Viale Borri, 231, 21100 Varese, Italia
Phone: +39 0332 279111

Megatiker M3 160 thermal magnetic circuit breakers and MS3 160 switch disconnectors

Reference(s) :
T7303F160, T7304F160, T7303N160, T7304N160, T7303H160, T7304H160, T7303L160, T7304L160, T7303S160, T7304S160

CONTENTS

1. USE

Megatiker M3 platform has been developed to give a new solution of protection devices for a more precise approach in power installations in order to offer the correct answer for different project needs.

Megatiker M3 platform provide a complete project approach in premium market segment, offering a range completely suitable for high power application with high performance breakers in compact dimensions and at a competitive costs.

2. RANGE

Circuit breakers

	Megatiker M3 160							
	36 kA		50 kA		70 kA		100 kA	
I_n (A)	3P	4P	3P	4P	3P	4P	3P	4P
160	T7303F160	T7304F160	T7303N160	T7304N160	T7303H160	T7304H160	T7303L160	T7304L160

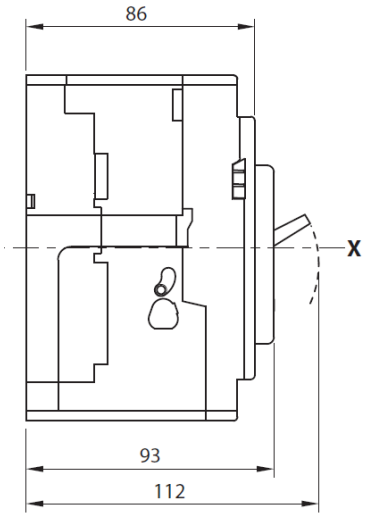
Switch disconnectors

Megatiker MS3 160		
I_n (A)	3P	4P
160	T7303S160	T7304S160

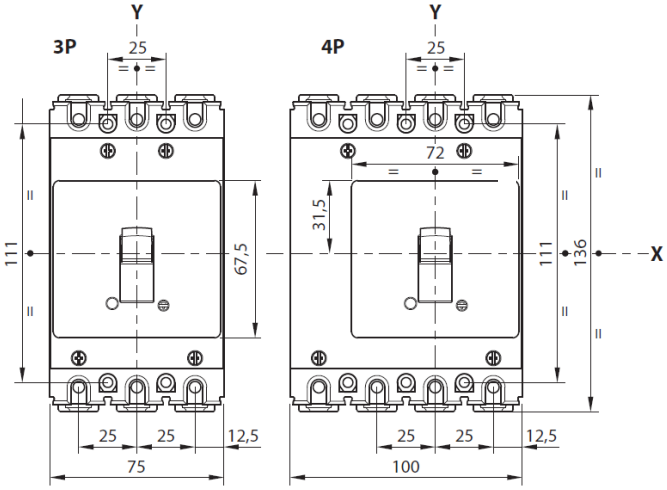
3. DIMENSIONS AND WEIGHTS

3.1 Dimensions

Lateral view



Frontal view (3 and 4 poles)



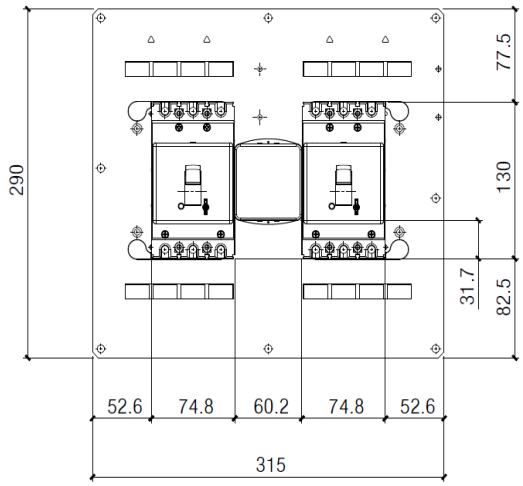
Megatiker M3 160 thermal magnetic circuit breakers and MS3 160 switch disconnectors

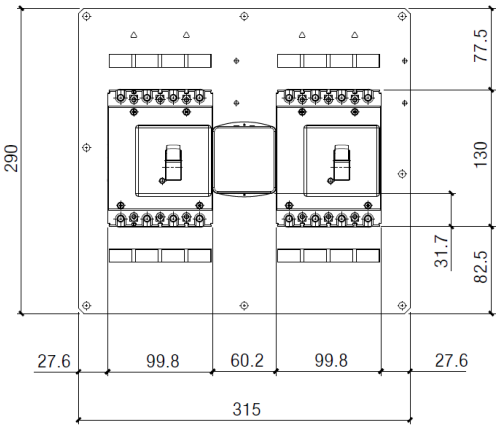
Reference(s) :

T7303F160, T7304F160, T7303N160, T7304N160, T7303H160, T7304H160, T7303L160, T7304L160, T7303S160, T7304S160

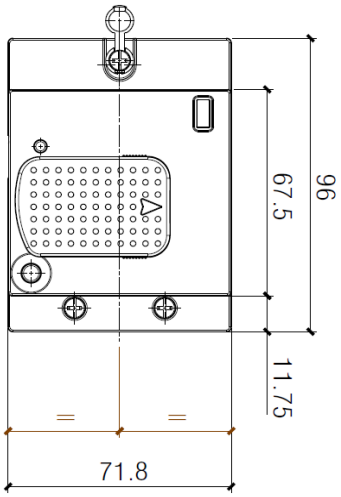
Interlock

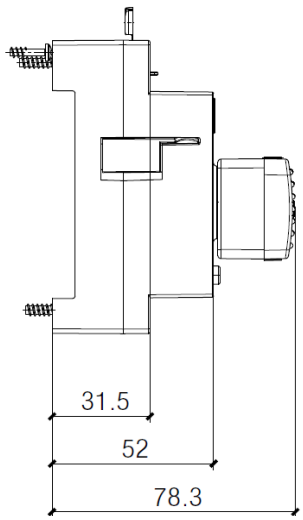
(for rear plate interlock dimension, see relative instruction sheet)

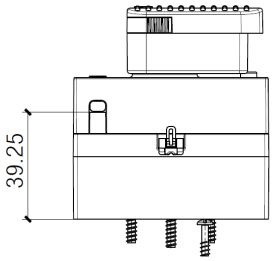


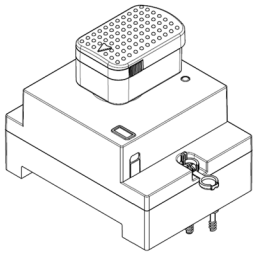


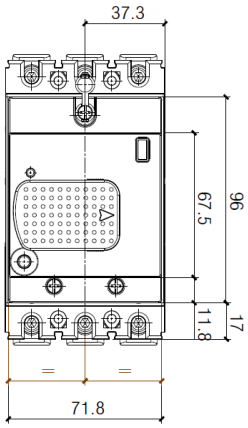
Direct rotary handle

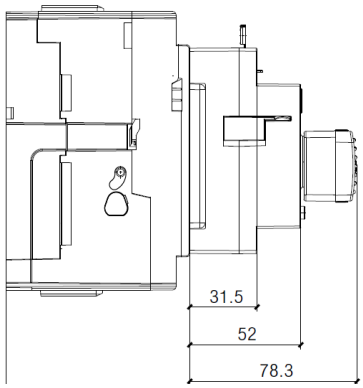










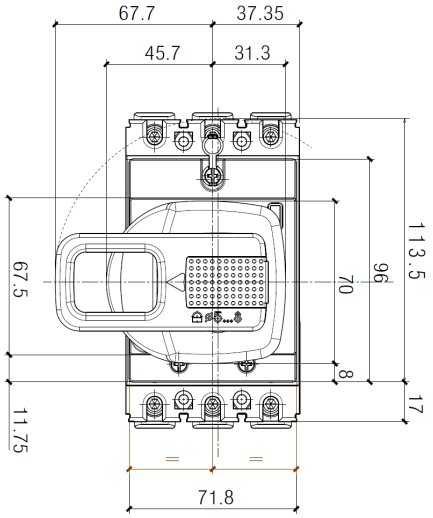


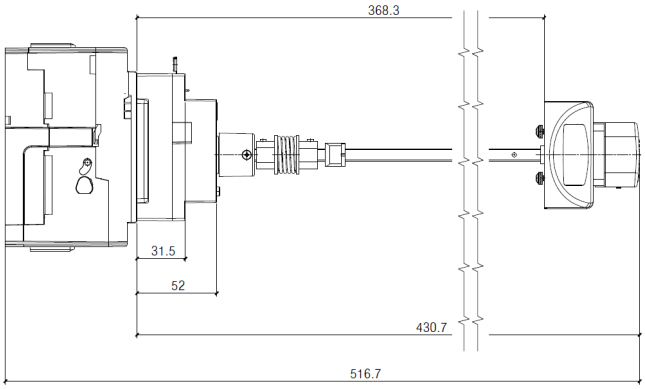
Megatiker M3 160 thermal magnetic circuit breakers and MS3 160 switch disconnectors

Reference(s) :

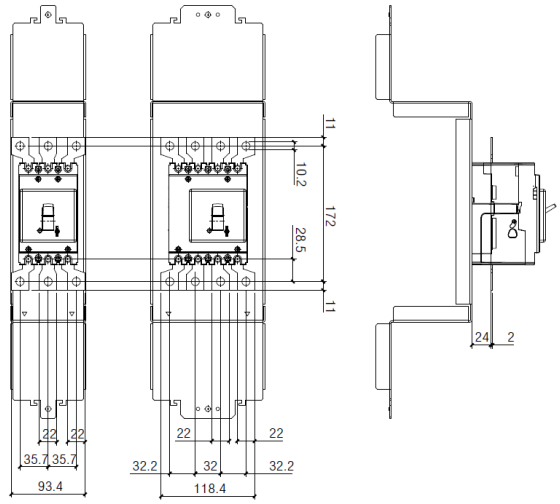
T7303F160, T7304F160, T7303N160, T7304N160, T7303H160, T7304H160, T7303L160, T7304L160, T7303S160, T7304S160

Vari-depth rotary handle

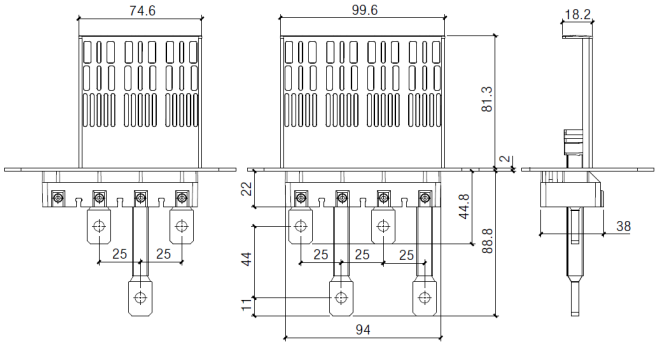




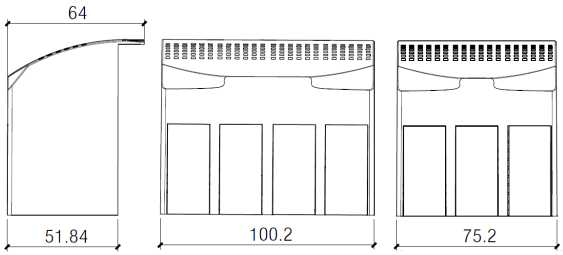
Spreaders

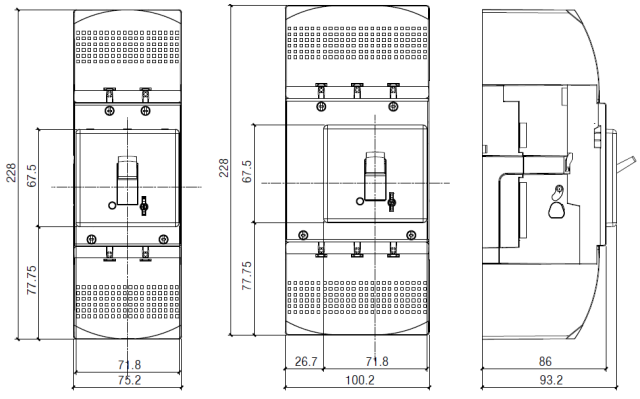


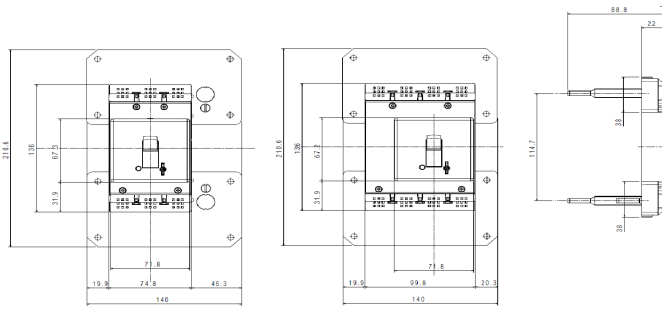
Rear terminals



Scalable terminal shields







3.2 Weights

	Weights (Kg)	
Configuration	**3P**	**4P**
Circuit breaker/switch disconnector	0.95	1.2
Direct rotary handle*	0.18	
Vari depth rotary handle*	0.55	
Interlock*	0.35	
Spreader*	0.135	0.175
** to add to device weight*		

4. OVERVIEW

4.1 Supplied with:

- fixing screws (2 for 3P and 4 for 4P)
- screws for connections (6 for 3P and 8 for 4P)
- phase insulators (2 for 3P and 3 for 4P)

5. ELECTRICAL CONNECTIONS

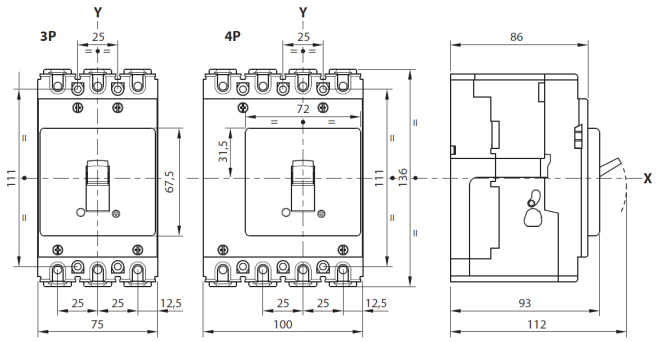
5.1 Mounting possibilities

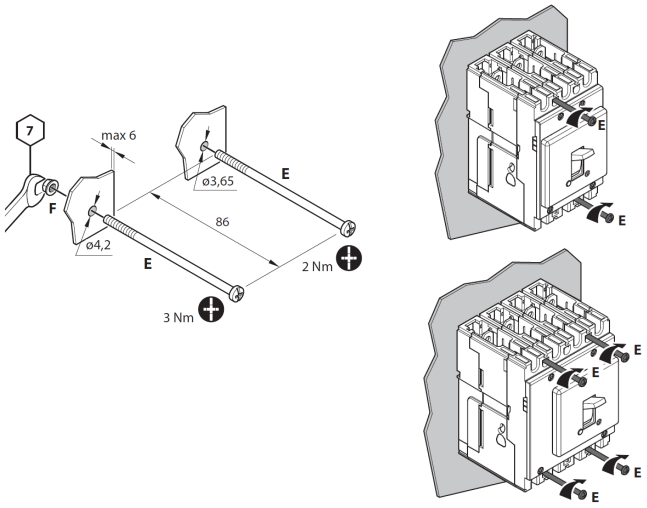
On plate:

- Vertical
- Horizontal
- Supply invertor type

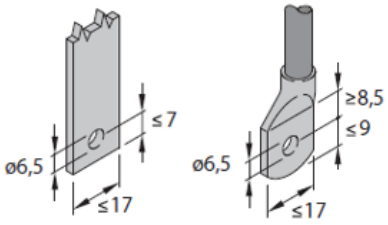
5.2 Mounting

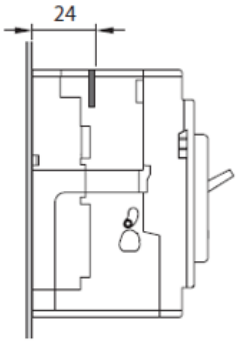
(see instruction sheet for detailed mounting procedures)





Busbars/cable lugs:

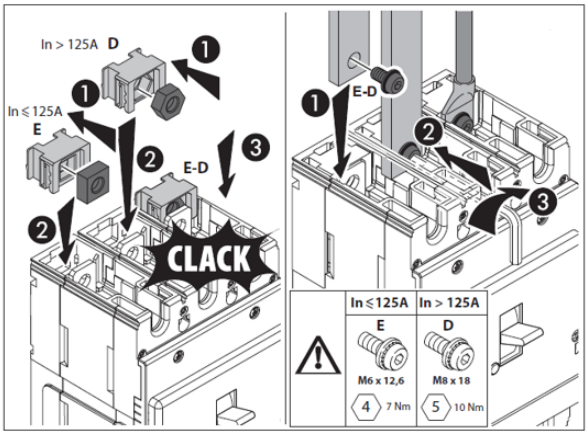


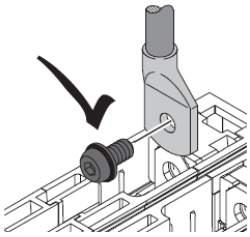


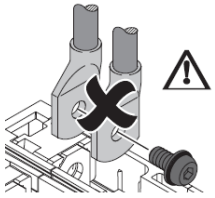
Megatiker M3 160 thermal magnetic circuit breakers and MS3 160 switch disconnectors

Reference(s) :

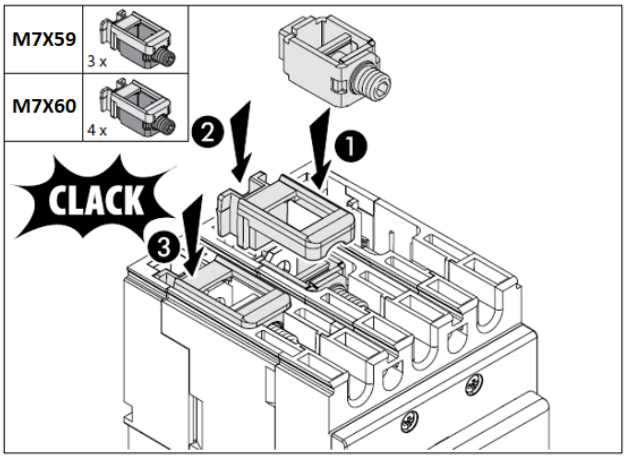
T7303F160, T7304F160, T7303N160, T7304N160, T7303H160, T7304H160, T7303L160, T7304L160, T7303S160, T7304S160



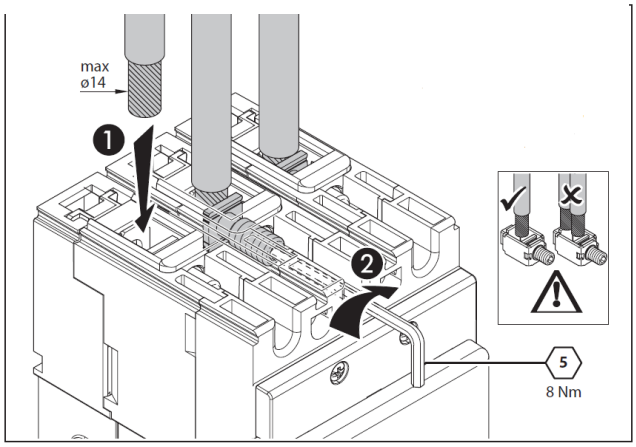




Cables:



For Cu/Al cables, 1x70 mm2 for flexible and rigid cables (for Al cables In max 80A)



Megatiker M3 160 thermal magnetic circuit breakers and MS3 160 switch disconnectors

Reference(s) :
T7303F160, T7304F160, T7303N160, T7304N160, T7303H160, T7304H160, T7303L160, T7304L160, T7303S160, T7304S160

6. ELECTRICAL AND MECHANICAL CHARACTERISTICS

Circuit breaker

Circuit Breaker	Megatiker M3 160 F/N/H/L (36kA, 50kA, 70kA, 100kA)
Rated current (A)	160
Poles	3 - 4
Pole pitch (mm)	25
Rated insulation voltage (50/60Hz) U_i (V)	800
Rated operating voltage (50/60Hz) U_e (V)	690
Rated impulse withstand current U_{imp} (kV)	8
Rated frequency (Hz)	50 - 60
Reference ambient temperature(°C)	40 - 50
Operating temperature (°C)	-25 ÷ 70
Mechanical endurance (cycles)	20000
Electrical endurance at I_n (cycles)	8000
Utilization category	A
Suitable for isolation	Yes
Type of protection	Thermal-magnetic
Thermal adjustment I_r	0,8 - 0,9 - 1 x I_n
Magnetic adjustment I_i (A)	In=1600A (not adjustable)
Neutral protection for 4P (%I_{th} of phase pole)	100
Dimensions (W x H x D) (mm)	75 x 135 x 86 (3P)
	100 x 135 x 86 (4P)

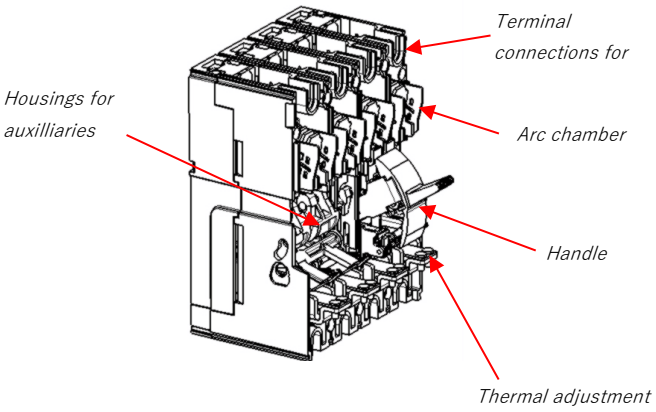
Switch disconnectors

Switch	Megatiker MS3 160
Uninterrupted nominal current I_e (A)	160
Short-time resistive current I_{cw}(kA) for 1s	1.5
Rated short-circuit making capacity I_{cm} (kA)	2.5
Rated insulation voltage U_i (V AC)	800
Maximum rated operating voltage U_e (V AC)	690
Rated impulse withstand voltage U_{imp} (kV)	8
Utilisation category	AC23A
Suitable for isolation	Yes
Nominal frequency (Hz)	50-60
Operating temperature (°C)	-25 ÷ 70
Mechanical endurance (cycles)	20000
Electrical endurance at I_n (cycles)	8000
Dimensions (W x H x D) (mm)	75 x 135 x 86 (3P)
	100 x 135 x 86 (4P)

The maximum admissible (absolute) temperature is 125° C (for detail, see IEC 60947-1 and 60947-2).

Megatiker product line has the possibility to supply both in "direct" and "reverse" feed.
If "direct", the word "LINE" needs to be marked on supply terminals (normally the top ones), as well as "LOAD" has to be written on the output terminals to be connected to the load (normally the bottom ones).
If "reverse", any indications about LINE / LOAD are NOT expected on the product.

6.1 Main parts constituting the circuit breaker



6.2 Breaking capacity (kA)

		Breaking capacity (kA) & I_{cs}			
		3P-4P			
	U_e/I_{cu} (I_{cu} letter)	36kA (F)	50kA (N)	70kA (H)	100kA (L)
IEC 60947-2	240 V AC	70	90	100	150
	415 V AC	36	50	70	100
	500 V AC	12	16	20	25
	690V AC	5	6	10	12
	250 V DC	10	10	10	10
	I_{cs}(% I_{cu})	100	100	100	100
	Rated making capacity under short circuit I_{cm}				
	I_{cm} (kA) at 415V	76.5	105	154	220
NEMA AB-1	240 V AC	70	90	100	150
	500 V AC	12	16	20	25
	690 V AC	5	6	10	12

6.3 Rated current (I_n) at 40° C / 50° C

	Phases limit trip current			
	thermal (I_r)		magnetic (I_i)	
I_n (A)	0.8 x I_n	1 x I_n	min	max
125	128	160	1600	1600

6.4 Load operations

Force on handle	N
Opening operation	40
Closing operation	40
Restore operation	53

6.5 Electrodynamic forces

The table below shows an indication of suggested distances to keep between the breaker and the first fixing point of the conductor and bars in order to reduce the effects of the electrodynamic stresses that may be created during a short circuit. In the realization of anchorage system it is recommend the use of isolators suitable for the type of conductor used and the operating voltage.

I_{cc} (kA)	Maximum Distance (mm)
36	350
50	300
70	250
100	200

According to conductor type and bar system (except Legrand bar kits), the choice of the distance to keep is to be calibrated by the installer.
Also installer must take into account the weight of the conductors so that this does not affect the electrical junction between the conductor itself and the connection point.

6.6 Power losses per pole under I_n

Circuit breaker (I_{cu} <= 50kA)

	Power losses per pole (W)
In (A)	160
Lugs	15.62
Spreaders	18.18
Rear terminals	24.58

Circuit breaker (I_{cu} > 50kA)

	Power losses per pole (W)
In (A)	160
Lugs	16.64
Spreaders	18.18
Rear terminals	24.58

Note: power losses in the table above are referred and measured as described in the standard IEC 60947-2 (Annex G) for circuit-breakers. Values in the table are referred to a single phase.

Switch disconnectors

	Power losses per pole (W)
	I_n(A)
	160
Lugs	12.80
Spreaders	15.36
Rear terminals	21.76

Note: power loss in the table above are referred and measured as described in the standard IEC 60947-3 for switches. Values in the table are referred to a single phase.

6.7 DERATINGS

according to IEC/EN 60947-1

6.7.1 Temperature

Rated current and his adjustment has to be considered relating to a rise or fall of ambient temperature and to a different version or installation conditions. The table below indicates the maximum long-time (LT) protection setting depending on the ambient temperature.

	Temperature Ta (°C)										
I_n (A)	-20	-10	-5	0	10	20	30	40	50	60	70
160	201	193	189	187	179	173	166	160	160	146	138

For derating temperature with other configurations, see table A.

6.7.2 Specific condition use

Climatic conditions

according to IEC/EN 60947-1 Annex Q, Cat. F subject to temperature, humidity, vibration, shock and salt mist.

Pollution degree

for Megatiker M3 160 circuit breakers, degree 3, according to IEC/EN 60947-2

6.7.3 Altitude

Altitude derating for Megatiker M3 circuit breakers and switch disconnertors

Altitude (m)	2000	3000	4000	5000
U_e (V)	690	590	520	460
I_n (A) (T_a = 40°C/50°C)	1 x I_n	0.98 x I_n	0.93 x I_n	0.9 x I_n

6.6.4 Use in DC

See table B.

Megatiker M3 160 thermal magnetic circuit breakers and MS3 160 switch disconnectors

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T7303F160, T7304F160, T7303N160, T7304N160, T7303H160, T7304H160, T7303L160, T7304L160, T7303S160, T7304S160

7. CONFORMITY

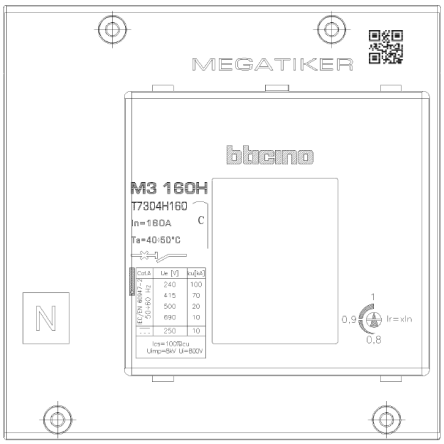
Megtiker M3 range of product concerning circuit-breakers and switch-disconnectors exceed compliance with the IEC/EN standard 60947-2 and 60947-3 respectively. Certification available by IECEE CB-scheme or LOVAG Compliance scheme.
Megtiker M3 respect the European Directives REACh, RoHS, RAEE.
.
For specific information, please contact Legrand support.

7.1 Marking

Product (both circuit breakers and switch disconnectors) are provided with labelling in full conformity to the referred standard and directives requirements by laser or sticker labels (for illustrative purposes only) as:

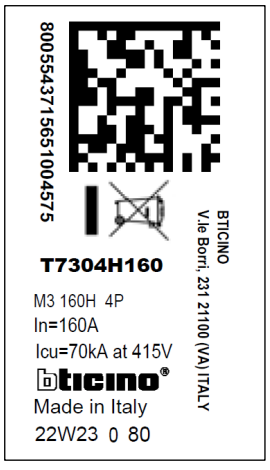
Product laser label on front

- -Manufacturer responsible
- -Denomination, type product, code
- -Standard conformity
- -Standard characteristics declared
- -Coloured identification of I_{cu} at 415V



Product sticker label on side

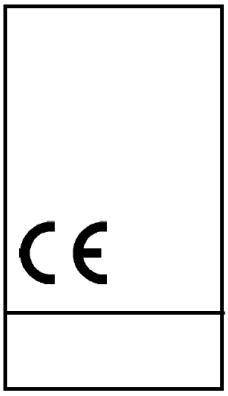
- -Manufacturer responsible
- -Denomination and type product
- -Standard conformity
- -Mark/Licence (if any)
- -Directive requirements
- -Bar code identification product
- -Manufacturing Country



T7304H160

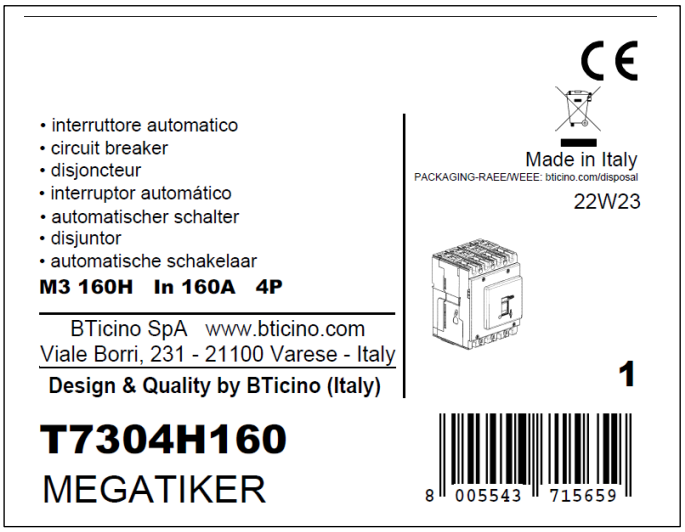
Mark sticker label on side

- -Product code
- -Mark/Licence (if any)
- -Country deviation, if any



Packaging sticker label

- -Manufacturer responsible
- -Denomination and type product
- -Mark/Licence (if any)
- -Directive requirements
- -Bar code identification product



8. EQUIPMENTS AND ACCESSORIES

8.1 Releases (for Megatiker M3 125/160/250, M1 and M2)

- shunt releases with voltage:

12 Vac and dc	*ref. M7S012*
24 Vac and dc	*ref. M7S024*
48 Vac and dc	*ref. M7S048*
110÷130 Vac	*ref. M7S110*
220÷277 Vac	*ref. M7S230*
380÷480 Vac	*ref. M7S415*

Maximum power = 400 VA / W

- undervoltage releases with voltage:

12 Vac and dc	*ref. M7U012*
24 Vac and dc	*ref. M7U024*
48 Vac and dc	*ref. M7U048*
110÷130 Vac and dc	*ref. M7U110*
220÷240 Vac	*ref. M7U230*
277 Vac	*ref. M7U277*
380÷415 Vac	*ref. M7U415*
440÷480 Vac	*ref. M7U480*

Maximum power = 4 VA
Circuit breaker opening time < 50 ms

UVR releases can be used on Megatiker M3 125/160/250 starting from batch 19W15

- time-lag undervoltage releases (800 ms)

Time-lag modules with voltage:

230 V ac	*ref. M7000MR/230*
400 V ac	*ref. M7000MR/400*

Release *ref. M7UEM*
(to be equipped with a time-lag module *M7000MR/230 and M7000MR/400)*

8.2 Auxiliary contacts

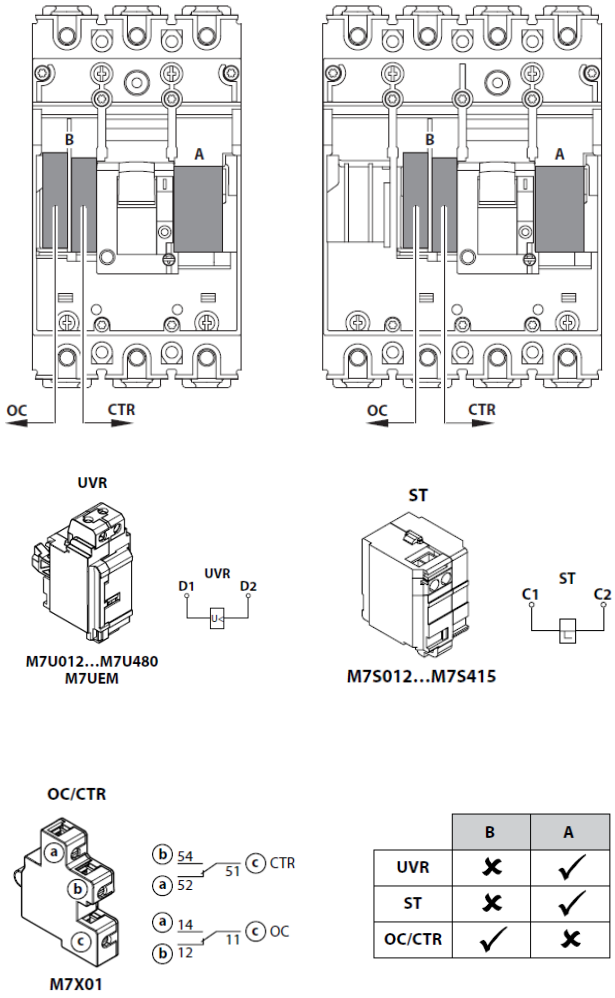
(for Megatiker M3 125/160/250, M1 and M2)

Changeover switch 3A – 250 VAC *ref. M7X01*

To show the state of the contacts or opening of the Megatiker M1/M2 and Megatiker M3 125/250 on a fault:
- Auxiliary contact (standard) **OC**
- Fault signal **CTR**

Auxiliary contact electrical characteristics		
Rated voltage (V_n)	**V (ac or dc)**	24 to 250
Intensity (A)	**24 V dc**	5
	48 V dc	1.7
	110 V dc	0.5
	230 V dc	0.25
	110 V ac	4
	230/250 V ac	3

Configurations:
Megatiker M3 160 → 1 auxiliary contacts + 1 fault signal



	B	A
UVR	✘	✓
ST	✘	✓
OC/CTR	✓	✘

To get more information on auxiliary mounting procedures, please refer to product instruction sheet.

8.3 Universal keylocks

These keylocks must be used for all the accessories that can be locked:

- rotary handle

For each of these, a specific accessory (indicated in the specific section of this datasheet) must be added in order to get the complete locking kits for the specific application.

- 1 lock + 1 flat key with random mapping *ref. M7R24*
- 1 lock + 1 flat key with fixed mapping (EL43525) *ref. M7R25*
- 1 lock + 1 flat key with fixed mapping (EL43363) *ref. M7R26*
- 1 lock + 1 star key with random mapping *ref. M7R27*

8.4 Rotary handles

Direct
- Standard (black) *ref. M7R20*
- For emergency use (red / yellow) *ref. M7R21*

Vari-depth handle IP55 (with auxiliary option)
- Standard (black) *ref. M7R22*
- For emergency use (red / yellow) *ref. M7R24*

Locking accessories (for rotary handle)
- Key lock accessory for vari-depth rotary handle *ref. M7R31*
  (ref. M7R31 is compatible with Megatiker M3 250 also)

Ref. M7R31 must be used with universal keylocks to get the complete locking kit for rotary handle

8.5 Mechanical accessories

- Padlock (for locking in "OPEN" position) *ref. M7X02*
  (ref. M7X02 is compatible with Megatiker M1/M2 and M3 250)

- Sealable terminal shields:
  - Set of 2 (for 3P) *ref. M7C20*
  - Set of 3 (for 4P) *ref. M7C21*

- Insulated shields:
  - Set of 2 (for 3P) *ref. M7F01*
  - Set of 3 (for 4P) *ref. M7F02*

  (ref. M7F01 AND M7F02 are compatible with Megatiker M3 250)

8.6 Connection accessories

Cage terminals
- Set of 3 terminals for Cu/Al cables, 1x70 mm² for flexible and rigid cables (for Al cables In max 80A) *ref. M7X59*

- Set of 3 terminals for Cu/Al cables, 1x70 mm² for flexible and rigid cables (for Al cables In max 80A) *ref. M7X60*

- Set of 3 terminals (high capacity) *ref. M7X52*
  for cables 70 mm² max for Cu and 95 mm² max for Al
  Section relative to maximum current is 70 mm² (for Al)

- Set of 4 terminals (high capacity) *ref. M7X53*
  for cables 70 mm² max for Cu and 95 mm² max for Al
  Section relative to maximum current is 70 mm² (for Al)

Spreaders *(incoming or outcoming):*
- Set of 3 (for 3P) *ref. M7A50*
- Set of 4 (for 4P) *ref. M7A51*

Rear terminals *(incoming or outcoming):*
- Set of 3 (for 3P) *ref. M7A54*
- Set of 4 (for 4P) *ref. M7A55*

Cage terminal use specifications

Megatiekr M3 125							
Type of cage terminal	***Cable standard suggested cross section (mm²)****			***Dimensions limits of cable for cage terminals***			
	In (A)	Cu	Al	MIN cross section (mm²)		MAX cross section (mm²)	
				Flexible	Rigid	Flexible	Rigid
Standard	16	2,5	4	2,5	4	70	95
	20	2,5	4				
	25	4	6				
	32	6	10				
	40	10	16				
	50	10	16				
	63	16	25				
	80	25	35				
	100	35	\				
	125	50	\				
High capacity	80	25	35	35	35	95	120
	100	35	50				
	125	50	70				
* The suggested cross section are in compliance with standard IEC60947-1 (ed.6 2020/04) and IEC60947-2 (ed.5.1 2019/07)							

8.7 Interlock mechanism

(for interlocking 2 Megatiker M3 125/160 HP or 2 Megatiker M3 250)

No frame mixing in interlock mechanism

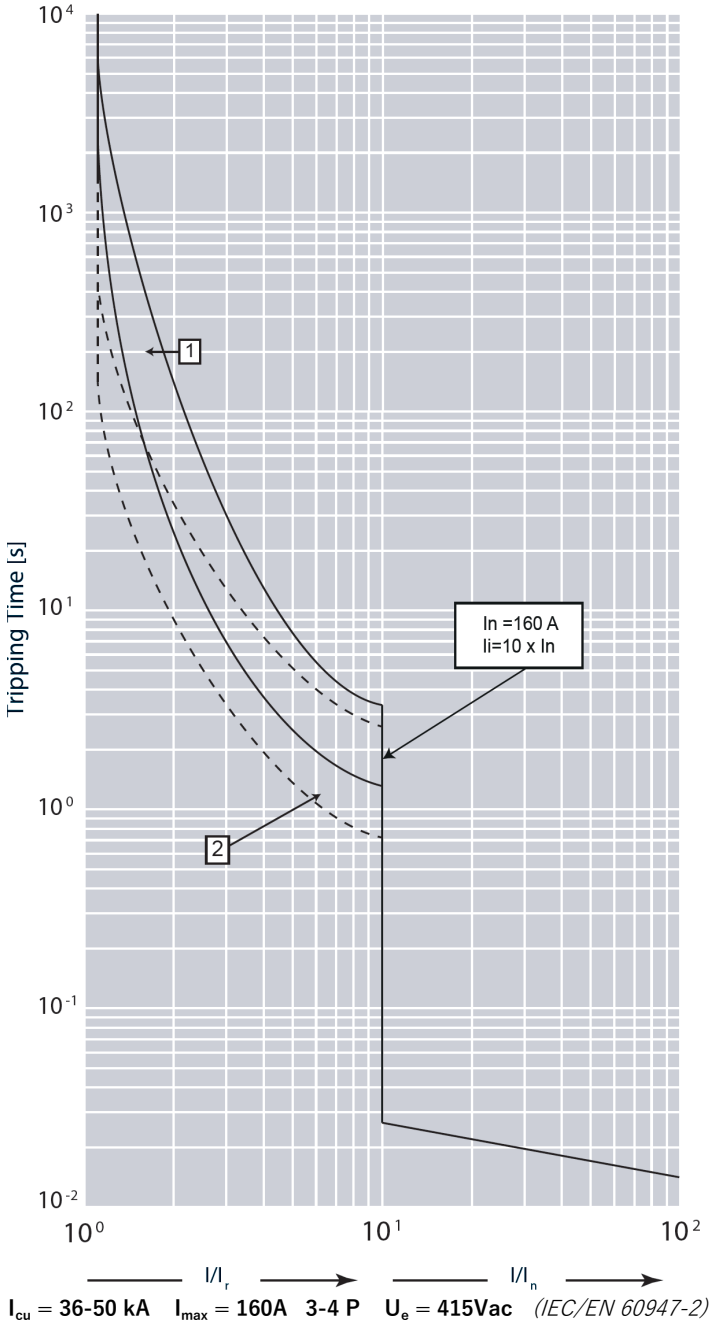
- Interlock mechanism – standard version (for fixed version Megatiker M3 160 and 250) *ref. M7I01*
- Interlock mechanism – for electronic module (for fixed version Megatiker M3 160 and 250) *ref. M7I02*

- Interlock plate for Megatiker M3 160 *ref. M7I04*

9. CURVES

9.1.1 Thermal magnetic tripping curve (rated current I_n <= 50A)

Update:

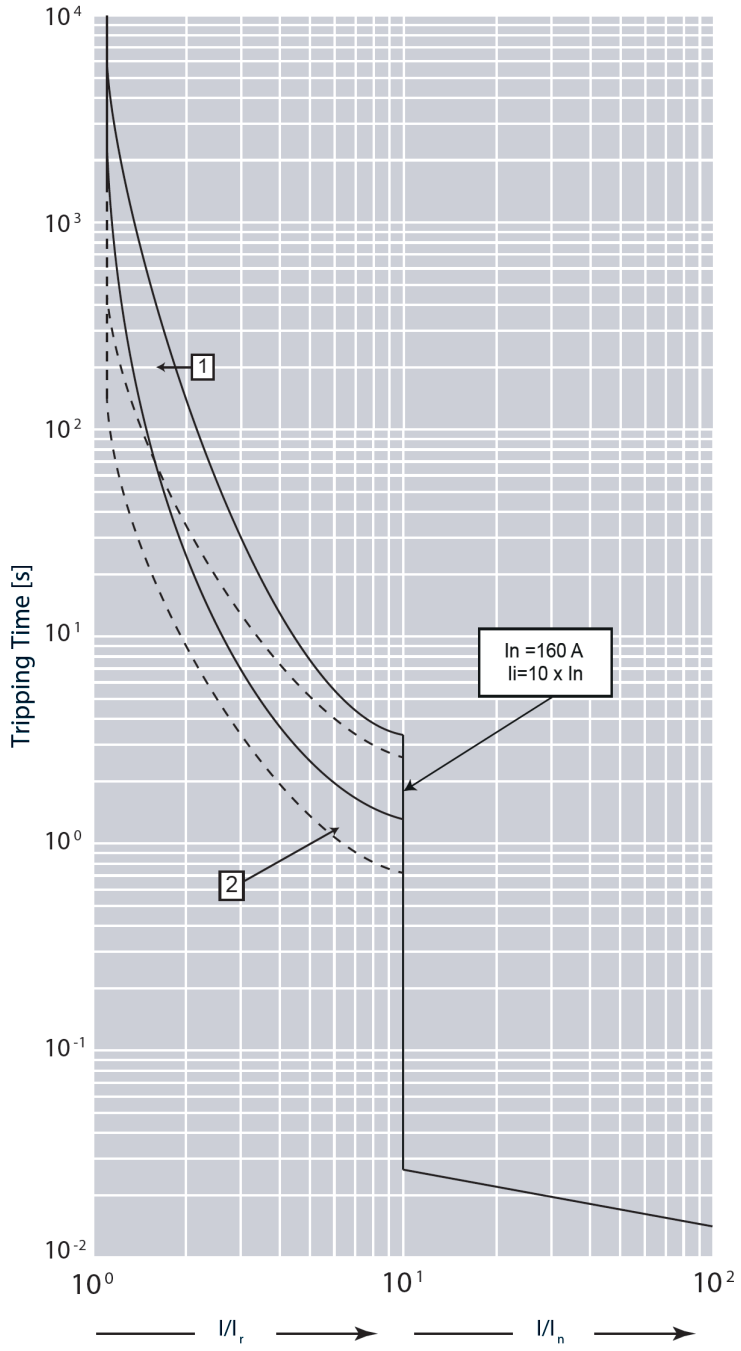


I_{cu} = 36-50 kA I_{max} = 160A 3-4 P U_e = 415Vac *(IEC/EN 60947-2)*

Value	Description
t	time
I	current
I_n	rated current
I_r	long time setting current
curve 1	characteristic with cold start
curve 2	characteristic with hot start

9.1.2 Thermal magnetic tripping curve (rated current $I_n > 50A$)

Update: 01/04/2022

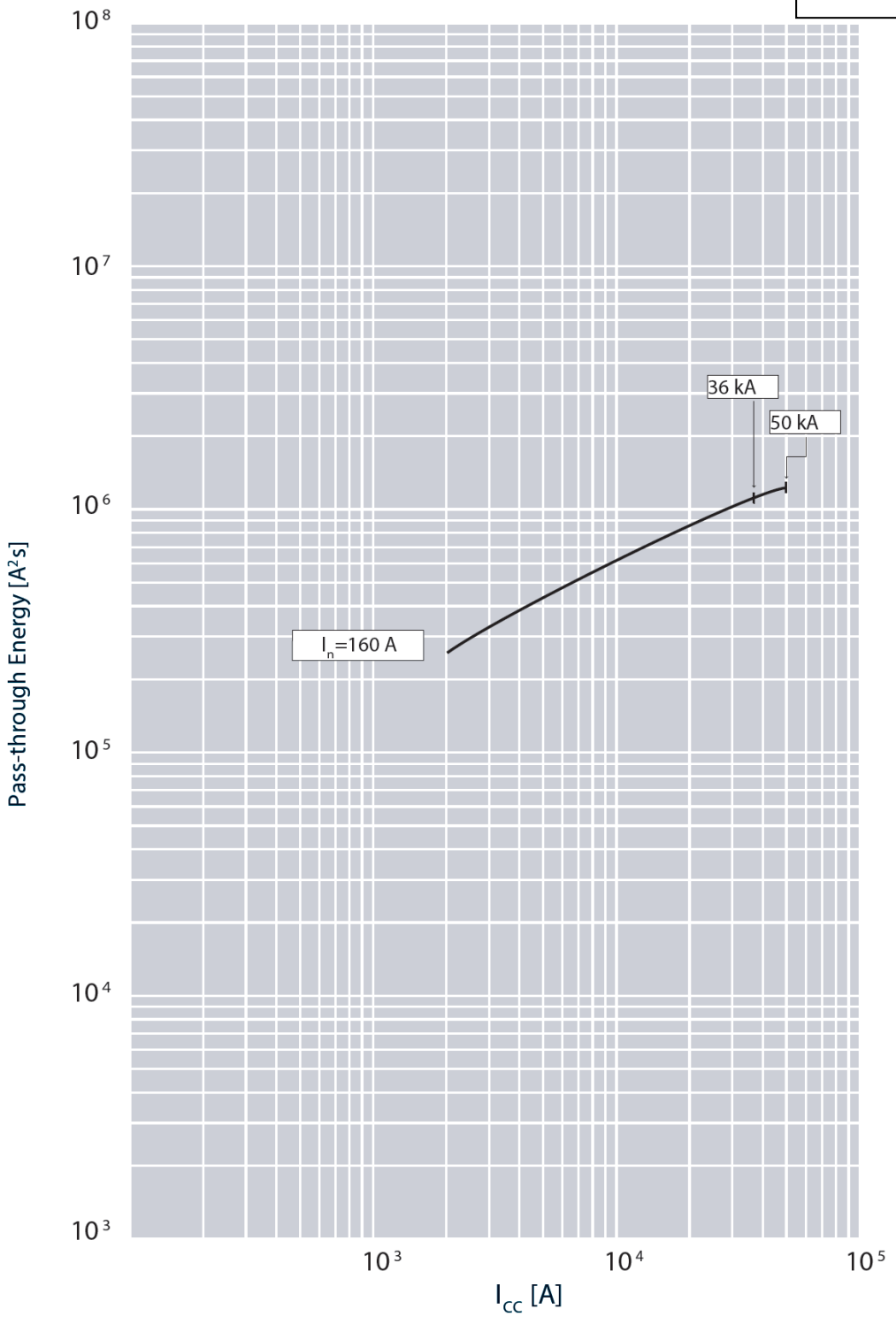


I_{cu} = 36-50-70-100 kA I_{max} = 160A 3-4 P U_e = 415Vac *(IEC/EN 60947-2)*

Value	Description
t	time
I	current
I_n	rated current
I_r	long time setting current
curve 1	characteristic with cold start
curve 2	characteristic with hot start

9.2.1 Pass-through specific energy characteristic curve (breaking capacity I_{cu} <= 50kA)

Update:

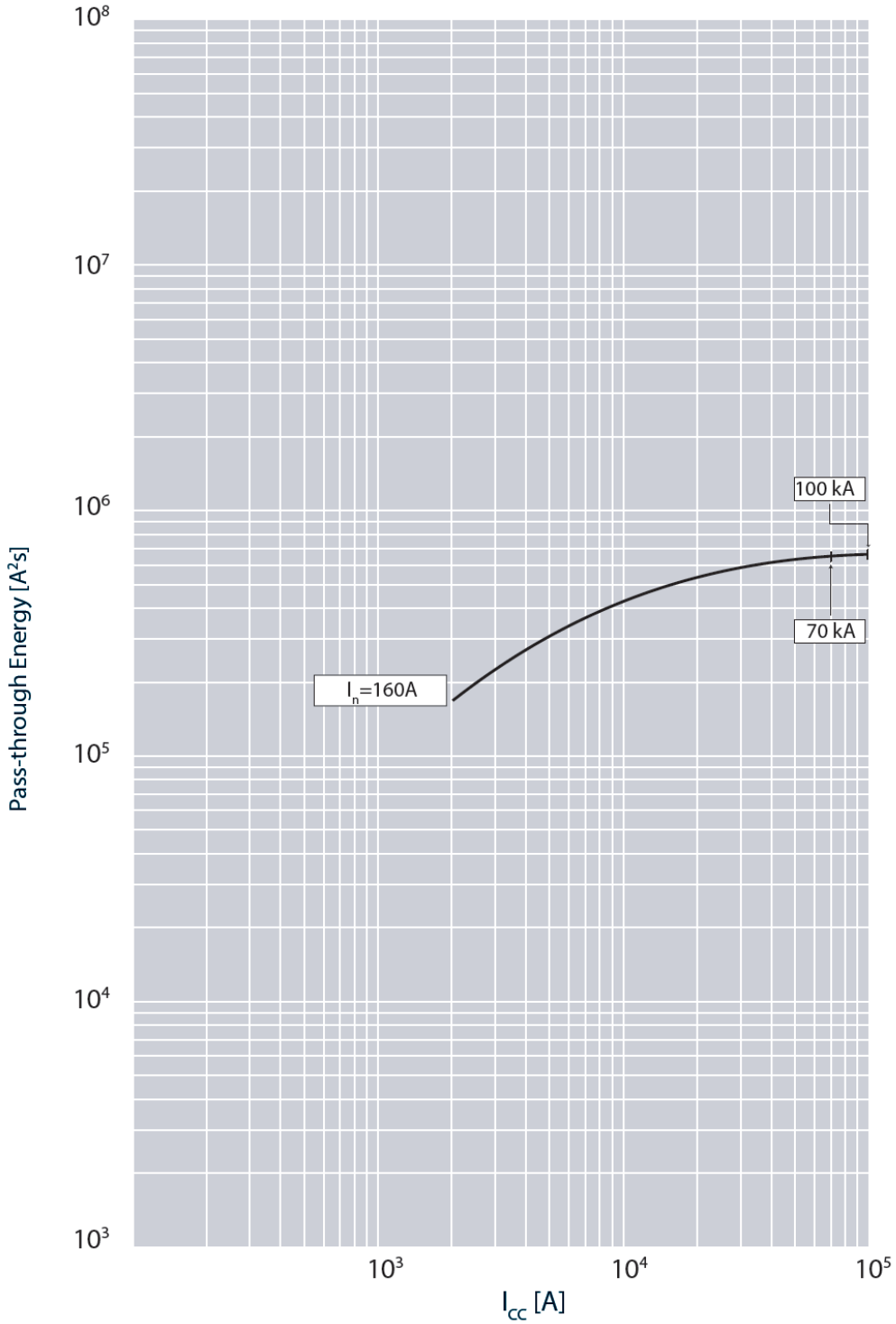


I_{cu} = 36-50-70-100 kA I_{max} = 160A 3-4 P U_e = 415Vac *(IEC/EN 60947-2)*

Value	Description
I_{cc}	short circuit current
I^2t (A^2s)	pass-through specific energy

9.2.2 Pass-through specific energy characteristic curve (breaking capacity I_{cu} > 50kA)

Update: 01/04/2022

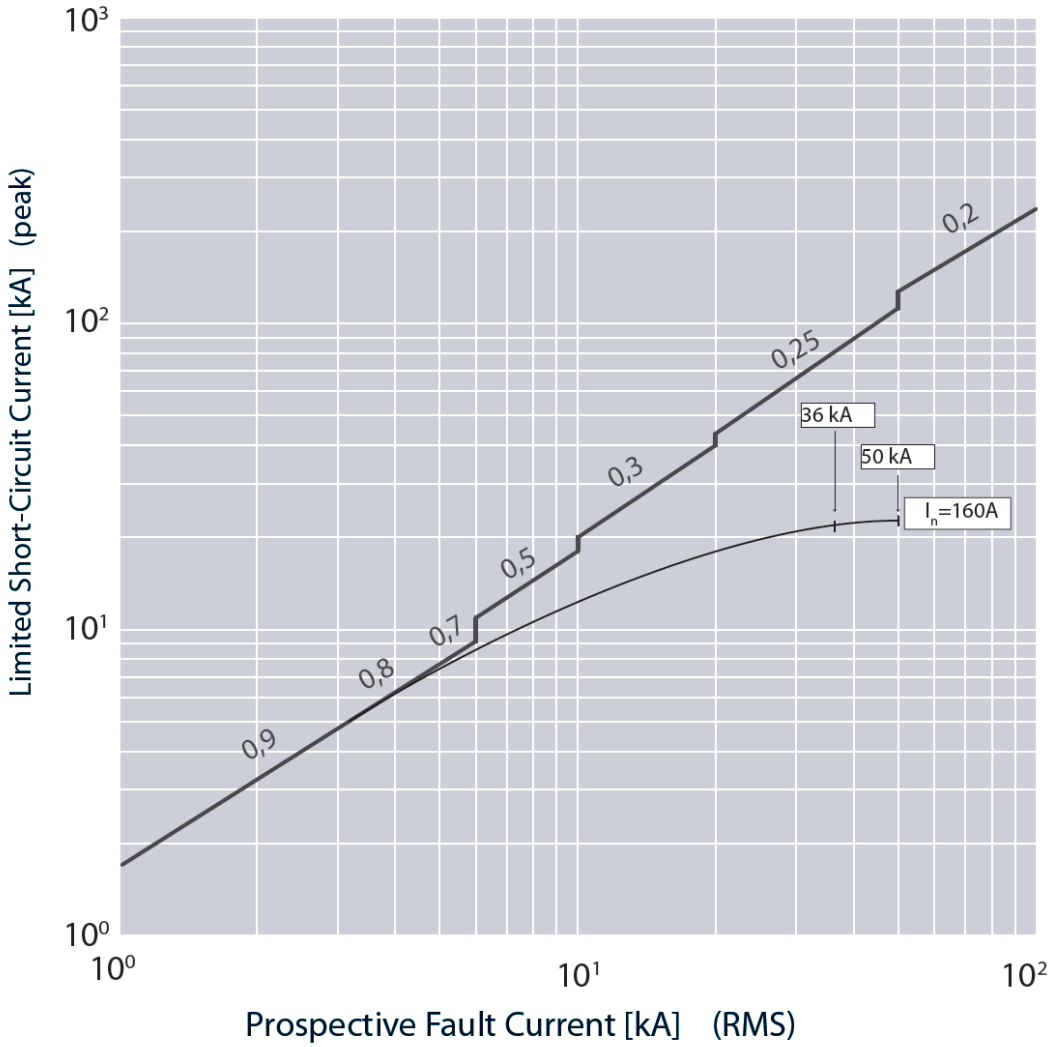


I_{cu} = 36-50-70-100 kA I_{max} = 160A 3-4 P U_e = 415Vac *(IEC/EN 60947-2)*

Value	Description
I_{cc}	short circuit current
I^2t (A^2s)	pass-through specific energy

9.3.1 Cut-off peak current characteristic curve (kA) (breaking capacity I_{cu} <= 50kA)

Update: 01/04/2022

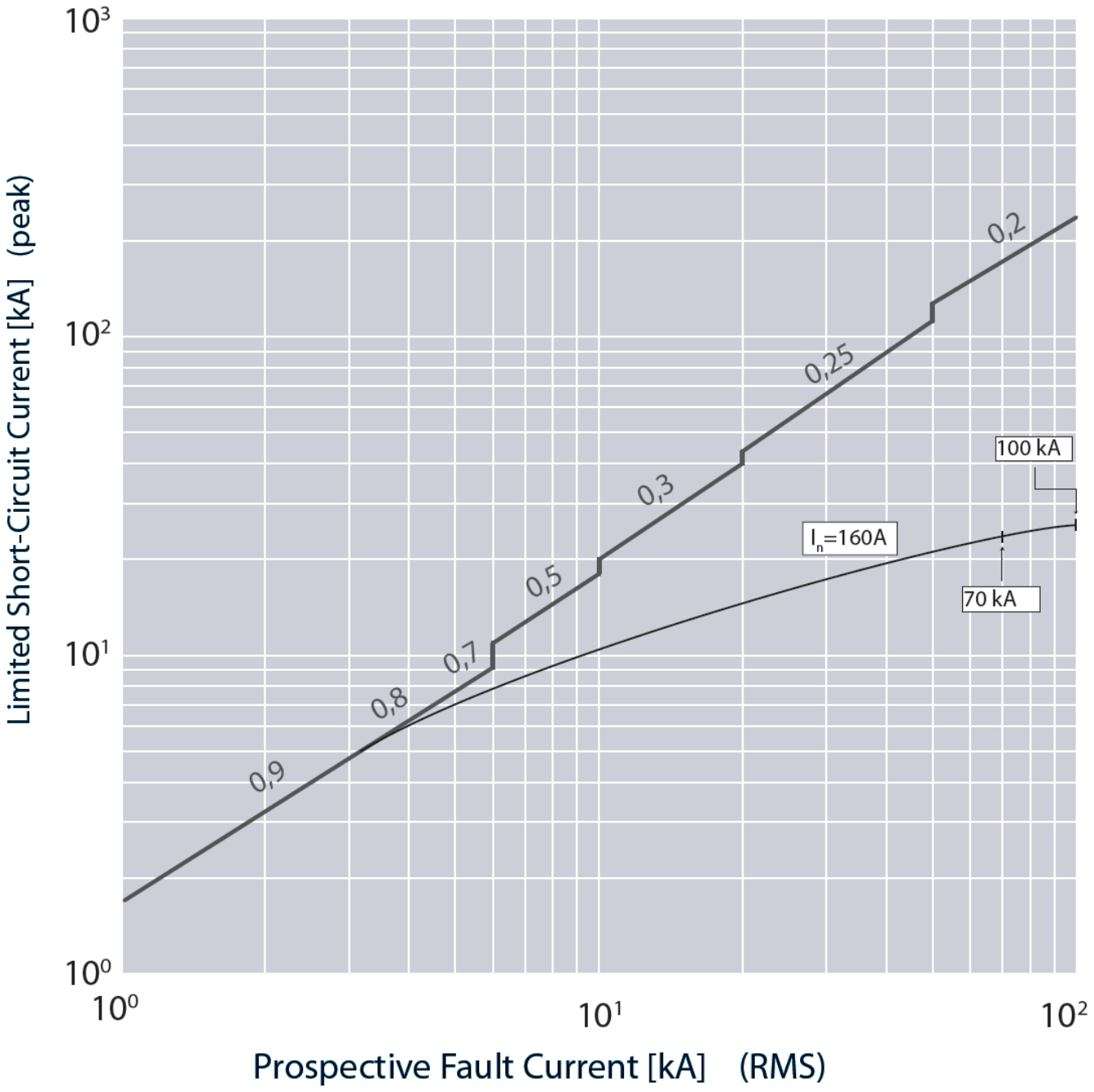


I_{cu} = 36-50-70-100 kA I_{max} = 160A 3-4 P U_e = 415Vac *(IEC/EN 60947-2)*

Value	Description
I_{cc}	estimated short circuit symmetrical current (RMS value)
I_p	maximum short circuit peak current
———	maximum prospective short circuit peak current corresponding at the power factor
———	maximum real peak short circuit current

9.3.2 Cut-off peak current characteristic curve (kA) (breaking capacity I_{cu} > 50kA)

Update: 01/04/2022



I_{cu} = 36-50-70-100 kA I_{max} = 160 3-4 P U_e = 415Vac *(IEC/EN 60947-2)*

Value	Description
I_{cc}	estimated short circuit symmetrical current (RMS value)
I_p	maximum short circuit peak current
———	maximum prospective short circuit peak current corresponding at the power factor
———	maximum real peak short circuit current

Megatiker M3 160 thermal magnetic circuit breakers and MS3 160 switch disconnectors

Reference(s) :
T7303F160, T7304F160, T7303N160, T7304N160, T7303H160, T7304H160, T7303L160, T7304L160, T7303S160, T7304S160

A) Derating Temperature and configurations

	Ambient temperature									
	30 °C		40 °C		50 °C		60 °C		70 °C	
Fixed version	I_{max} (A)	I_r / I_n	I_{max} (A)	I_r / I_n	I_{max} (A)	I_r / I_n	I_{max} (A)	I_r / I_n	I_{max} (A)	I_r / I_n
Cage terminals, flexible cable	166	1.04	160	1	160	1	146	0.91	138	0.86
Cage terminals, rigid cable	166	1.04	160	1	160	1	146	0.91	138	0.86
Lugs, flexible cable	166	1.04	160	1	160	1	146	0.91	138	0.86
Lugs, rigid cable	166	1.04	160	1	160	1	146	0.91	138	0.86
Spreaders, flexible cable	166	1.04	160	1	160	1	146	0.91	138	0.86
Spreaders, rigid cable	166	1.04	160	1	160	1	146	0.91	138	0.86
Rear flat terminals, flexible cable	166	1.04	160	1	160	1	146	0.91	138	0.86

For further technical information, please contact Legrand technical support.

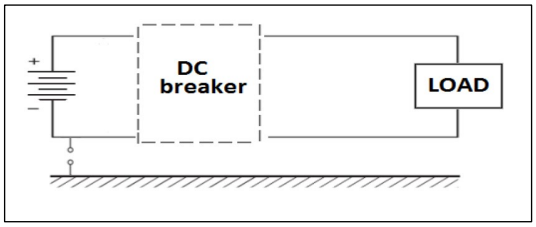
B) Use in DC

B.1 Circuit breakers: breaking capacity in DC (kA) *(values estimates only)*

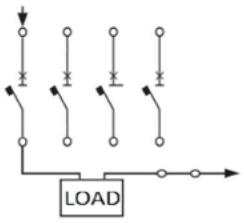
		1 pole *	2 poles in series *			3 poles in series *		
I_{cu} (kA)	I_n (A)	60 V	60 V	110 V	250 V	110 V	250 V	500 V
36	**160**	35	36	35	10	35	10	10
50	**160**	35	50	35	10	35	10	10

DC breaking capacity in the table respect the standards.
The positive tolerance is between 0% to 5% of voltage status

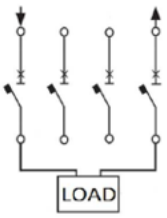
Applied to DC networks insulated from the ground
(*this diagram* ***applies to both 3P and 4P circuit breakers):***



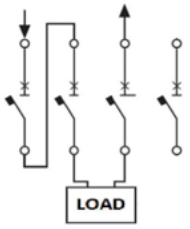
** <u>Connection modality of the DC breaker:</u>*



1 pole



2 poles in series

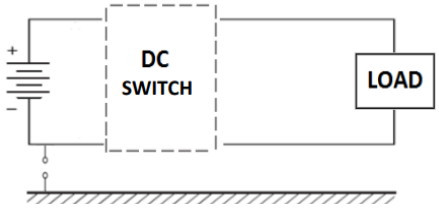


3 poles in series

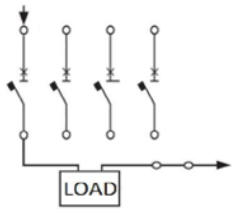
B.2 Switch disconnectors: category of use

Applied to DC networks insulated from the ground

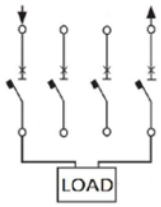
	1 pole *	2 poles in series *		3 poles in series *	4 poles in series *
I_n (A)	60 V	110 V	250	500 V	750 V
125	DC23	DC23	DC23	DC23	DC23



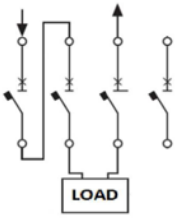
** Connection modality for DC switch disconnectors (polarity can be inverted):*



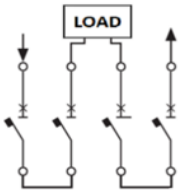
1 pole



2 poles in series



3 poles in series



4 poles in series

Data indicated in this document refers exclusively to test conditions according to product standards, unless otherwise indicated in the documentation.
For the different conditions of use of the product, inside electrical equipment or in any case inserted in the installation context, refer to the regulatory requirements of the equipment, local regulations and design specifications of the system