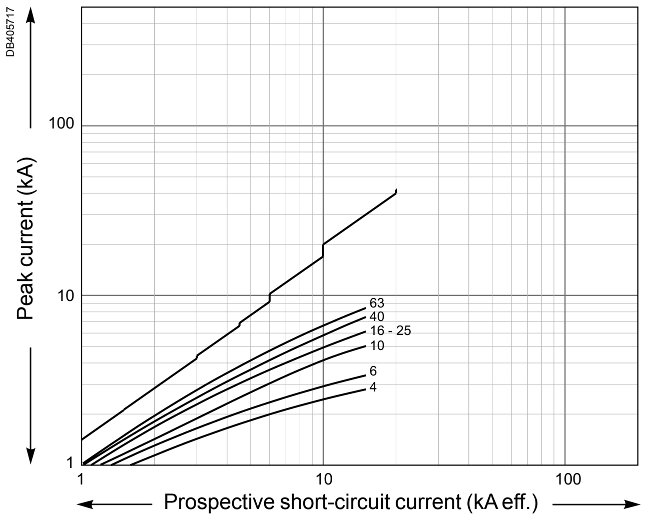
Short-circuit current limiting (cont.)

Limitation curves for network
Ue: 380-415 V AC (Ph/N 220-240 V AC)

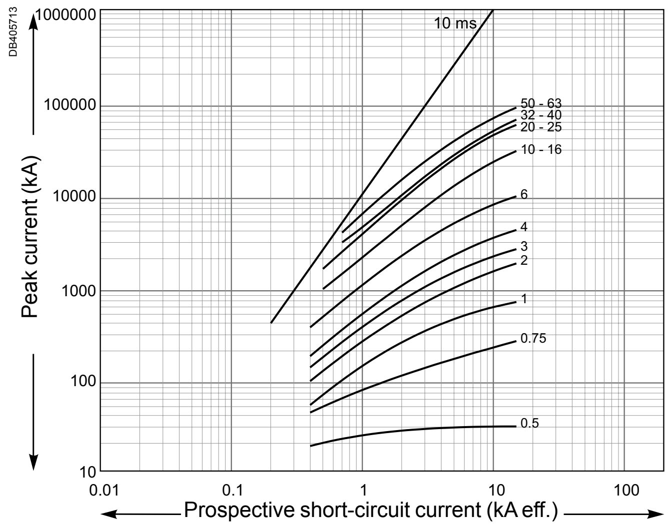
C60H

1P / 1P+N / 2P / 3P / 3P+N / 4P

Peak current



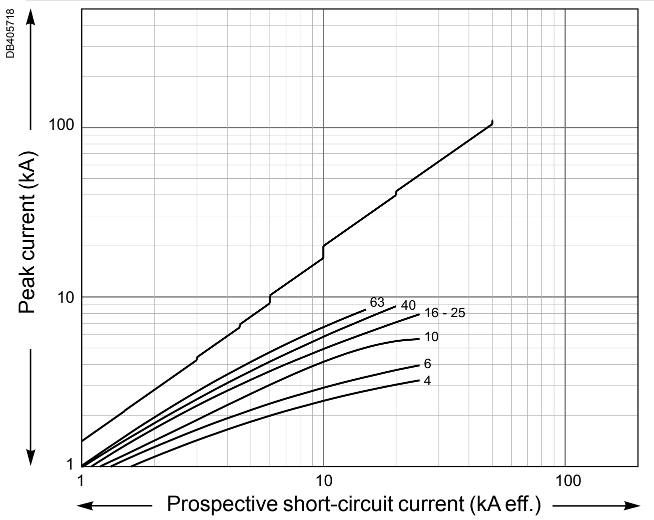
Thermal stress



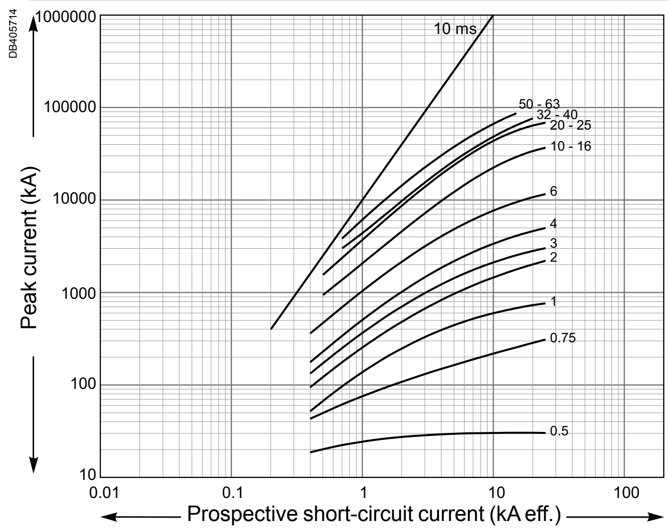
C60L

1P / 2P / 3P / 4P

Peak current



Thermal stress



Short-circuit current limiting (cont.)

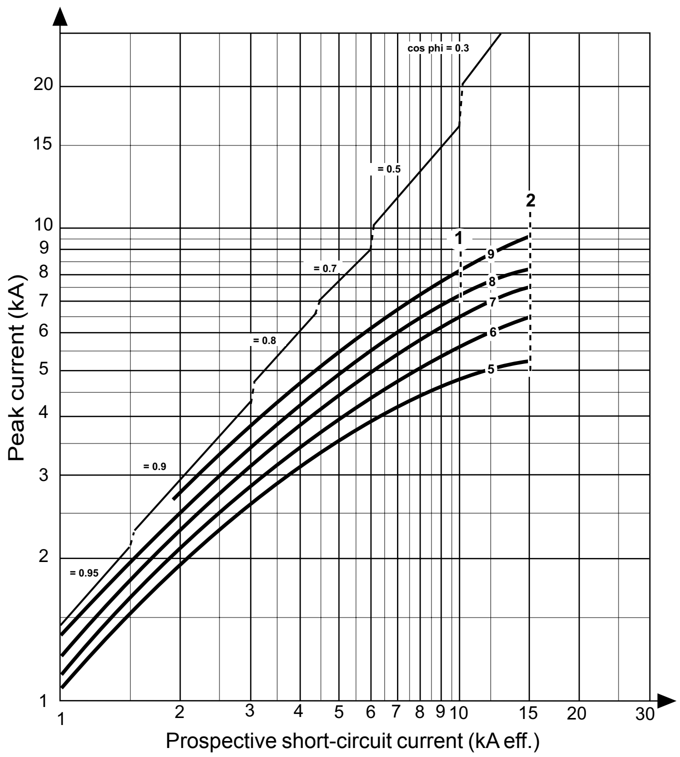
Limitation curves for network
Ue: 380-415 V AC (Ph/N 220-240 V AC)

C120N, H

1P / 2P / 3P / 4P

Peak current

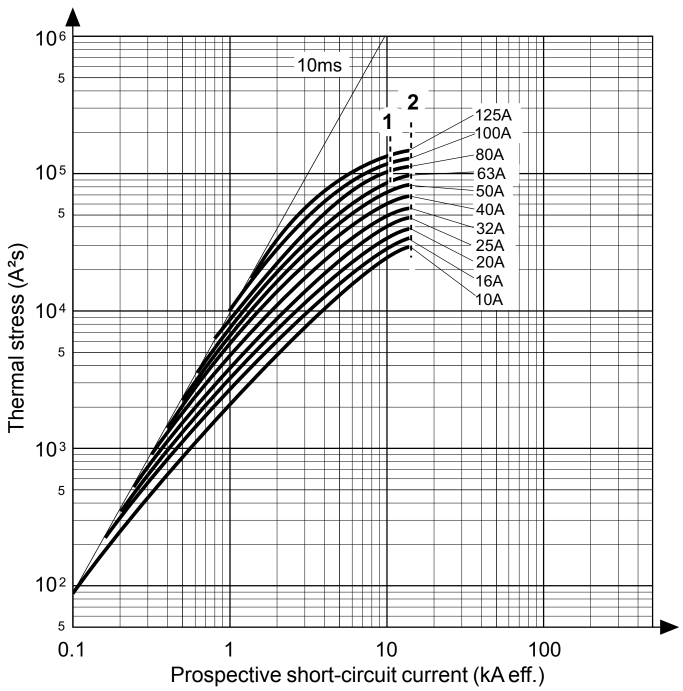
DB124293



- ■ Circuit breaker type in accordance with the mark:
- □ 1: C120N
- □ 2: C120H
- □ 5: 10-16 A
- □ 6: 20-25 A
- □ 7: 32-40 A
- □ 8: 50-63 A
- □ 9: 80-125 A

Thermal stress

DB405604



- ■ Circuit breaker type in accordance with the mark:
- □ 1: C120N
- □ 2: C120H

Short-circuit current limiting (cont.)

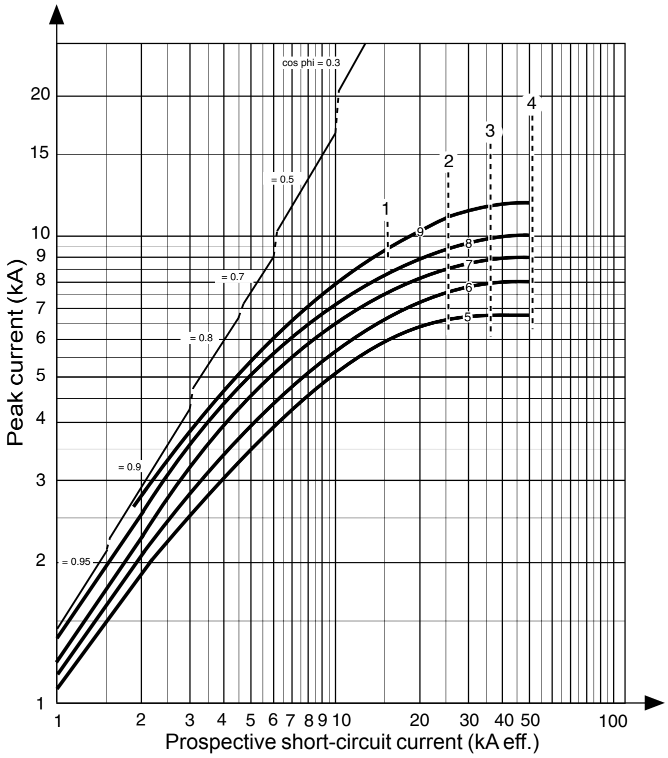
Limitation curves for network
Ue: 380-415 V AC (Ph/N 220-240 V AC)

NG125a, N, H, L

1P / 2P / 3P / 4P

Peak current

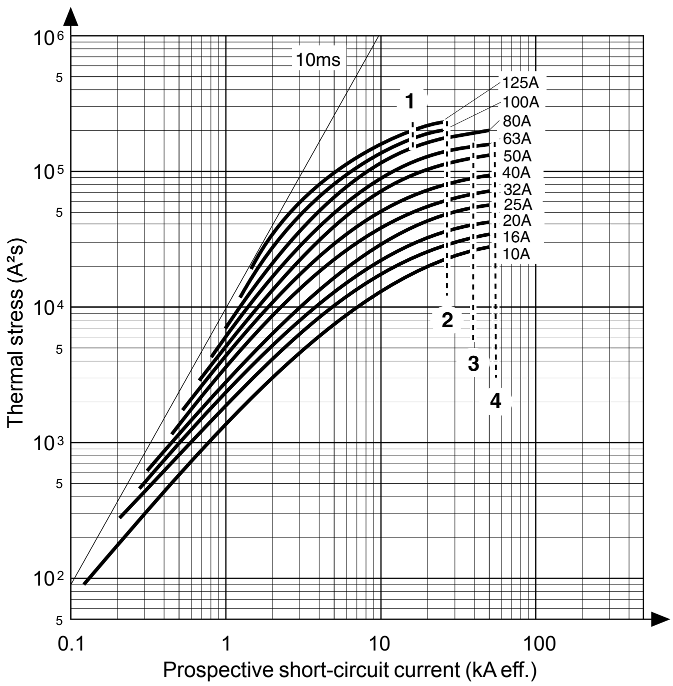
DB124299



- ■ Circuit breaker type in accordance with the mark:
- □ 1: NG125a
- □ 2: NG125N
- □ 3: NG125H
- □ 4: NG125L
- □ 5: 10 -16 A
- □ 6: 20-25 A
- □ 7: 32-40 A
- □ 8: 50-63 A
- □ 9: 80-125 A

Thermal stress

DB405607



- ■ Circuit breaker type in accordance with the mark:
- □ 1: NG125a 80-100-125 A
- □ 2: NG125N
- □ 3: NG125H
- □ 4: NG125L

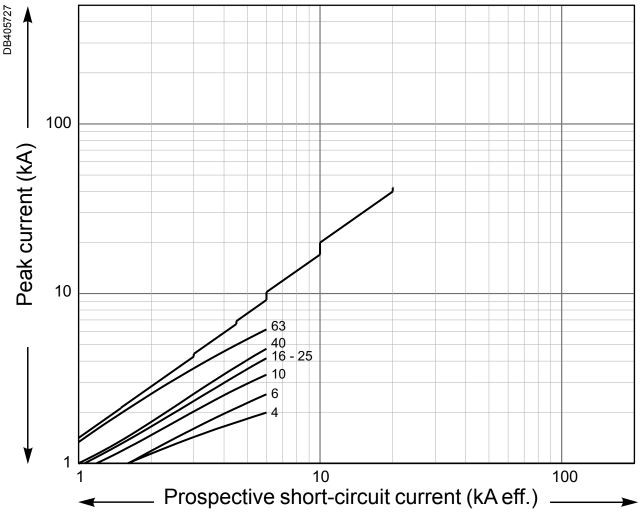
Short-circuit current limiting (cont.)

Limitation curves for network
Ue: 440 V AC

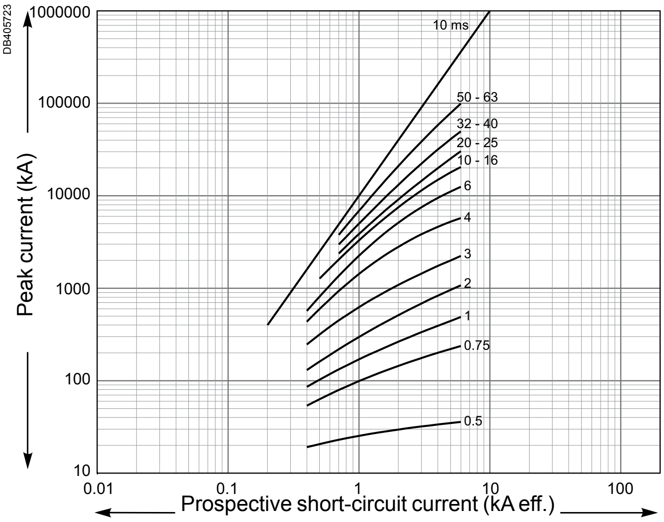
C60N

2P / 3P / 4P

Peak current



Thermal stress



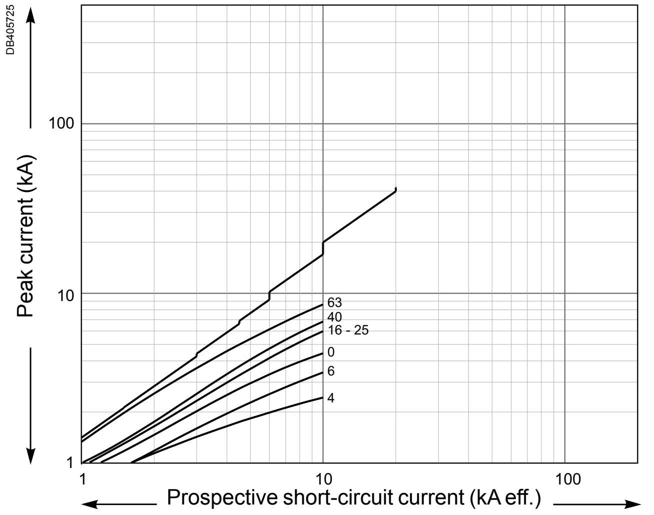
Short-circuit current limiting (cont.)

Limitation curves for network Ue: 440 V AC

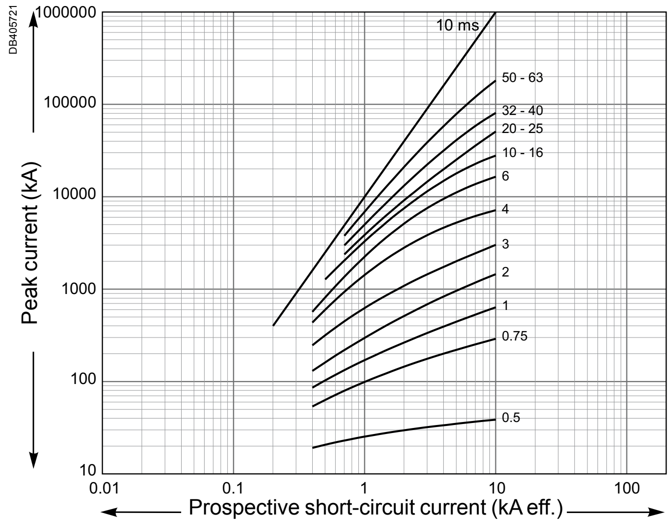
C60H

2P / 3P / 4P

Peak current



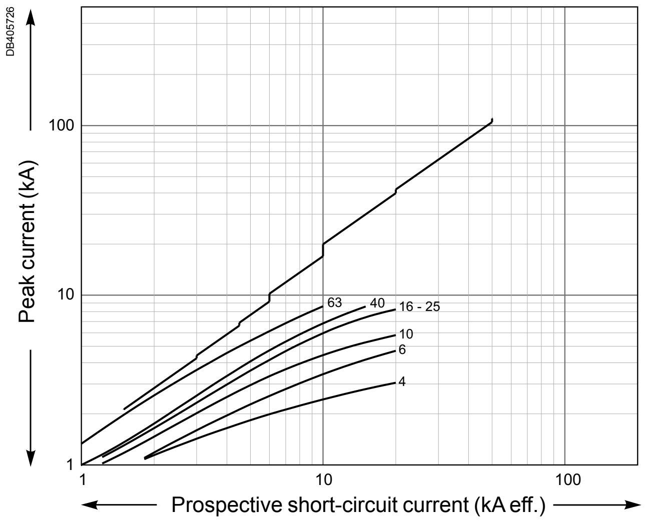
Thermal stress



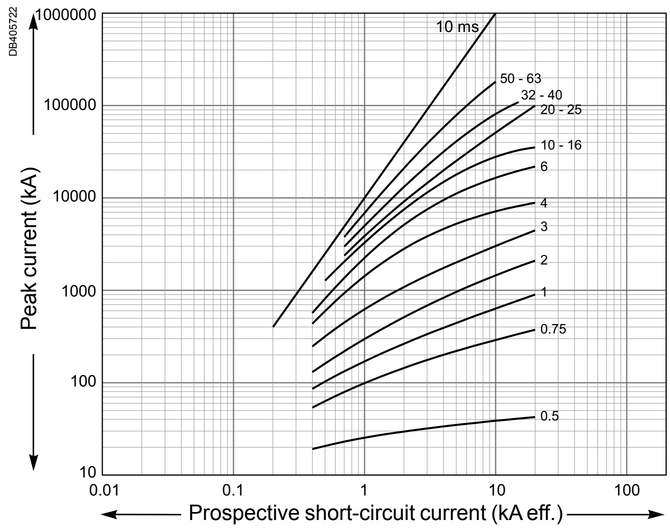
C60L

2P / 3P / 4P

Peak current



Thermal stress



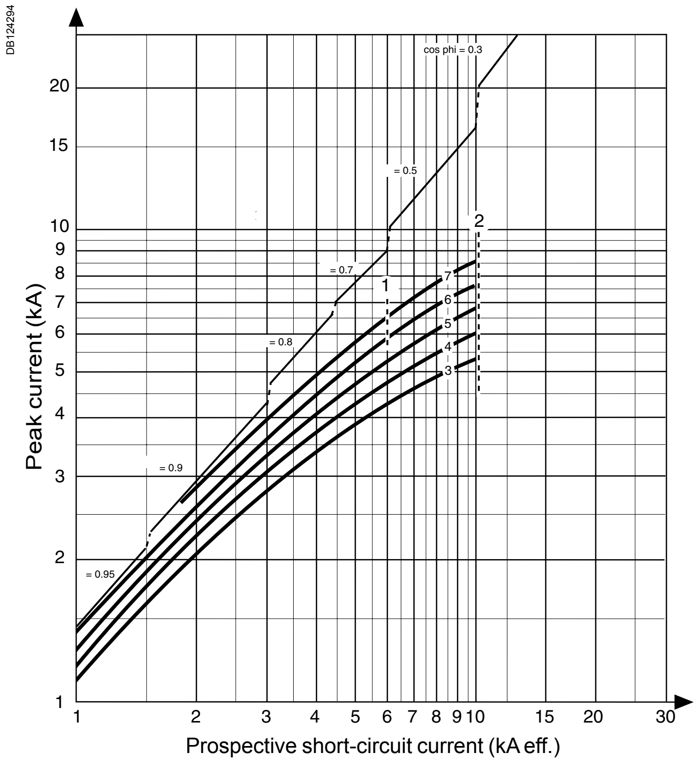
Short-circuit current limiting (cont.)

Limitation curves for network Ue: 440 V AC

C120N, H

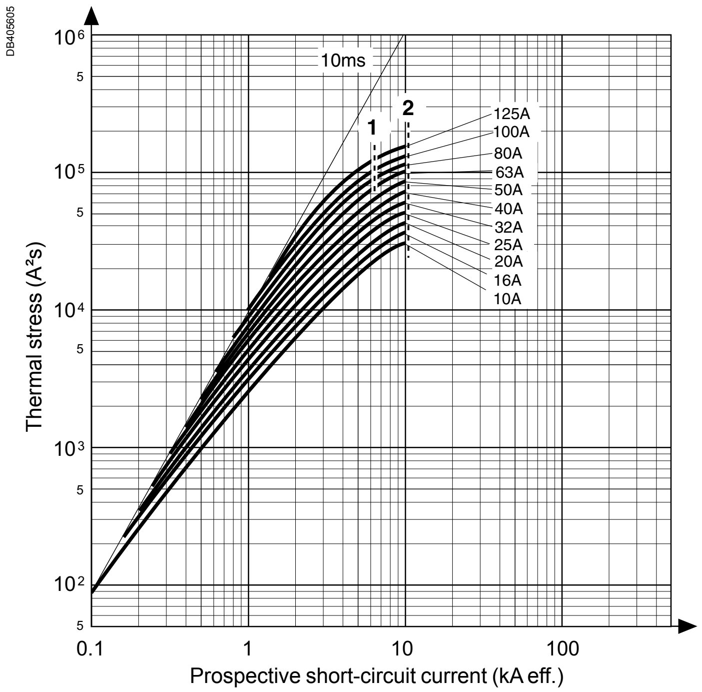
2P / 3P / 4P

Peak current



- Circuit breaker type in accordance with the mark:
  - 1: C120N
  - 2: C120H
  - 3: 0-16 A
  - 4: 20-25 A
  - 5: 32-40 A
  - 6: 50-63 A
  - 7: 80-125 A

Thermal stress



- Circuit breaker type in accordance with the mark:
  - 1: C120N
  - 2: C120H

Short-circuit current limiting (cont.)

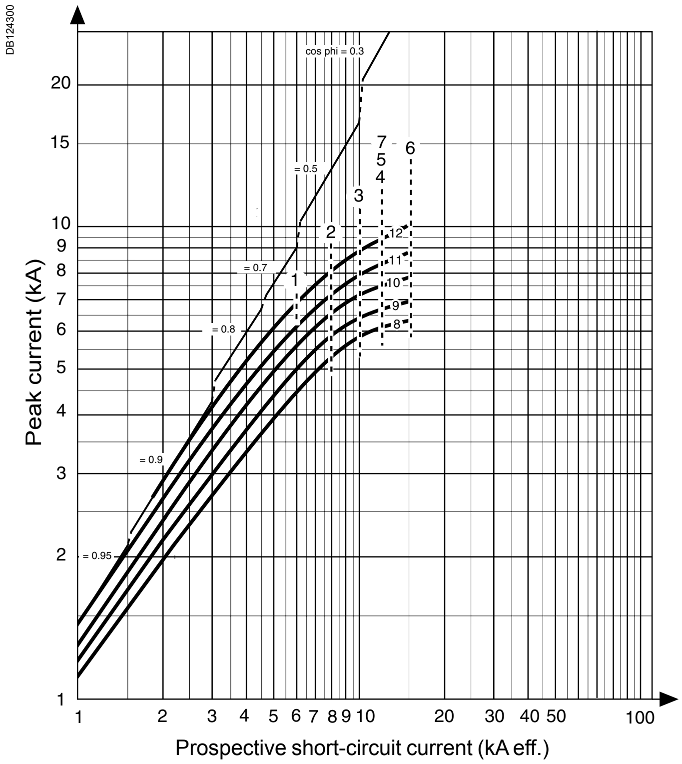
Limitation curves for network

Ue: 550 V AC

NG125a, N, H, L

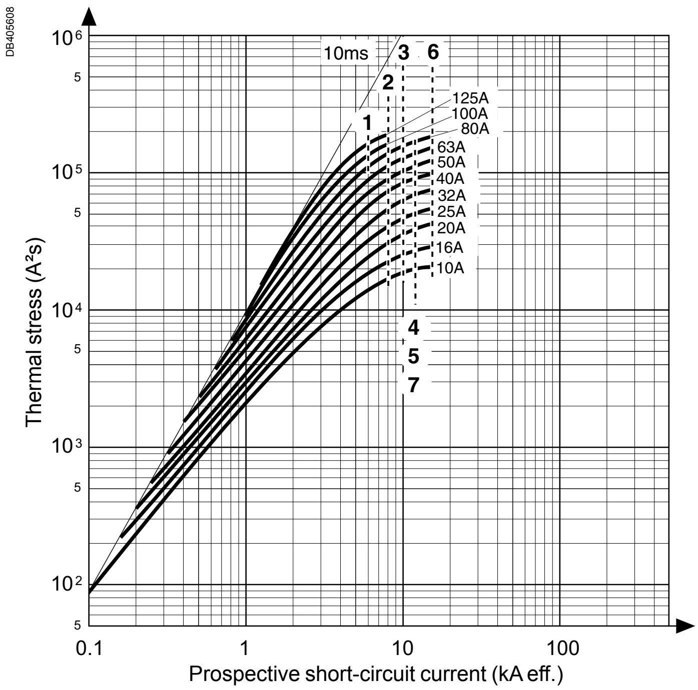
2P / 3P / 4P

Peak current



- ■ Circuit breaker type in accordance with the mark:
- □ 1: NG125a 3, 4P
- □ 2: NG125N 2, 3, 4P
- □ 3: NG125H 3, 4P
- □ 4-5: NG125H 2P/NG125L 3, 4P
- □ 6: NG125L 2P
- □ 7: NG125 LMA 2, 3, 4P
- □ 8: 10 -16 A
- □ 9: 20-25 A
- □ 10: 32-40 A
- □ 11: 50-63 A
- □ 12: 80-125 A

Thermal stress



- ■ Circuit breaker type in accordance with the mark:
- □ 1: NG125a 3, 4P
- □ 2: NG125N 2, 3, 4P
- □ 3: NG125H 3, 4P
- □ 4-5: NG125H 2P/NG125L 3, 4P
- □ 6: NG125L 2P
- □ 7: NG125LMA 2, 3, 4P

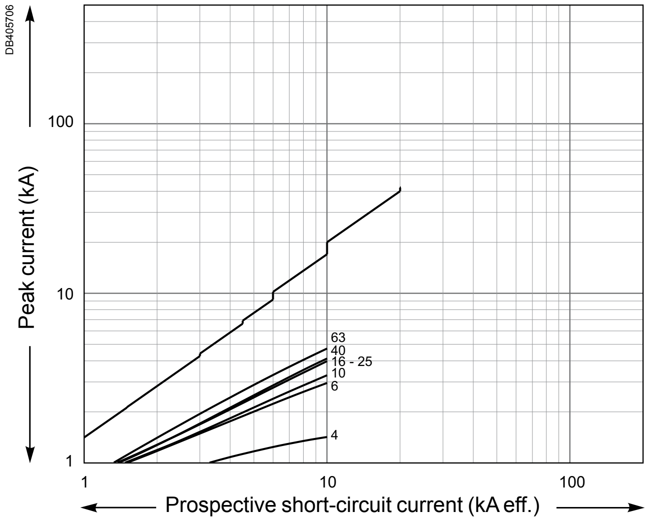
Short-circuit current limiting (cont.)

Limitation curves for network Ue: 220-240 V AC (Ph/N 110-130 V AC)

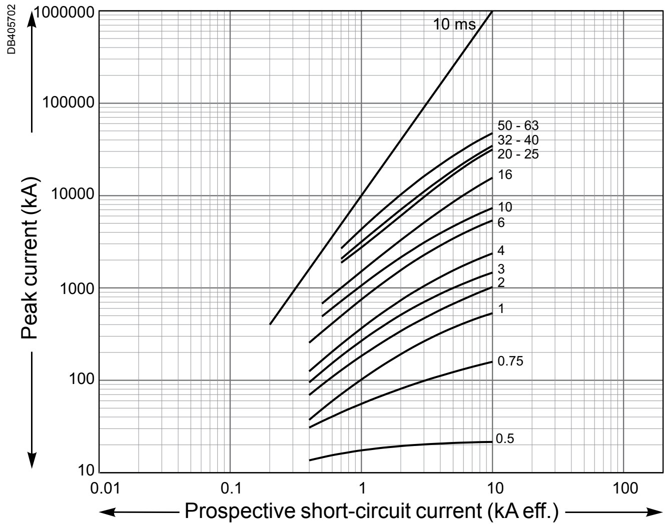
C60a

1P / 2P / 3P / 3P+N / 4P

Peak current



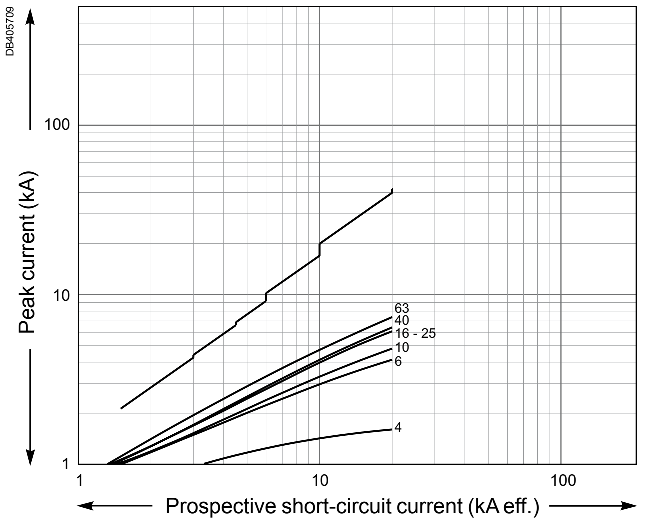
Thermal stress



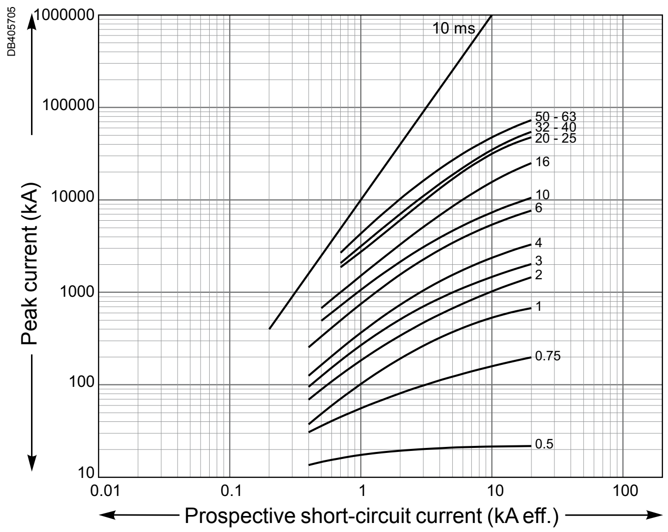
C60N

1P / 1P+N / 2P / 3P / 3P+N / 4P

Peak current



Thermal stress



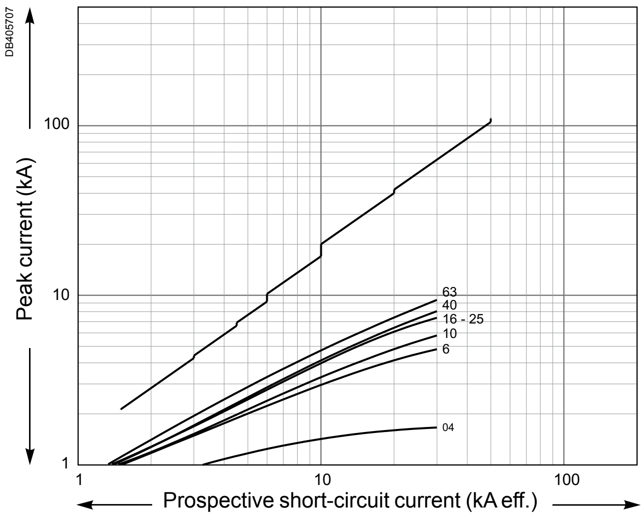
Short-circuit current limiting (cont.)

Limitation curves for network
Ue: 220-240 V AC (Ph/N 110-130 V AC)

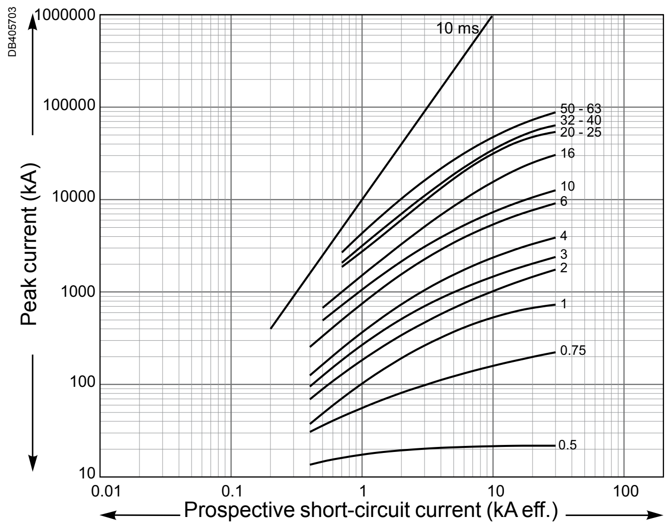
C60H

1P / 1P+N / 2P / 3P / 3P+N / 4P

Peak current



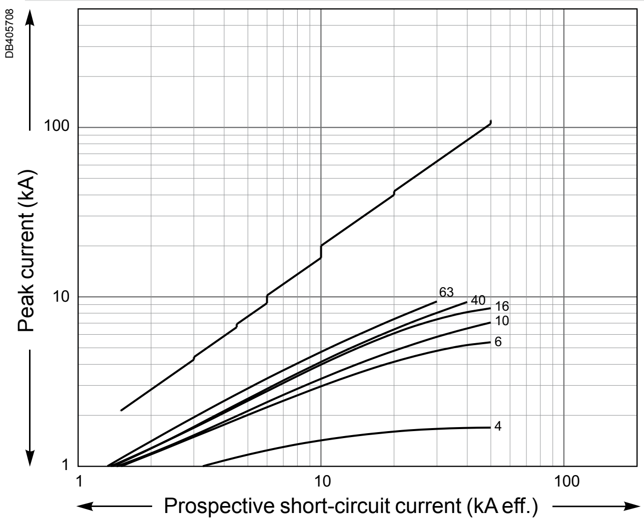
Thermal stress



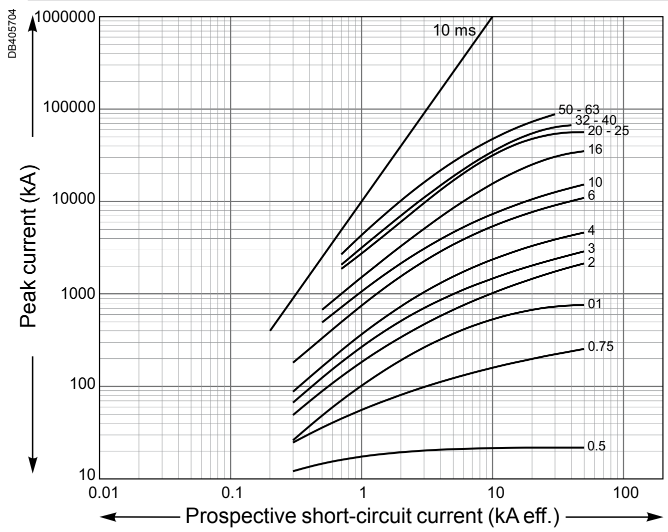
C60L

1P / 2P / 3P / 4P

Peak current



Thermal stress



Short-circuit current limiting (cont.)

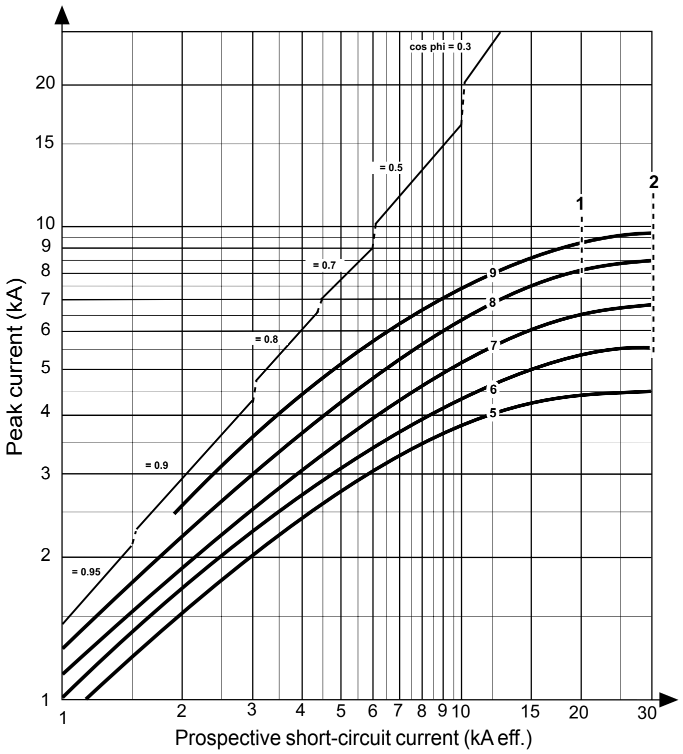
Limitation curves for network Ue: 220-240 V AC (Ph/N 110-130 V AC)

C120N, H

1P / 2P / 3P / 4P

Peak current

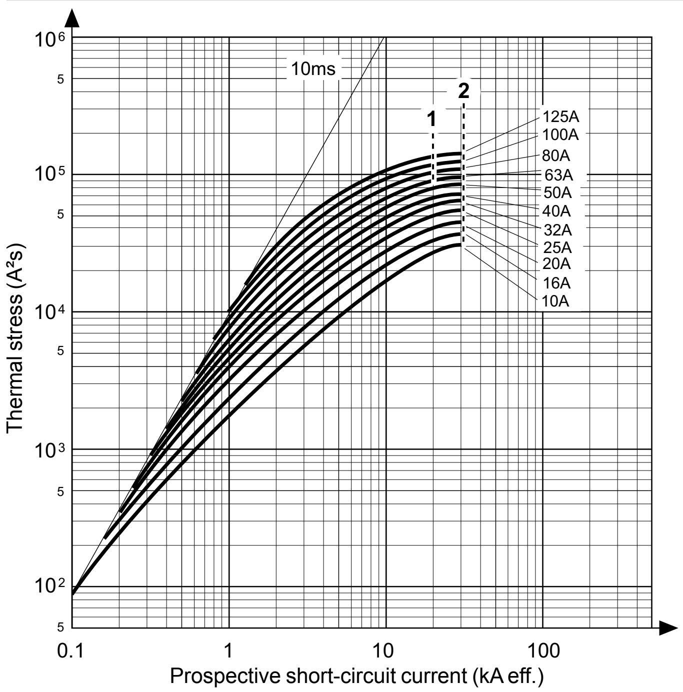
DB124292



- ■ Circuit breaker type in accordance with the mark:
- □ 1: C120N
- □ 2: C120H
- □ 5: 10-16 A
- □ 6: 20-25 A
- □ 7: 32-40 A
- □ 8: 50-63 A
- □ 9: 80-125 A

Thermal stress

DB405603



- ■ Circuit breaker type in accordance with the mark:
- □ 1: C120N
- □ 2: C120H

Short-circuit current limiting (cont.)

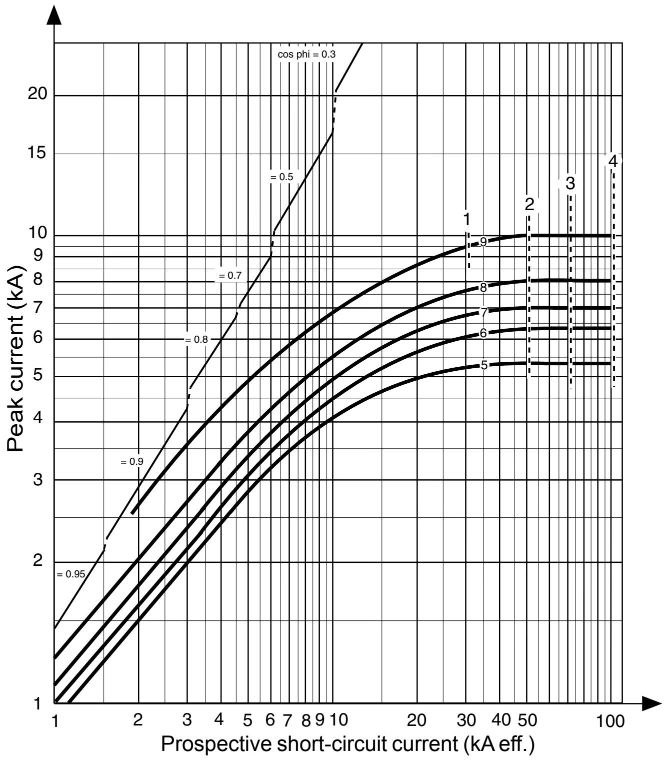
Limitation curves for network
Ue: 220-240 V AC (Ph/N 110-130 V AC)

NG125a, N, H, L

1P / 2P / 3P / 4P

Peak current

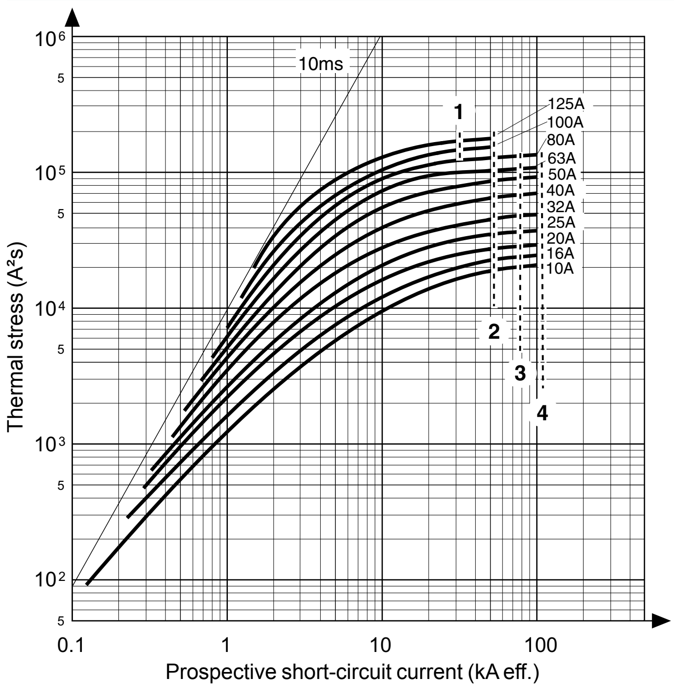
DB124298



- Circuit breaker type in accordance with the mark:
  - 1: NG125a
  - 2: NG125N
  - 3: NG125H
  - 4: NG125L
  - 5: 10-16 A
  - 6: 20-25 A
  - 7: 32-40 A
  - 8: 50-63 A
  - 9: 80-125 A

Thermal stress

DB405606



- Circuit breaker type in accordance with the mark:
  - 1: NG125a 80-100-125 A
  - 2: NG125N
  - 3: NG125H
  - 4: NG125L

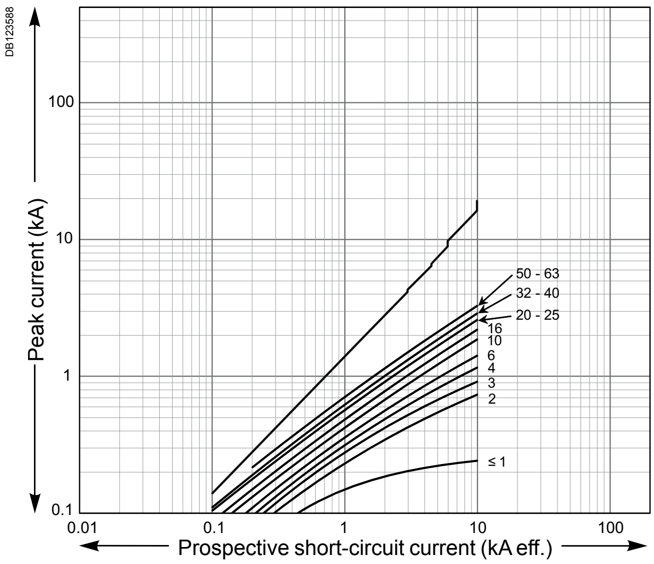
Short-circuit current limiting (cont.)

Limitation curves for direct current network

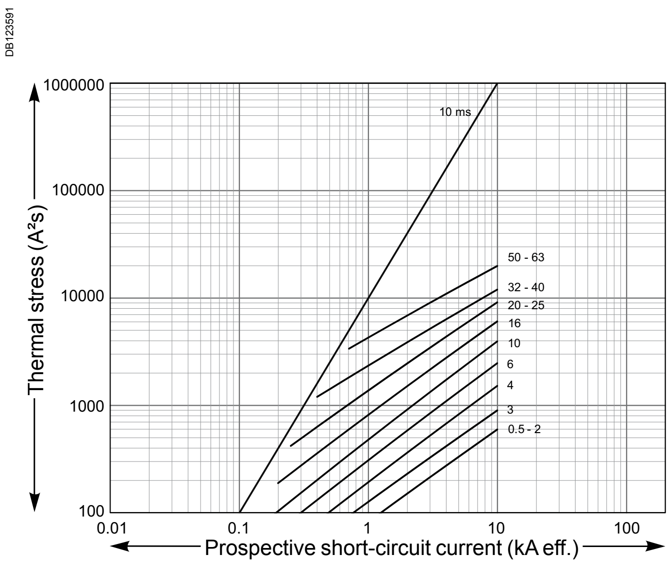
C60H-DC curve C

1P (220 V) - 2P (440 V)

Peak current



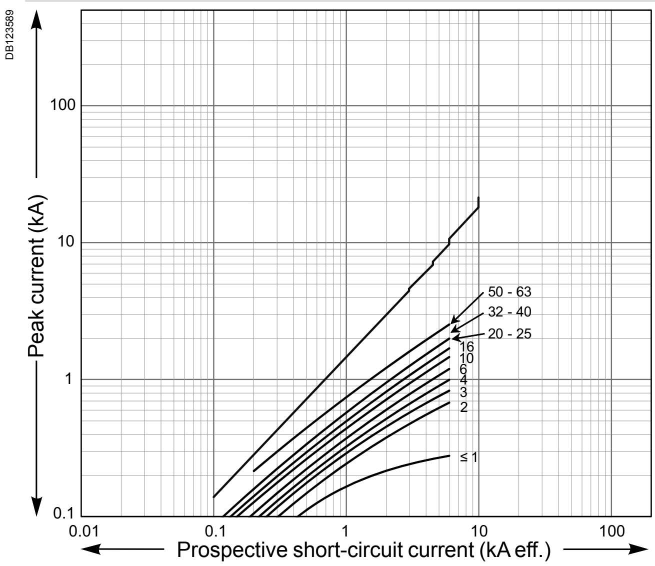
Thermal stress



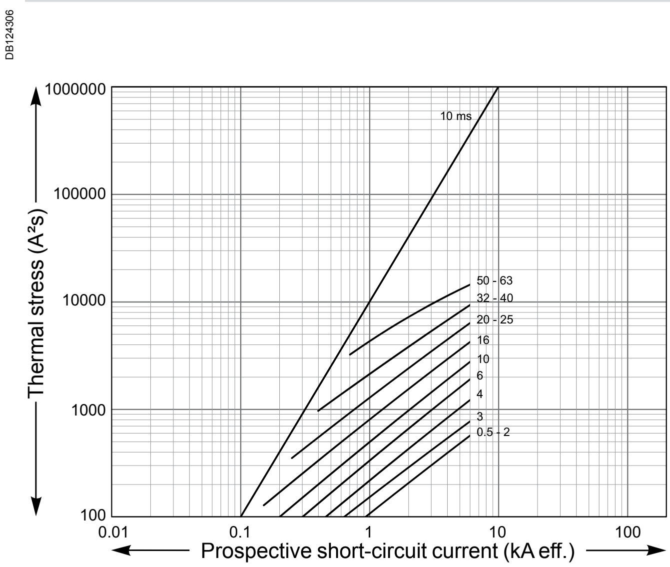
C60H-DC curve C

1P (250 V DC) - 2P (500 V DC)

Peak current



Thermal stress



Circuit breakers for direct current applications

24 V - 48 V direct current applications

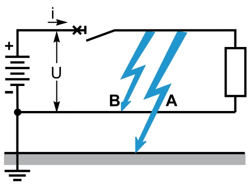
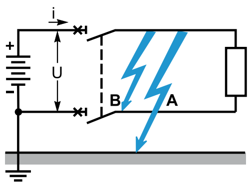
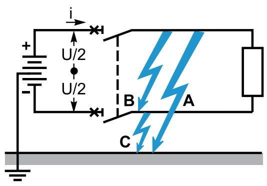
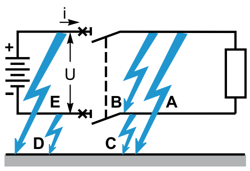
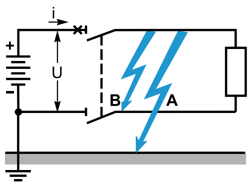
Typical applications

Direct current has been used for a long time and in many fields. It offers major advantages, in particular immunity to electrical interference. Moreover, direct-current installations are now simpler, because they benefit from the development of power supplies with electronic converters and batteries.

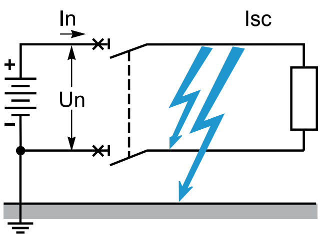
■ Communication or measurement network:
□ 48 V DC switched telephone network,
□ 4-20 mA current loop.
■ Electrical supply for industrial PLCs:
□ PLCs and peripheral devices (24 or 48 V DC).
■ Auxiliary uninterruptible direct current power supply:
□ relays or electronic protection units for MV cubicles,
□ switchgear opening / closing trip units,
□ LV control and monitoring relays,
□ indicator lights,
□ circuit-breaker or on/off switch motor drives,
□ power contactor coils,
□ control/monitoring and supervision devices with communication that can be powered via a separate uninterruptible power supply.
■ 24 to 48 V DC wind application:
□ isolated homes,
□ cottages, bungalows, mountain refuges,
□ pumps, street lighting,
□ measuring instruments, data acquisition,
□ telecommunication relays,
□ industrial applications.

Types of direct current networks

According to the types of DC networks illustrated below, we can identify the risks to the installation and define the best means of protection.

Earthed			Isolated from earth
I: Earthed (or grounded) polarity (in this case negative)		II: Earthed mid-point	III: Isolated polarities
1 pole (1P isolation)	2 poles (2P isolation)	2 poles	2 poles
DB124075 	DB124067 	DB124076 	DB124068 
	2 poles (1P isolation 1P+N)		
	DB124387 		
Worst-case faults			
Fault A and fault B (if only one polarity is protected)		Fault B	Double fault A and D or C and E

For further information on the types of networks and the faults that characterise them, refer to the direct current circuit breaker (LV) selection guide, 220E2100.indd.

DB124236


For all these configurations, we propose a single protection solution that depends only on the requirement for the nominal current In and the short-circuit current Isc at the installation point concerned.

The second important point in our solution is the fact that the protection is implemented by non-polarised circuit breakers that can operate efficiently, whatever the direction of the direct current.

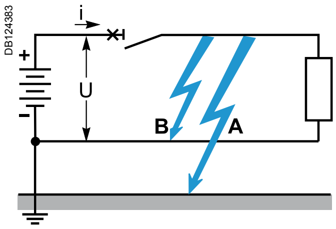
Circuit breakers for direct current applications (cont.)

24 V - 48 V direct current applications

24 - 48 V direct current protection solution

The performance levels shown in the tables below correspond to the most critical faults according to the network configuration.

- Breaking on one pole.
- Fault between polarity and earth (Fault A).

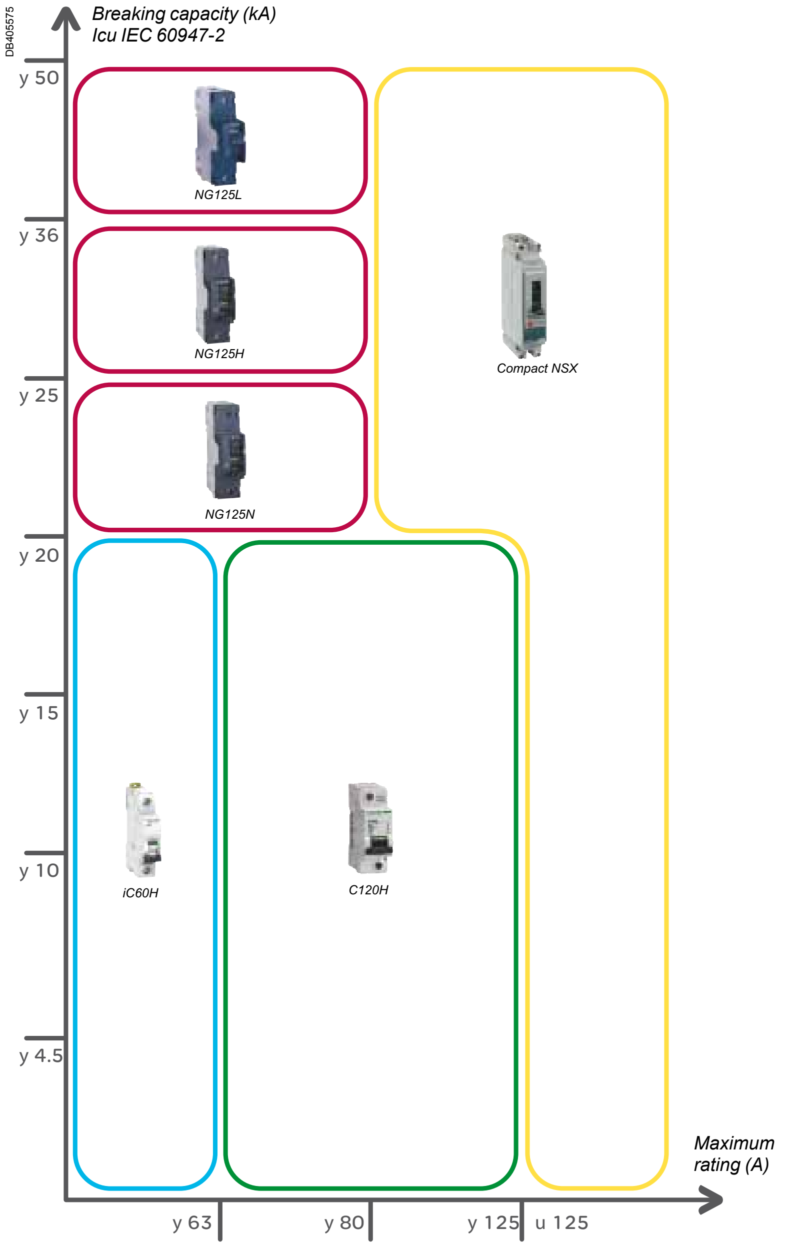


Standard solution depending on the network and the requirements of the installation (In / Isc)

In addition to the parameters shown on the following pages, the tables below illustrate our range of circuit breakers according to the nominal current of the load and short-circuit current at the point of installation.

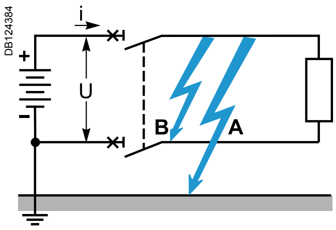
- Circuit breaker rating.
- Breaking capacity of the circuit breaker.

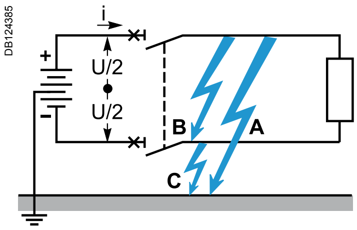
1 pole isolation solution (1P)

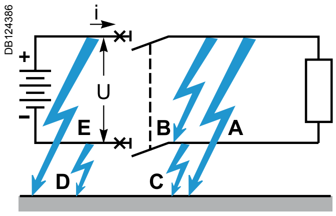


Circuit breakers for direct current applications (cont.)

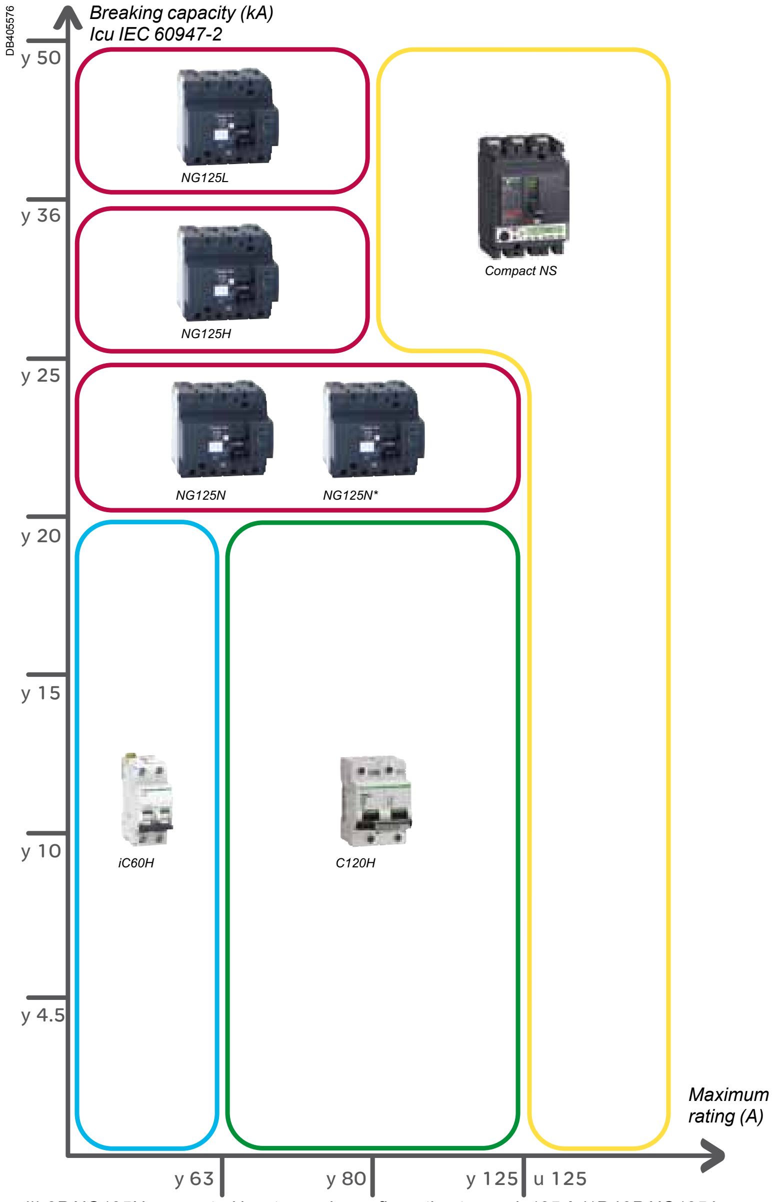
24 V - 48 V direct current applications







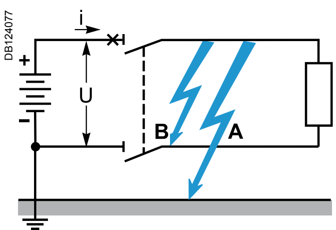
2 pôles isolation solution (2P)

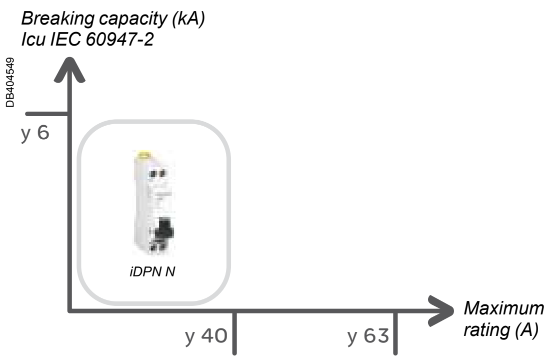


(*) 3P NG125N connected in a two-pole configuration to reach 125 A (1P / 2P NG125 has a maximum rating of 80 A).

1 pole isolation solution (1P+N)

Specific use of the iDPN range in a network with one polarity earthed and both poles isolated: compact solution (1P+N in 18 mm).





(*) iC60a breaking capacity Icu = 10 kA.

Circuit breakers for direct current applications (cont.)

24 V - 48 V direct current applications

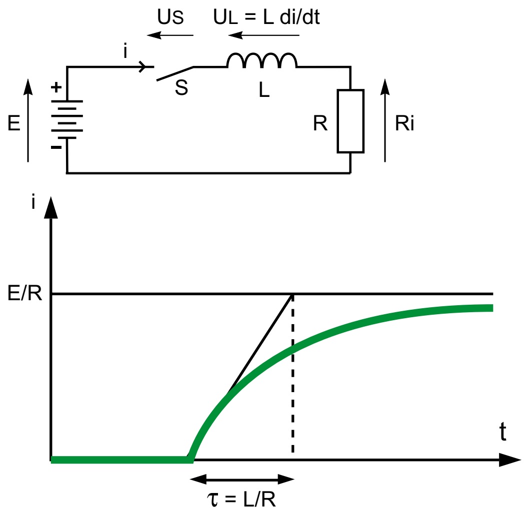
Constraints related to "direct current" applications

In direct current, inductors and capacitors do not disturb the operation of the installation in steady state. Capacitors are charged and inductors no longer oppose changes in the current.
However, they create transient phenomena when the circuit opens or closes, during which time the current varies. Actual loads have both characteristics and generate oscillatory phenomena.

Type of load

Inductive load

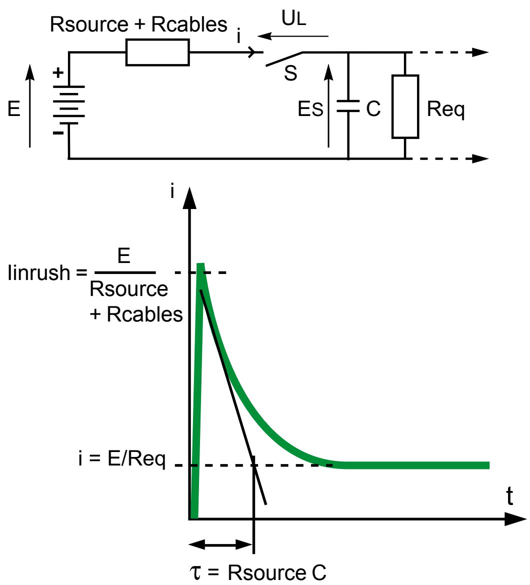
An inductive load will tend to lengthen the current interrupt or establishment time, because the inductance **L** then opposes the change in the current (**Ldi/dt**).
The transient phenomenon will mainly be characterised by a time constant imposed by the load and whose value corresponds approximately to the interrupt or closing time that the switchgear has to withstand. In addition, during the interrupt time, the switchgear must be able to withstand the additional energy stored in the inductor in steady state.
An inductive load therefore requires particular attention with respect to its time constant.
A low value (typically < 5 ms) facilitates interruption.



Inductive load

Capacitive load

During a closing operation, a capacitive load will cause an inrush current due to the load on the capacitor, virtually under short-circuit condition at the beginning of the phenomenon.
On opening, it will tend to discharge. The time constant is generally very low (< 1 ms) and its effect is secondary with respect to the inrush current. A capacitive load will require particular attention to the inrush or discharge current surges.



Capacitive load

Circuit breakers for direct current applications (cont.)

24 V - 48 V direct current applications

Time constant L/R

When a short-circuit occurs across the terminals of a direct current circuit, the current increases from the operating current (< In) to the short-circuit current Isc during a time depending on the resistance **R** and the inductance **L** of the short-circuited loop.

The equation that governs the current in this loop is: $U = Ri + Ldi/dt$.

A short-circuit current is established (neglecting In with respect to Isc) by the equation:
$i = Isc\ (1 - \exp(-t/\tau))$,
where $\tau = L/R$ is the time constant used to establish the short-circuit.

In practice, after a time $t = 3\tau$ the short-circuit is considered to be established, because the value of exp(-3) = 0.05 is negligible compared to 1.
The lower the corresponding time constant (e.g. battery circuit), the faster a short-circuit is established.

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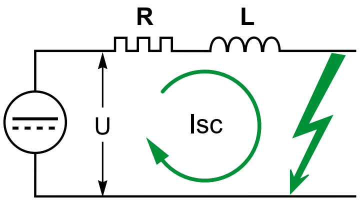

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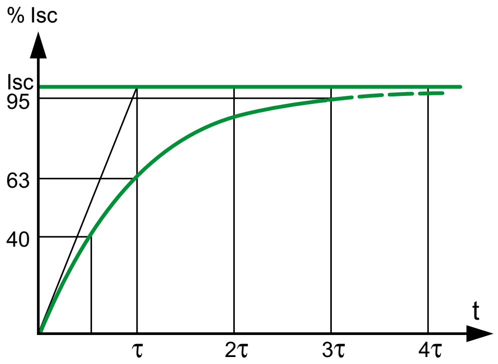
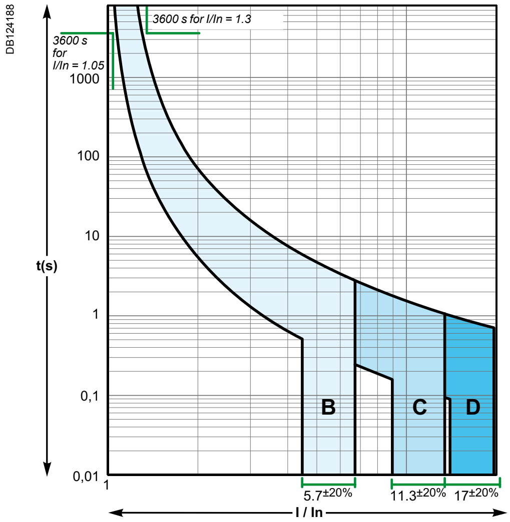


L/R	Description	DC applications
2 ms	Very fast short-circuit	■ Photovoltaic applications
5 ms	Fast short-circuit established	■ Resistive or slightly inductive circuits: □ indicator light □ trip units (MN, MX) □ motor armatures □ battery charger/uninterruptible power supply (UPS) ■ Capacitive circuits: electronic controller
15 ms	Standardised value used in standard IEC 60947-2	■ Inductive circuits: □ electromagnetic coil □ contactor coil □ motor inductor
30 ms	Slower short-circuit established	■ Highly inductive circuits: □ electromagnetic coil □ contactor coil □ motor inductor

In general, the system time constant is calculated under worst case conditions, across the terminals of the generator.

Circuit breakers for direct current applications (cont.)

24 V - 48 V direct current applications



Curves B, C, D, ratings 6 A to 63 A

Tripping curves

We can choose our solution according to the inrush currents generated by our loads, in the same way as for alternating current. In direct current, the same thermal tripping curves are obtained as in alternating current. The only difference is that the magnetic thresholds are offset by a coefficient √2 compared to the curves obtained in alternating current.

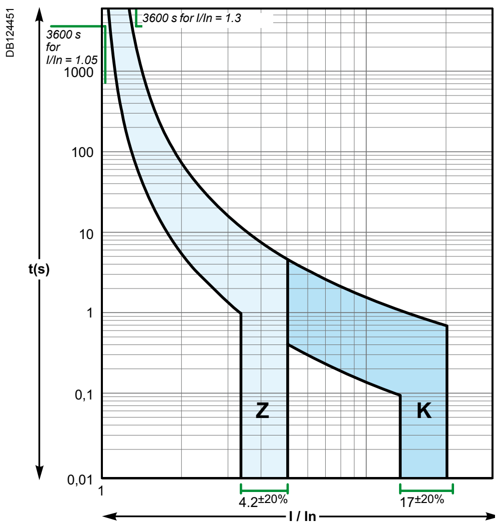
Characteristics of the various curves and their applications:

Curves	Magnetic thresholds		DC applications
	AC	DC	
Z	2.4 to 3.6 In	3.4 to 5 In	■ Resistive loads ■ Loads with electronic circuits
B	3.2 to 4.8 In	4.5 to 6.8 In	■ Motor inductor: starting current 2 to 4 In ■ Battery charger/Uninterruptible power supply (UPS)
C	6.4 to 9.6 In	9.05 to 13.6 In	■ Electronic controller
D et K	9.6 to 14.4 In	13.6 to 20.4 In	■ Electromagnetic coil: inrush overvoltage 10 to 20 Un ■ LV relay ■ Trip units (MN, MX) ■ Indicator light ■ PLCs (industrial programmable logic controllers)

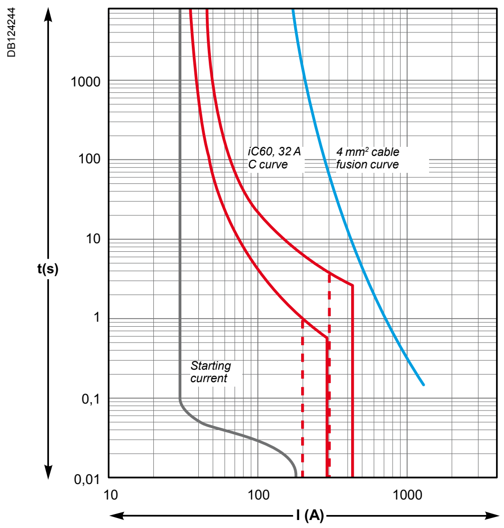
The figures opposite are iC60 tripping curves showing DC magnetic thresholds and normative limits

Example

Protection of the 4 mm² cable supplying a load at In = 30 A with a 32 A rating and a tripping curve that allows the starting current for this load to be absorbed.



Curves Z, K, ratings 6 A to 63 A



Curve C, rating 32 A (AC magnetic thresholds in dotted lines)

Circuit breakers for direct current applications (cont.)

24 V - 48 V direct current applications

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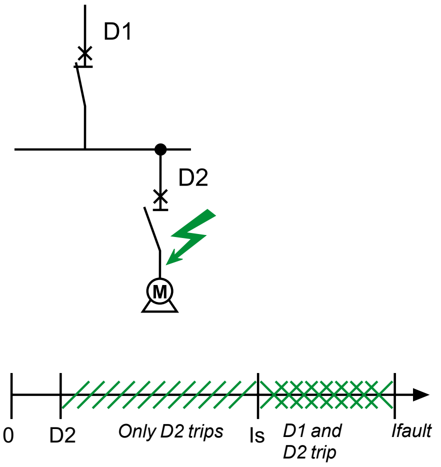

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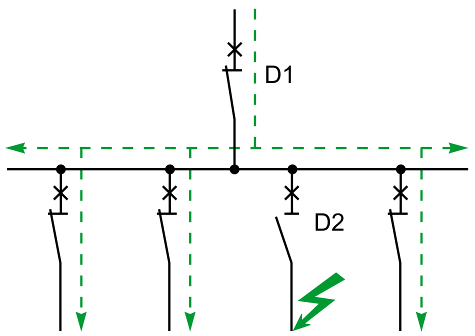


Continuity of service of the solutions

Discrimination of the direct current protection devices

Discrimination is a key element that must be taken into account right from the design stage of a low-voltage installation to allow continuity of service of the electrical power.

Discrimination involves coordination between two circuit breakers connected in series, so that in the event of a fault, only the circuit breaker positioned immediately upstream of the fault trips. A discrimination current Is is defined as:
- I fault < Is: only D2 removes the fault, discrimination ensured,
- I fault > Is: both circuit breakers may trip, discrimination not ensured.

Discrimination may be partial or total, up to the breaking capacity of the downstream circuit breaker. To ensure total discrimination, the characteristics of the upstream device must be higher than those of the downstream one.

The same principles apply to designing both direct current and alternating current installations. Only the limit currents change when direct current is used.

Once again, we find the same concepts of discrimination:
- **total**: up to the breaking capacity of the downstream device. Our tests have been performed at up to 25 kA or 50 kA depending on the breaking capacity of the devices in question.
- **partial**: indication of the discrimination limit current **Is**. Discrimination is ensured below this value; above this value, the upstream device participates in the breaking process,
- **none**: no discrimination ensured, the upstream and downstream circuit breakers will trip.

For further information about the discrimination concept for protection devices in general, refer to technical supplement 557E4300, "Discrimination of modular circuit breakers".

Total discrimination solutions

In the following tables, we offer you solutions that favour continuity of service (total discrimination between circuit breakers), for different short-circuit currents.

T	*Total discrimination.*
	No discrimination.

Circuit breakers for direct current applications (cont.)

24 V - 48 V direct current applications

Total discrimination: 20 kA

		Upstream	Curve C	Time constant (L/R) = 15 ms						
		iC60H					C120H			NS
	In (A)	10 - 16	20 - 25	32	40	50 - 63	80	100	125	≥ 100
Downstream										
iC60H	≤ 3	T	T	T	T	T	T	T	T	T
Curves B,C	4		T	T	T	T	T	T	T	T
	6				T	T	T	T	T	T
	10						T	T	T	T
	13						T	T	T	T
	16 to 25						T	T	T	T
	32							T	T	T
	40								T	T
	50 - 63								T	T

Total discrimination: 36 kA

		Upstream Curve C Time constant (L/R) = 15 ms	
		NG125H	NS
	In (A)	80	≥ 100
Downstream			
NG125H	10	T	T
Curves B,C	16 to 63		T

Total discrimination: 50 kA

		Upstream Curve C Time constant (L/R) = 15 ms	
		NG125L	NS
	In (A)	80	≥ 100
Downstream			
NG125L	10	T	T
Curves B,C	16 to 63		T

T	*Total discrimination.*
	No discrimination.

Circuit breakers for direct current applications

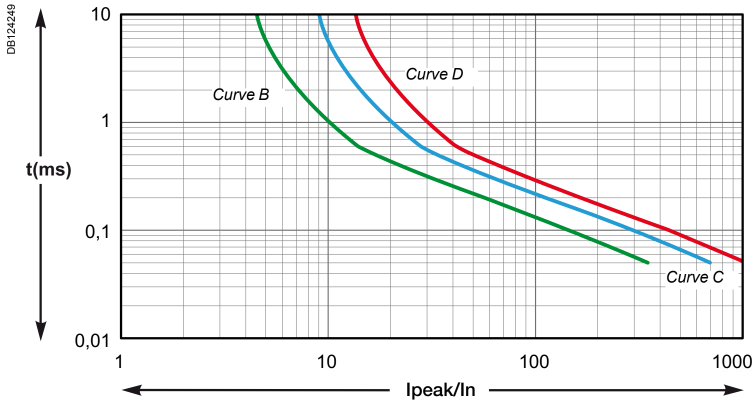
24 V - 48 V direct current applications

Coordination with loads

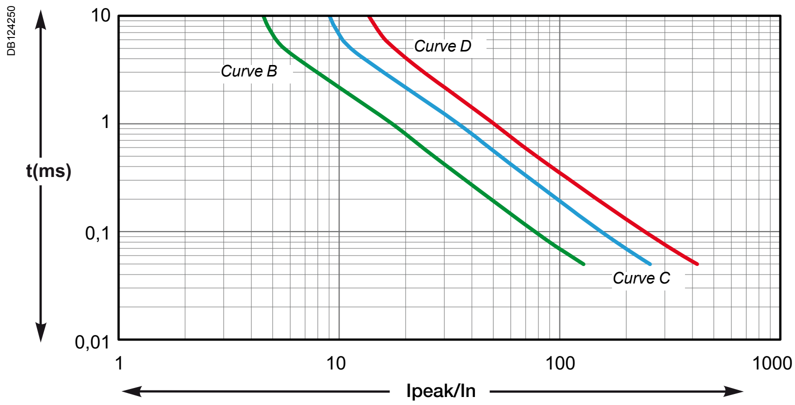
As seen above, the circuit-breaker characteristics chosen depend on the type of load downstream of the installation.
The rating depends on the size of the cables to be protected and the curves depend on the load inrush current.

Product selection according to the load inrush current
When certain "capacitive" loads are switched on, very high inrush currents appear during the first milliseconds of operation. The following graphs show the average DC non-tripping curves of our products for this time range (50 µs to 10 ms).

iC60



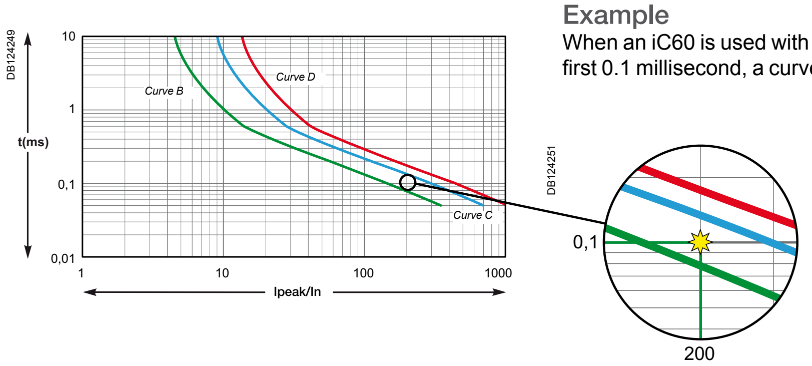
NG125 / C120



This information allows us to select the most appropriate product, according to the load specifications: curve and rating.

Example

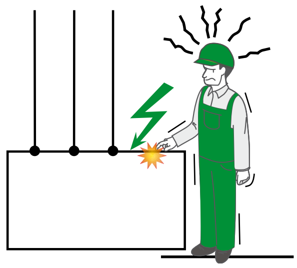
When an iC60 is used with a load with current peaks in the order of 200 In during the first 0.1 millisecond, a curve C or D product must be installed.



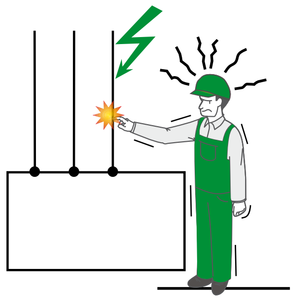
Circuit breakers for direct current applications

24 V - 48 V direct current applications

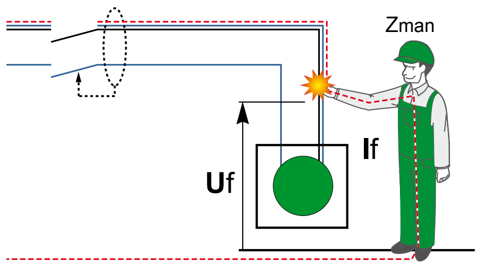
DB124238



DB124239



DB124237



Standards: IEC 60479-2, NF C 15100, IEC 60755.

Personal protection

Personal protection (earth-leakage protection) is not mandatory for this voltage range (24-48 V DC).
In fact, according to the standards currently in force, the minimum ventricular fibrillation current **If** for human beings is in the order of 25 mA for alternating current (50 Hz), whereas for direct current, it is more than 50 mA.
The table below shows the data according to the standards and conditions:

Environment		Voltage specifications	
		AC	DC
Dry environment Zman = 2000 Ohm	Uf = Z x If	50 V	100 V
Wet environment Zman = 1000 Ohm	Uf = Z x If	25 V	50 V

*With **Z** corresponding to the impedance of the human body in the different types of environment, **If** being the current passing through the body and **Uf** the minimum contact voltage required to reach the danger current.*

Under normal operating conditions, this voltage range (< 50 V) is therefore not dangerous to human beings.

Circuit breakers for direct current applications (cont.)

24 V - 48 V direct current applications

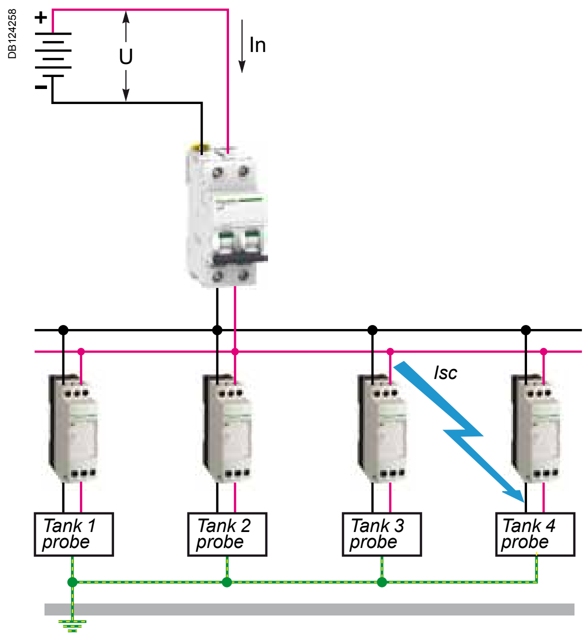
Examples of applications

Industrial applications

Monitoring of agro-food tanks with 24 V DC converters for probes and other sensors

■ Isolated network:
□ Isc = 20 kA,
□ In = 40 A.

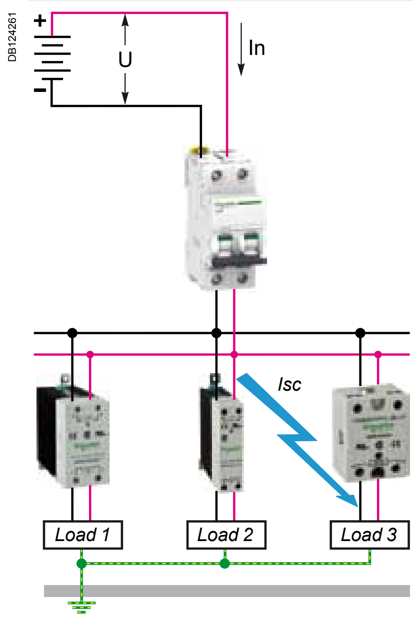
Solution
iC60H 2P 40 A + 24 V converters



Control of industrial process measurement by 12/24/48 V DC control

■ Isolated network:
□ Isc = 20 kA,
□ In = 40 A.

Solution
iC60H 2P 40 A + DC solid-state relays



Circuit breakers for direct current applications (cont.)

24 V - 48 V direct current applications

24 V DC generator power supply protection

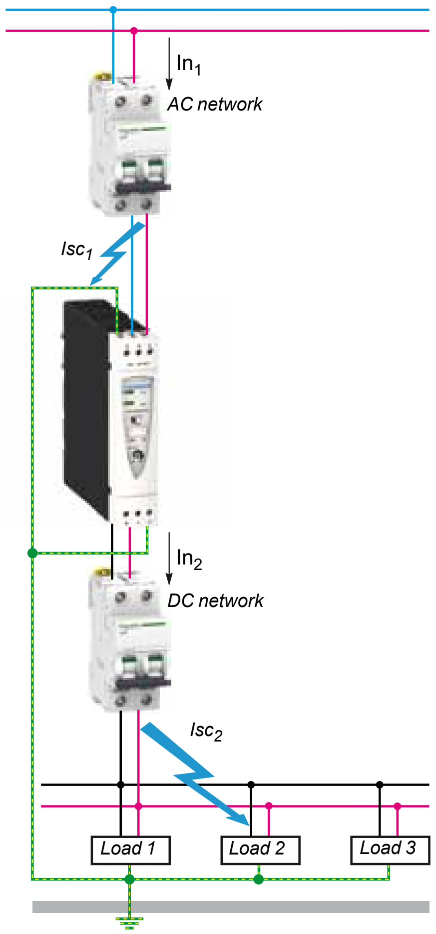
■ Earthed network:

□ Isc = 10 kA / In = 63 A,

□ Isc = 10 kA / In = 20 A.

Solution
iC60H 2P 63 A + iC60N 2P 20 A + DC loads

DB124262



Circuit breakers for direct current applications (cont.)

24 V - 48 V direct current applications

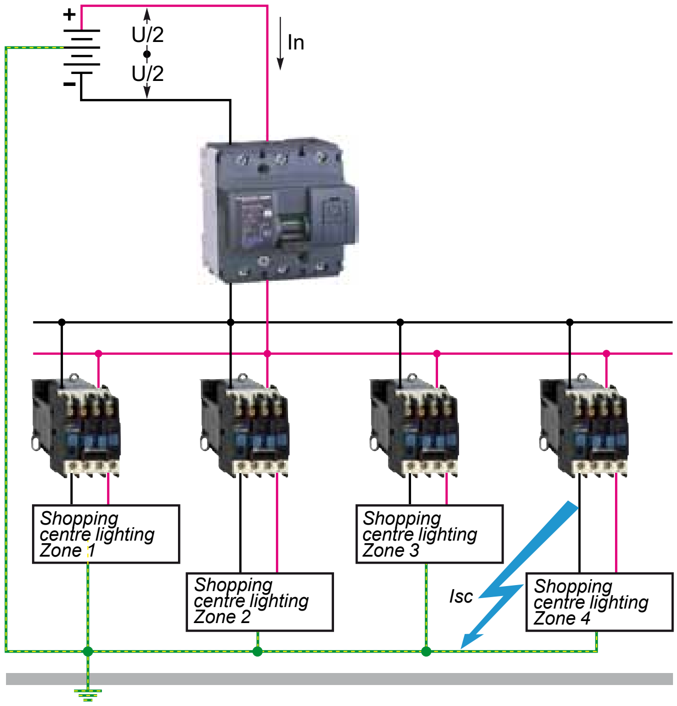
Tertiary applications

Control and monitoring of the 48 V DC emergency lighting distribution for a shopping centre

- Mid-point of the network:
  - Isc = 20 kA,
  - In = 125 A.

Solution
NG125H 3P 125 A + power contactors

DB124259



Circuit breakers for direct current applications (cont.)

24 V - 48 V direct current applications

Power supply protection by 24 V DC direct current generator

■ Earthed network:

□ Isc_1 = 10 kA / In = 40 A,

□ Isc_2 = 10 kA / In = 2/4/6 A.

Solution

iC60H 2P 40 A + iC60H 2P 2/4/6 A + PLC inputs + DC loads

The Phaseo network failure solution provides the installation (or part thereof) with a 24 V DC power supply in the event of a mains voltage failure:

■ throughout the mains failure, to ensure the continuity of service of the installation.

■ during a limited time to allow:

□ data to be backed up,

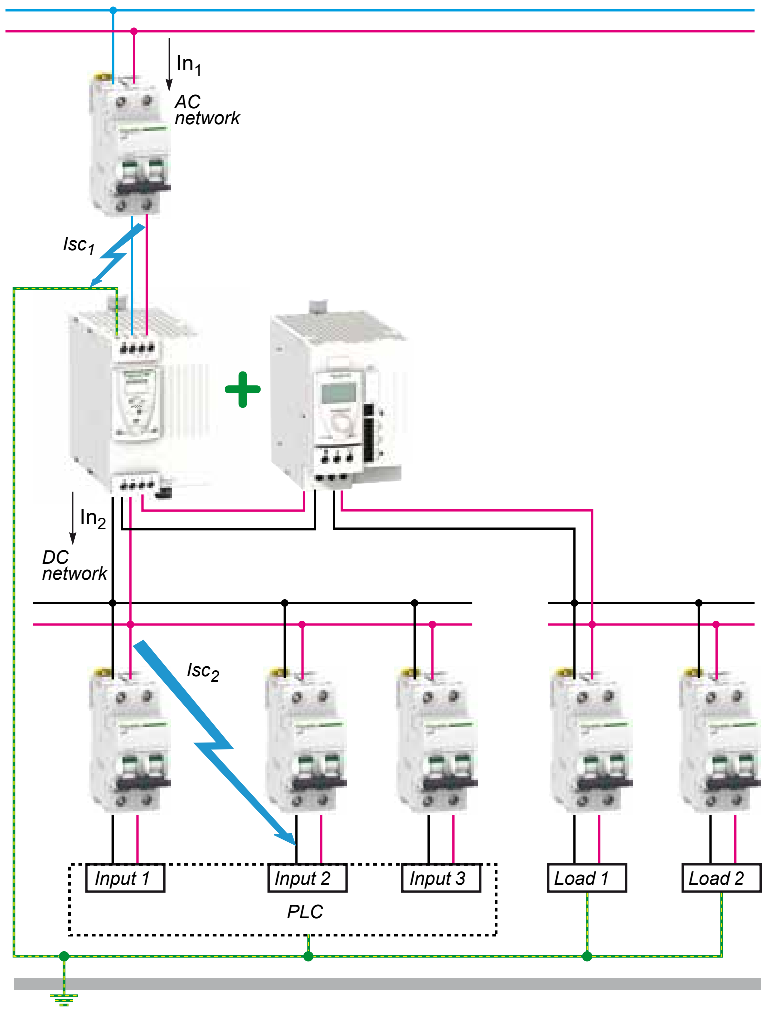
□ actuators to be put in the fallback position,

□ a generating set to be started up,

□ the operating systems to be shut down,

□ remote supervision data to be transmitted.

DB124282



400 Hz network

Compatibility of 50/60 Hz equipment with a 400 Hz network

The performance of products designed for domestic frequencies of 50/60 Hz is impacted by the specific properties of networks of 400 Hz frequency.

Phenomena due to the increased frequency influence the behaviour of the copper components of transformers, cables and protective equipment.

Some types of equipment designed for 50/60 Hz networks may not be suitable. You should check whether or not a product is compatible and also apply any correction factors given by the manufacturer.

Circuit breakers

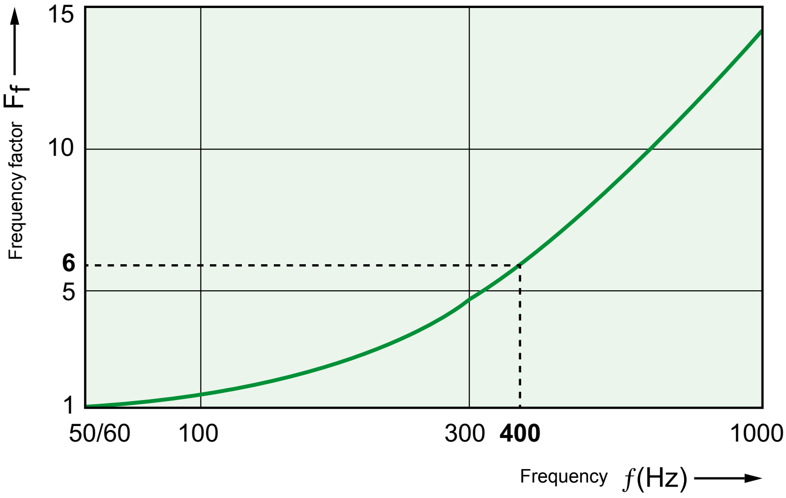
Depending on the technologies used, modular circuit breakers designed for 50/60 Hz can be used at 400 Hz.
To choose the performance of a modular circuit breaker:
■ do not take any thermal derating into account
(In at 400 Hz is equivalent to In at 50 Hz).
■ increase the magnetic tripping threshold, according to the table below.
■ check that the short-circuit current on the installation is less than the breaking capacity of the circuit breaker. The breaking capacity of the circuit breakers at a frequency of 400 Hz is the same as at frequencies of 50/60 Hz. This characteristic is generally complied with, due to the fact that the short-circuit current of a 400 Hz generator is relatively low. In most cases, the generator Isc does not exceed four times the rated current.

Circuit breaker	Curve	Magnetic trip thresholds		
		50 Hz	400 Hz	Tolerance
iDPN, DPN	B	4 In	6 In	± 20 %
	C	8 In	12 In	
	D	12 In	18 In	
iC60	B	4 In	5.6 In	
	C	8 In	11.2 In	
	D	12 In	16.8 In	
C60	B	4 In	5.1 In	
	C	8.5 In	10.9 In	
	D	12 In	15.4 In	
C120	The NG125 and C120 circuit breakers are not suitable for networks of 400 Hz frequency. Refer to the Compact NSX offer.			
NG125				

400 Hz network (cont.)

Earth leakage protection devices

The residual current device trip thresholds designed for 50/60 Hz increase with the frequency, but since the human body is less sensitive to the passage of a current at 400 Hz, protection is still ensured for the users.
According to the IEC 60479-2 standard, at 400 Hz the ventricular fibrillation threshold is higher by a ratio of 6 (which means that the physiological effect of a 180 mA current at 400 Hz will be the same as that of a 30 mA current at 50/60 Hz).



Variations in the ventricular fibrillation threshold for shock durations exceeding the period of cardiac cycle (as per IEC 60479-2).

Compatibility of residual current devices at 400 Hz:

Depending on the type and the technology employed, a residual current device designed for a frequency of 50/60 Hz will or will not be capable of ensuring protection for users in accordance with the requirements of the standard.

Type of protection and type of equipment		Use possible on network of 400 Hz frequency	Limit
A type		Not compatible	Trip threshold exceeding the limit given by the curve
AC type		Not recommended	Excessive sensitivity with risk of unwanted tripping (poor guarantee of continuity of service)
Si type	iID	YES	
	Vigi iC60	Not compatible	Trip threshold exceeding the limit given by the curve
	DPN Vigi, Vigi DPN	YES	

Note: The choice of an iID residual current circuit breaker ensures protection for users at 400 Hz while ensuring good continuity of service.

At 400 Hz, the test function of residual current devices designed for 50/60 Hz is not operational due to the increase in the trip threshold.

Auxiliary function

Voltmetric releases

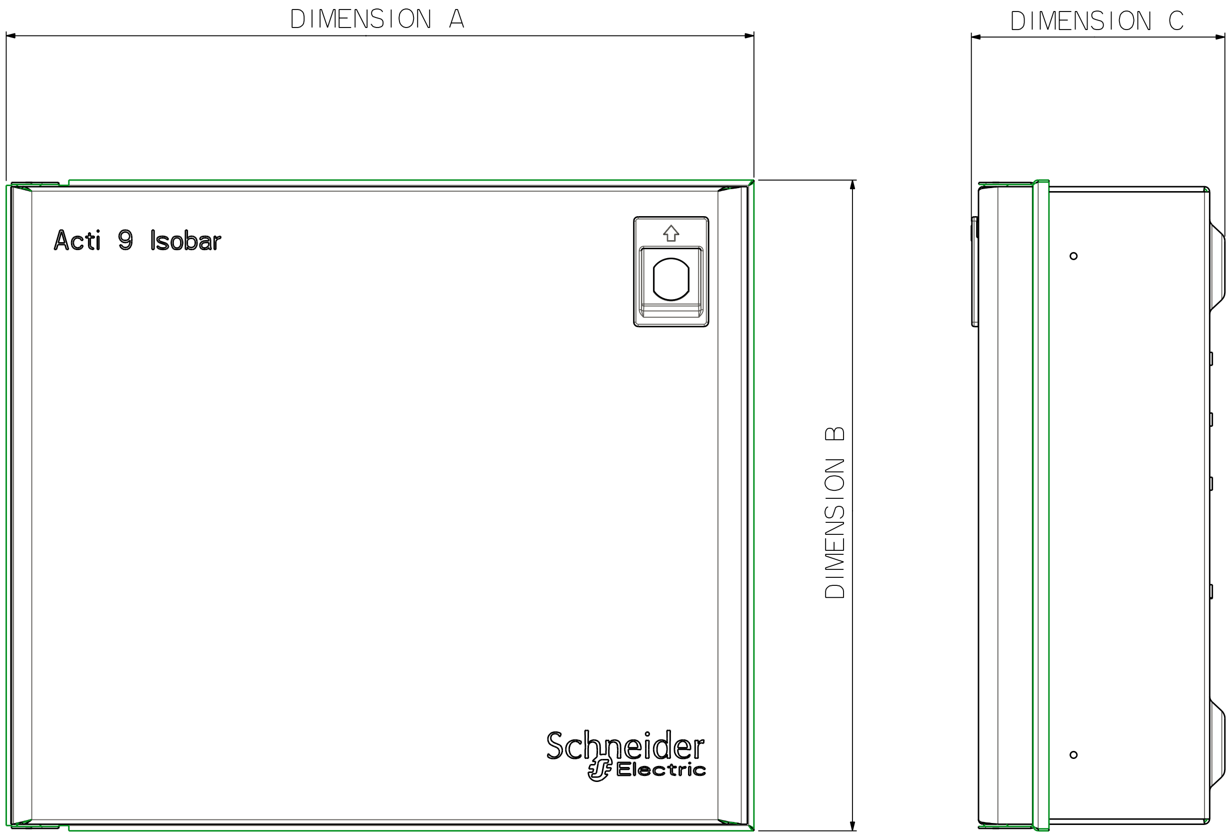
If a circuit breaker needs to be provided with a voltmetric release whose control circuit is powered by the 400 Hz network, it is necessary to use a release auxiliary of appropriate characteristics for 400 Hz networks:

Type	Voltage	Cat. no.
Undervoltage release iMN	115 V AC - 400 Hz	A9A26959

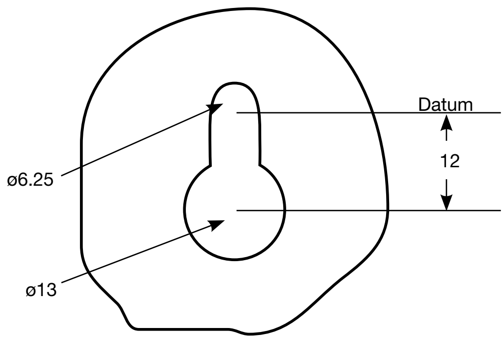
Dimensions (mm)

Distribution boards
A type

Part number	A	B	C
SEA9AN2	200	300	117
SEA9AN6	273	300	117
SEA9AN10, SEA9AN26DS	345	300	117
SEA9SNI4, SEA9AN26SL, SEA9AN66DS, SEA9AN616MS, SEA9ANI08MS	417	300	117
SEA9ANI8, SEA9AN6S6, SEA9AN5I0SL, SEA9AN96SL, SEA9ANI06DS, SEA9AN624MS, SEA9ANI016MS, SEA9ANI48MS	489	300	117
SEA9AN27, SEA9ANI0SI0, SEA9ANI432MS	417	530	117



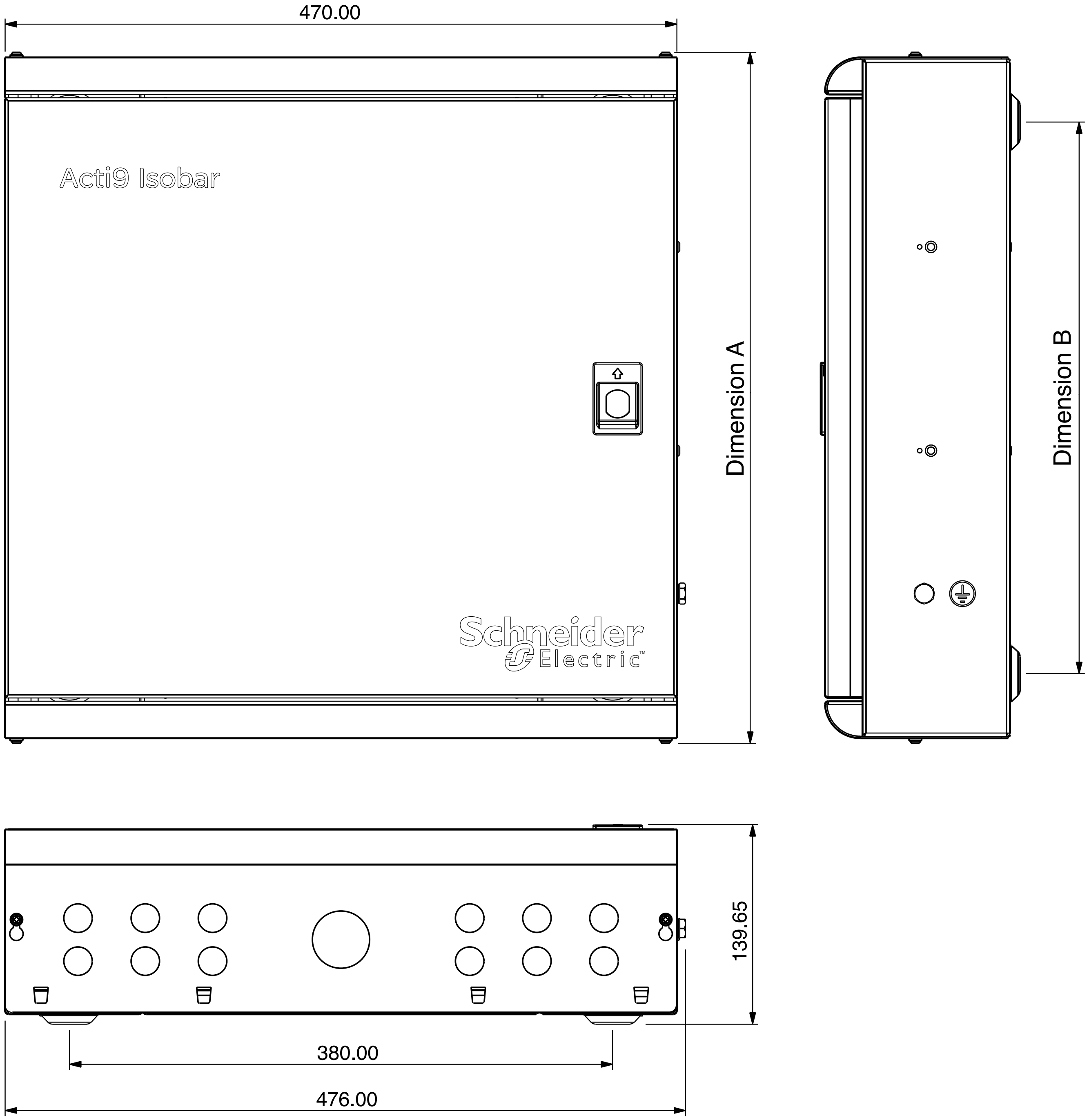
Key hole slot dimensions



Dimensions (mm)

Distribution boards B type

Part number	A	B
SEA9BN4,SEA9BN6	484	386
SEA9BN8	538	440
SEA9BN12	700	602
SEA9BN16, MGBN18	862	710
SEA9BN24	1024	872
SEA9BN split metering	1294	1192

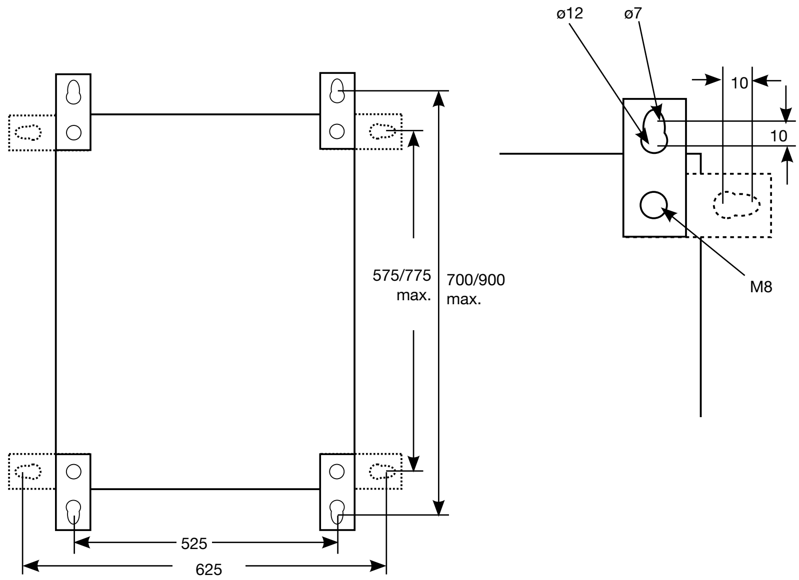


Dimensions (mm)

Heavy duty distribution board (100A) IP55 weatherproof

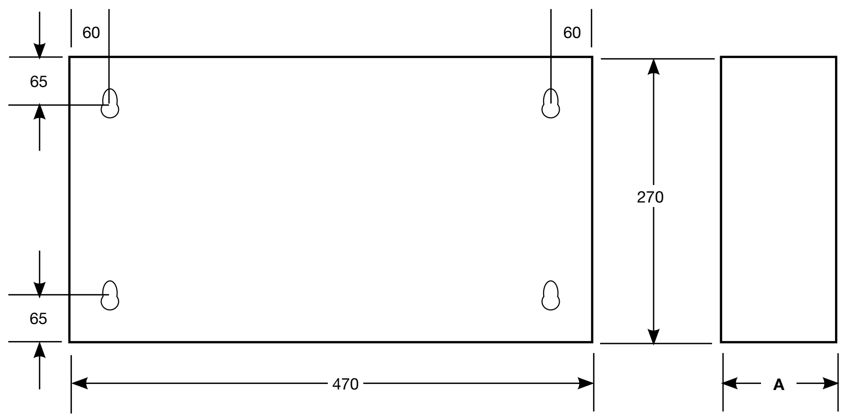
Part number	Number of	Dimensions (mm)		
		Height	Width	Depth
SEA9BN6HDGK/G-R	6	650	600	290*
SEA9BN8HDGK/G-R	8	650	600	290*
SEA9BN12HDGK/G-R	12	850	600	290*
SEA9BN16HDGK/G-R	16	850	600	290*

* Denotes the maximum depth dimensions with key fitted.



B board extension box enclosures

Part number	A
SEA9BNEXN	124
SEA9BNEX034N	140
SEA9BNKWH	124
SEA9BNEXA15N	140
SEA9BN100CCI	140
SEA9BNDSI	124

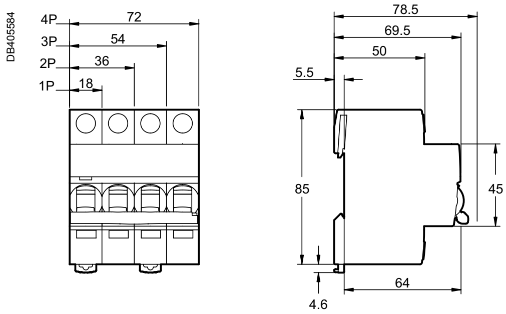


iC60H circuit breakers

Weight (g)

Circuit-breaker	
Type	iC60H
1P	125
2P	250
3P	375
4P	500

Dimensions (mm)



Vigi iC60 add-on residual current devices

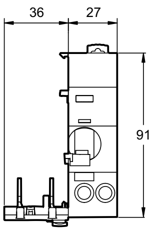
Weight (g)

Add-on residual current devices	
Type	Vigi iC60
2P	165
4P	245

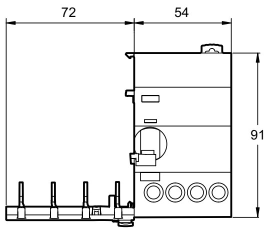
Dimensions (mm)

Vigi iC60 25 A

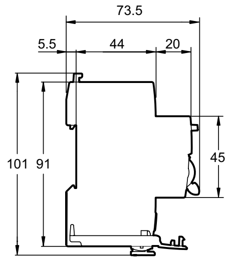
DB122766



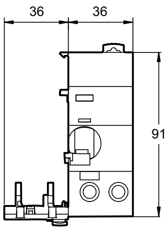
2P



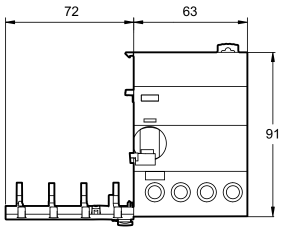
4P



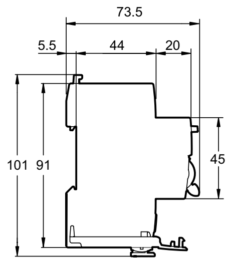
Vigi iC60 40 and 63 A



2P



4P

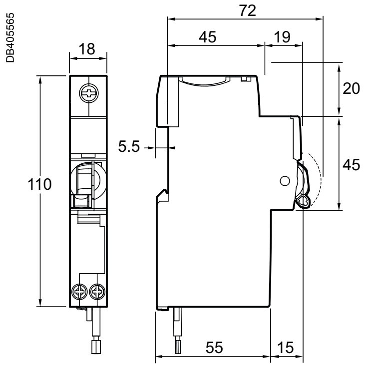


iC60 RCBO
10, 30 and 100 mA

Weight (g)

iC60 RCBO	
iC60H RCBO	205

Dimensions (mm)



iC60N RCBO, iC60H RCBO

Electrical auxiliaries for iC60, iID, RCA and ARA

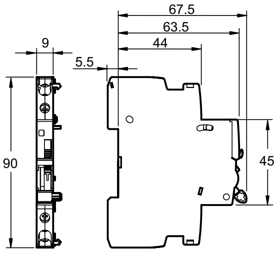
Technical data

Weight (g)

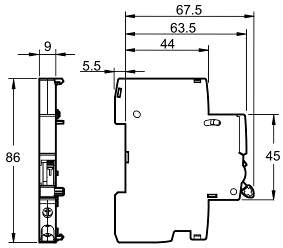
Electrical auxiliaries	
Type	
iMN	69
iMNs	72
iMNx	79
iMSU	68
iMX	64
iMX+OF	68
iOF	32
iSD	33
iOF/SD+OF	43
iOF+SD24	25

Dimensions (mm)

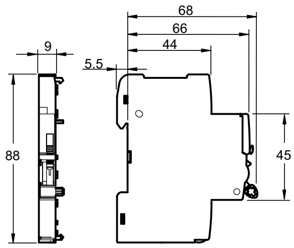
DB124223



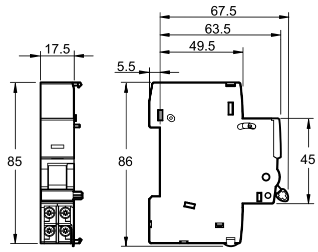
iOF/SD+OF



iOF, iSD



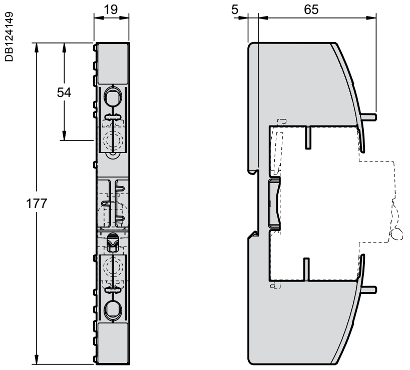
iOF+SD24



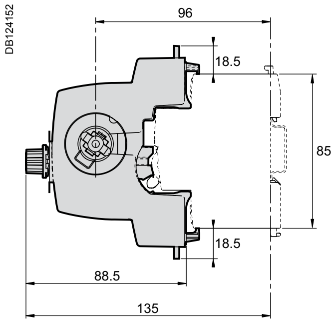
iMN, iMNs, iMNx, iMSU, iMX, iMX+OF

Accessories for iC60, iID , iDPN Vigi, iSW-NA, Reflex iC60, RCA, ARA, iSW (cont.)

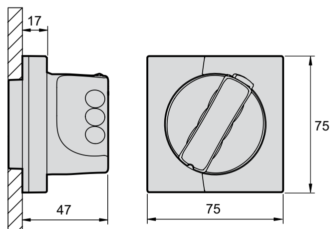
Dimensions (mm)



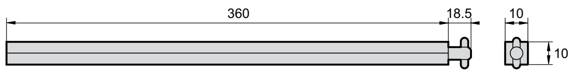
Plug-in base



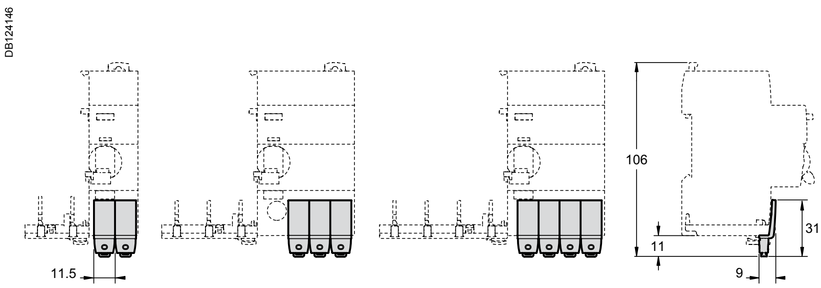
Adapter mechanism



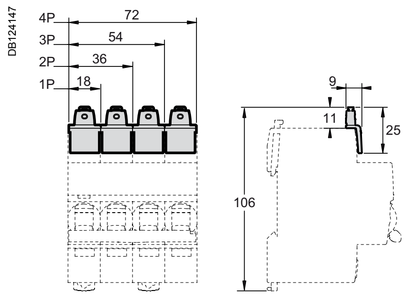
Handle



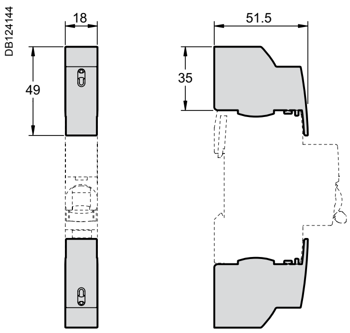
Rotary handle



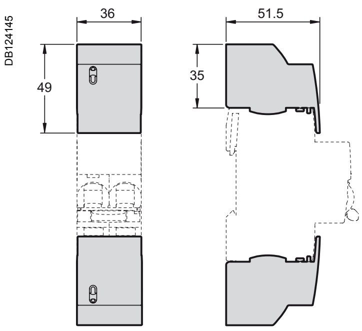
Screw shield 1P (A9A26982)



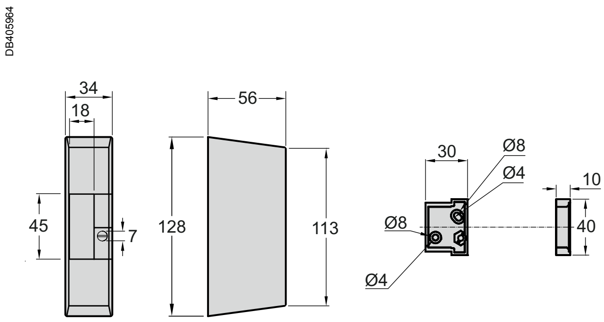
Screw shield 4P (A9A26981)



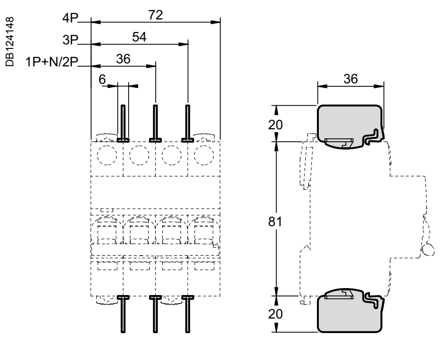
Terminal shield 1P



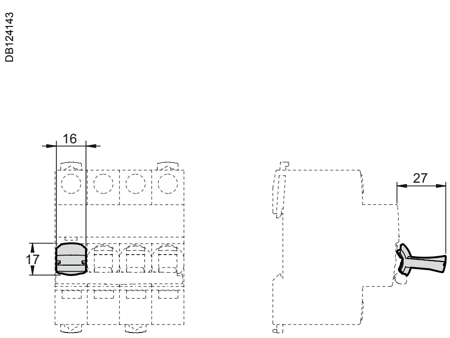
Terminal shield 2P



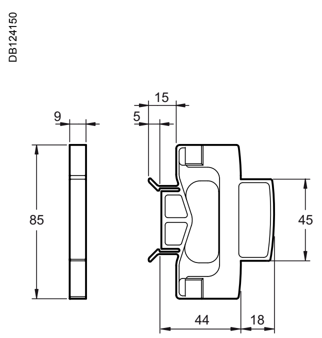
Wall mounted



Inter-pole barrier



Padlocking device



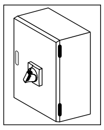
Spacer

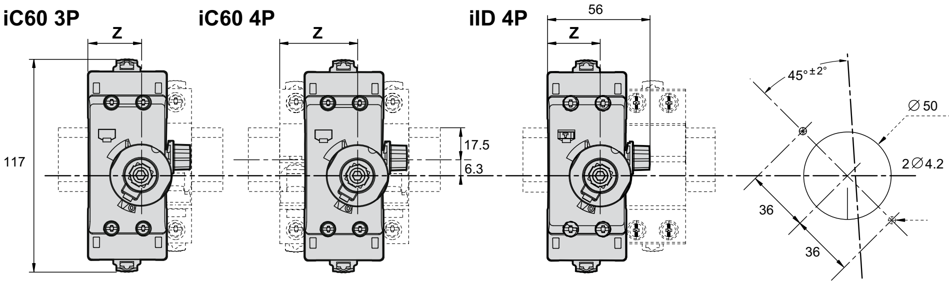
Accessories for iC60, iID , iDPN Vigi, iSW-NA, Reflex iC60, RCA, ARA, iSW (cont.)

Rotary handle installation

Dimensions (mm)

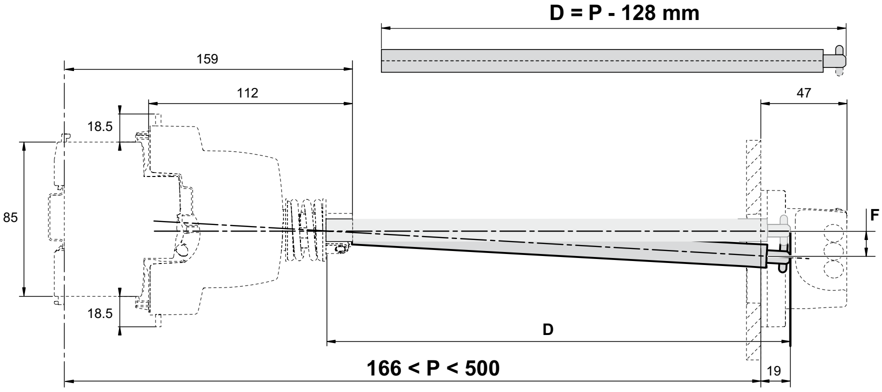
DB124142

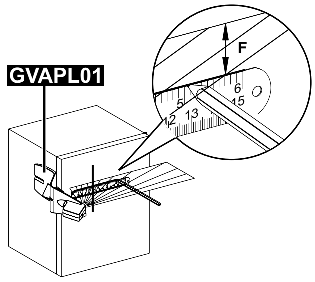




iC60	Z (mm)
2P	25.3
2P + Vigi	25.3
3P	25.3
3P + Vigi	43
4P	43
4P + Vigi	43

iID	Z (mm)
2P	25.3
4P	25.3

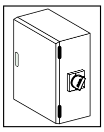


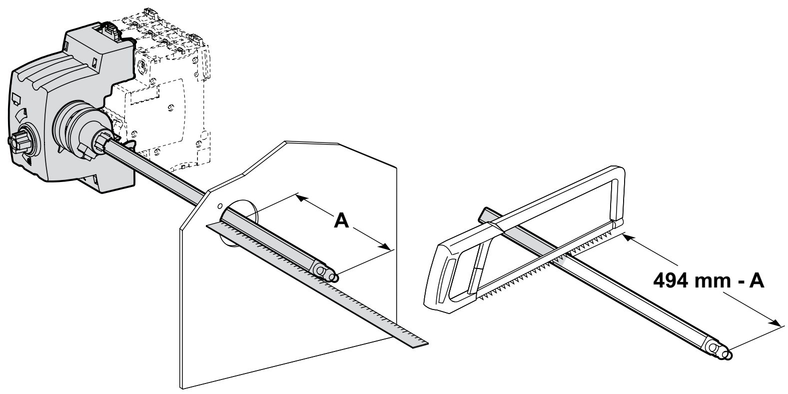


P (mm)	F (mm)
300	5
500	11

Rotary handle: front mounted control

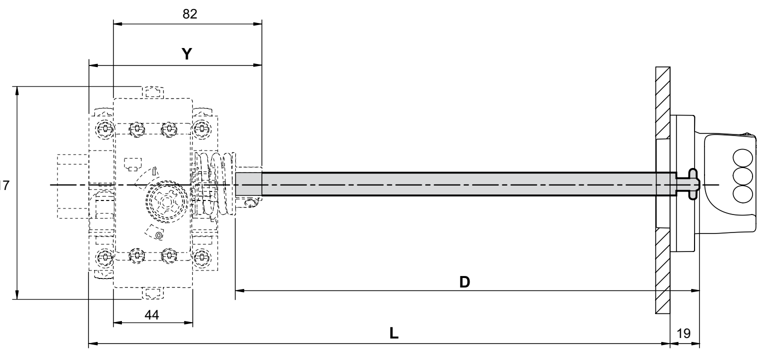
DB124141

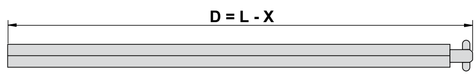




iC60	X (mm)	Y (mm)
2P	44.5	76.8
2P + Vigi	44.5	76.8
3P	44.5	76.8
3P + Vigi	62	94.5
4P	62	94.5
4P + Vigi	62	94.5

iID/iSW-NA	X (mm)	Y (mm)
2P	44.5	76.8
4P	44.5	76.8





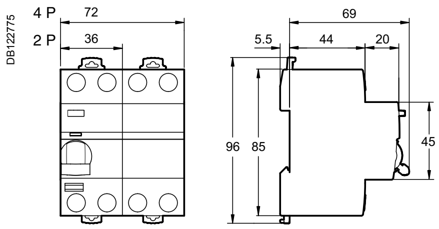
Rotary handle: side mounted control

iID residual current circuit breakers (AC, A, *SI* types) (cont.)

Weight (g)

Residual current circuit breakers	
Type	iID
2P	210
4P	370

Dimensions (mm)



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