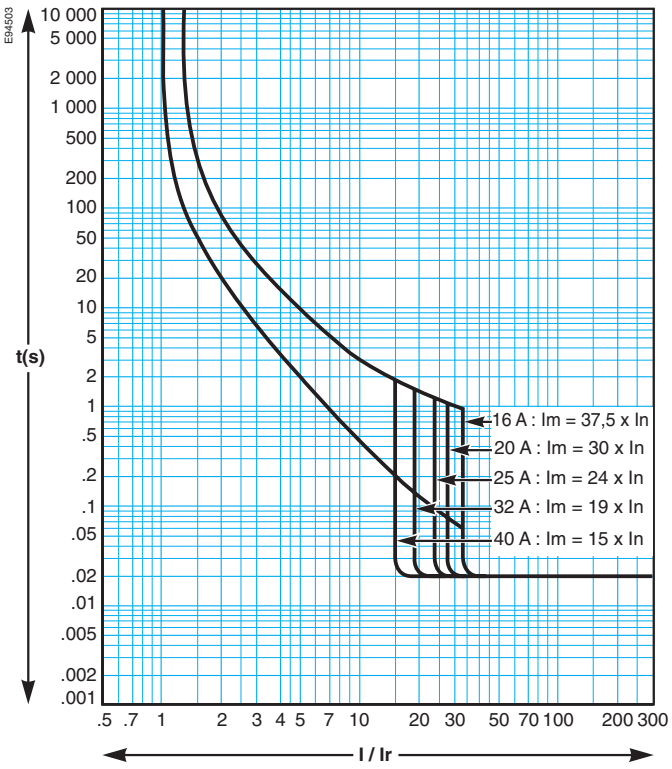
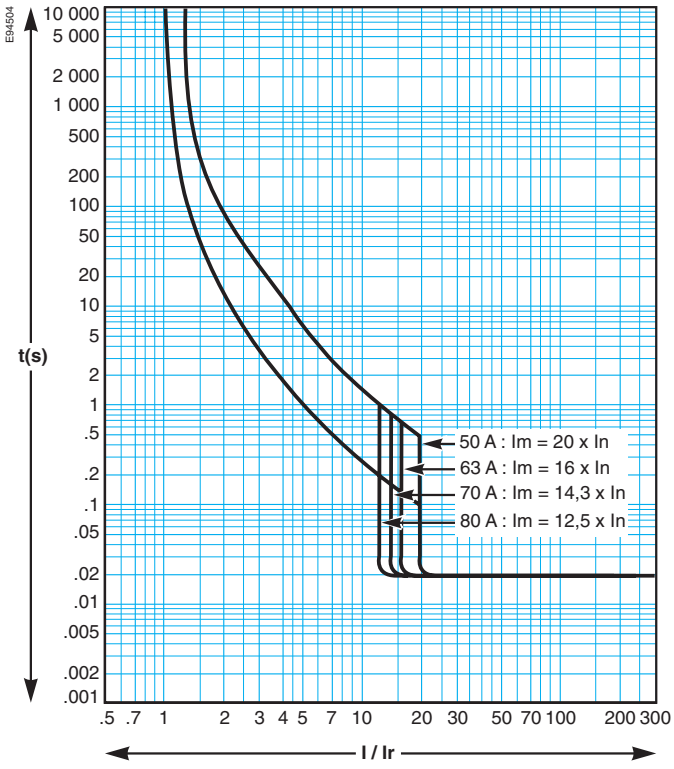
Additional characteristics

Tripping curves
Compact NSC100 and NS80H-MA

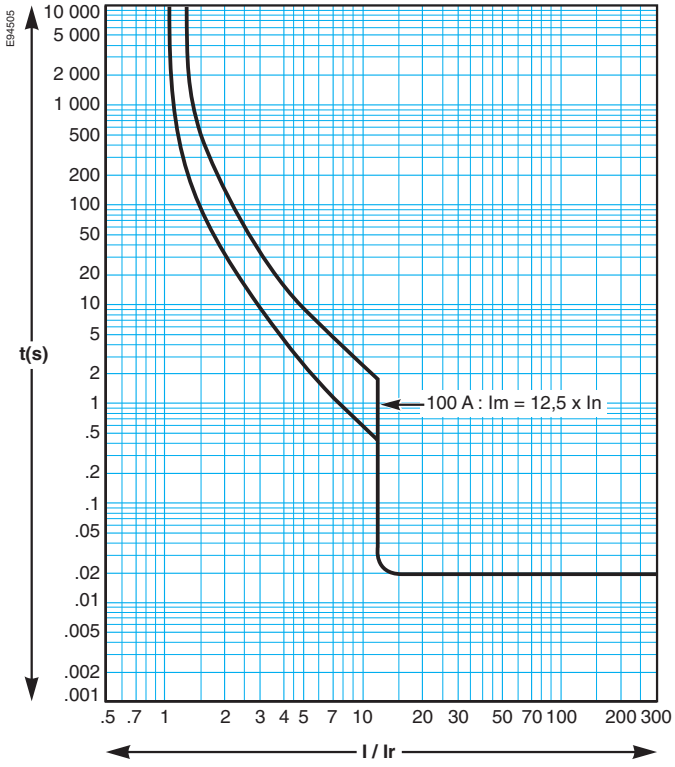
NSC100 - 16…40 A



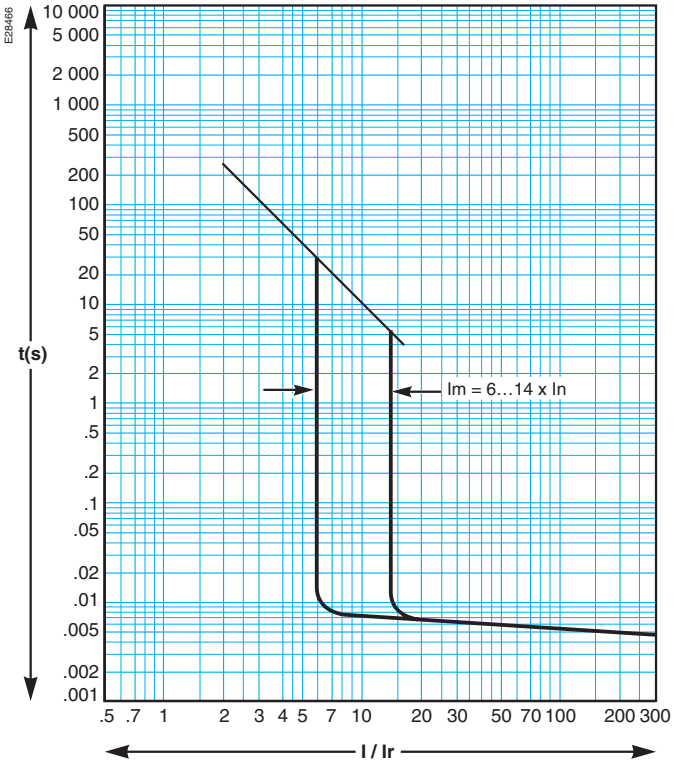
NSC100 - 50…80 A



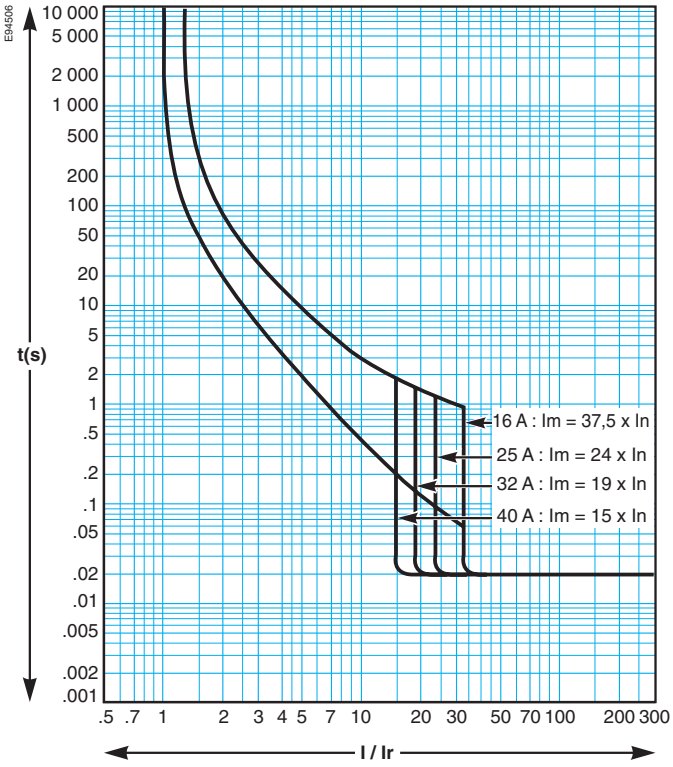
NSC100 - 100 A



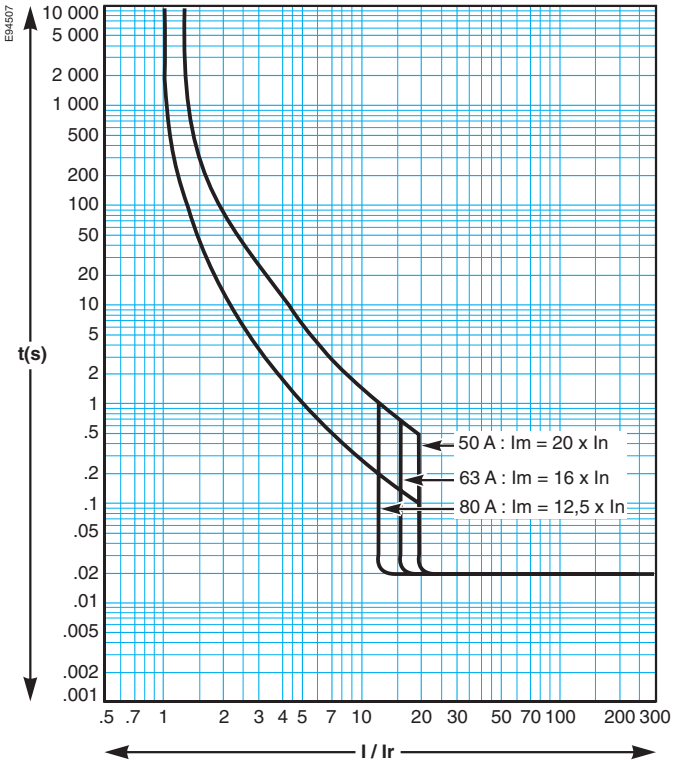
NS80H-MA - MA1.5…MA80



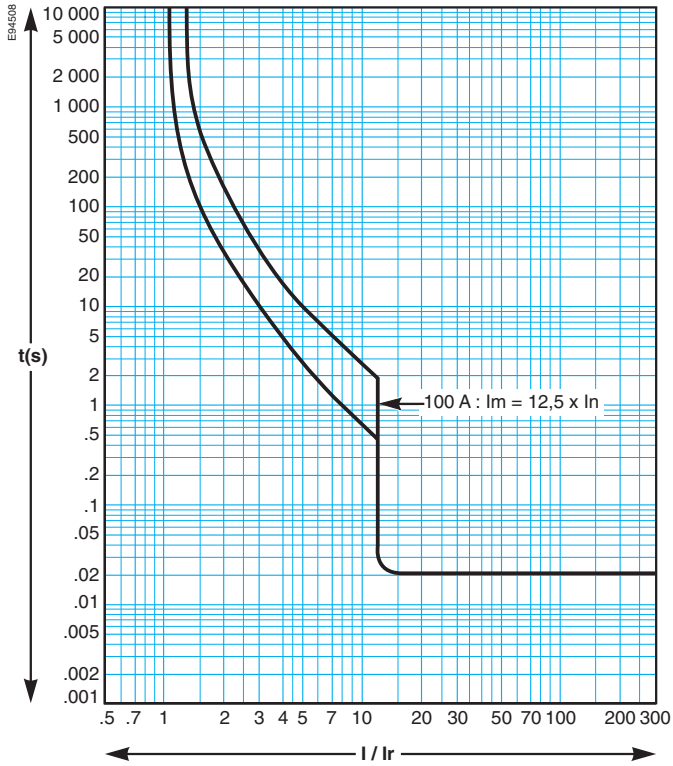
16…40 A



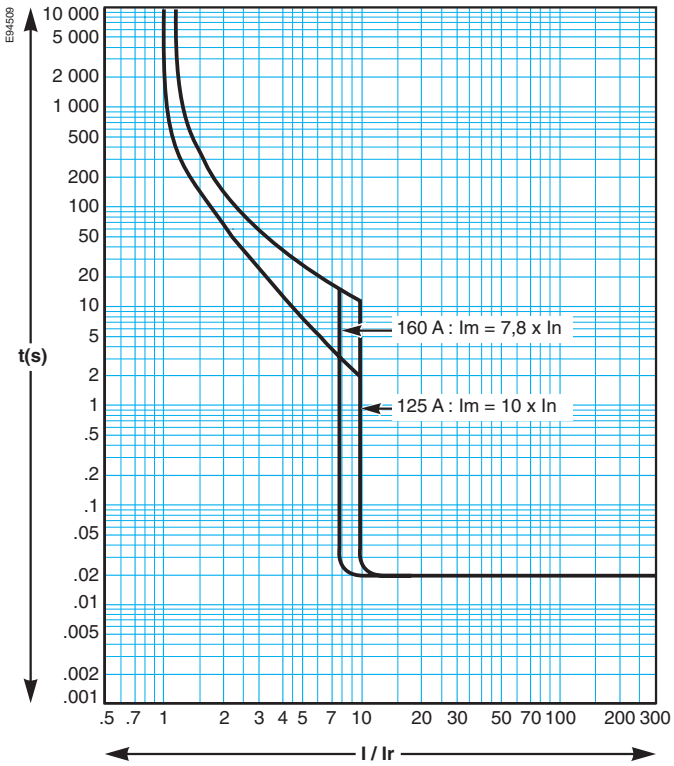
50…80 A



100 A



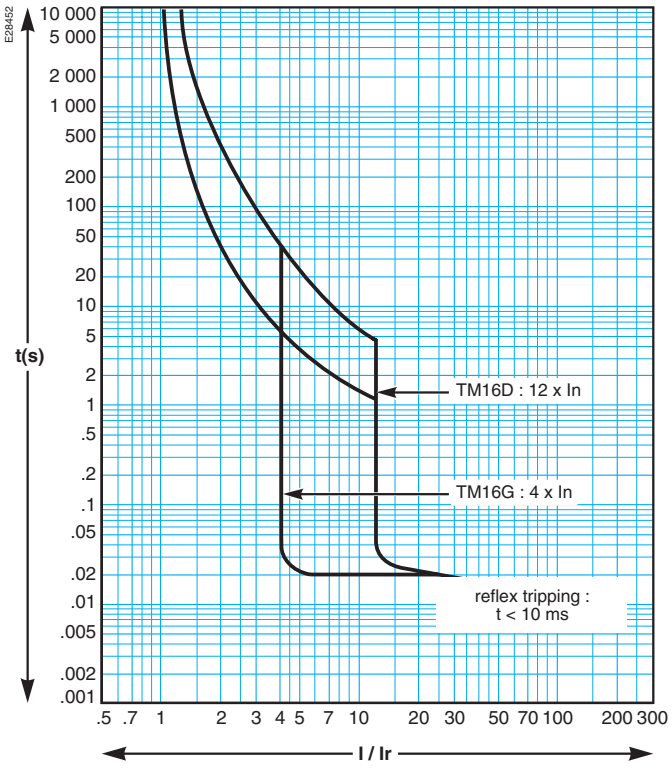
125…160 A



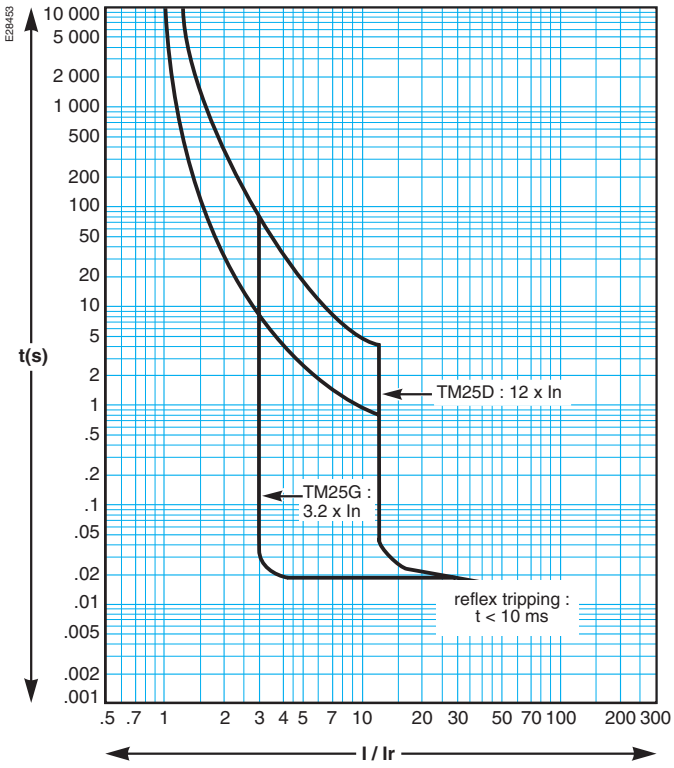
Tripping curves
Compact NS100 to 250
Protection of distribution systems

TM magnetic trip units

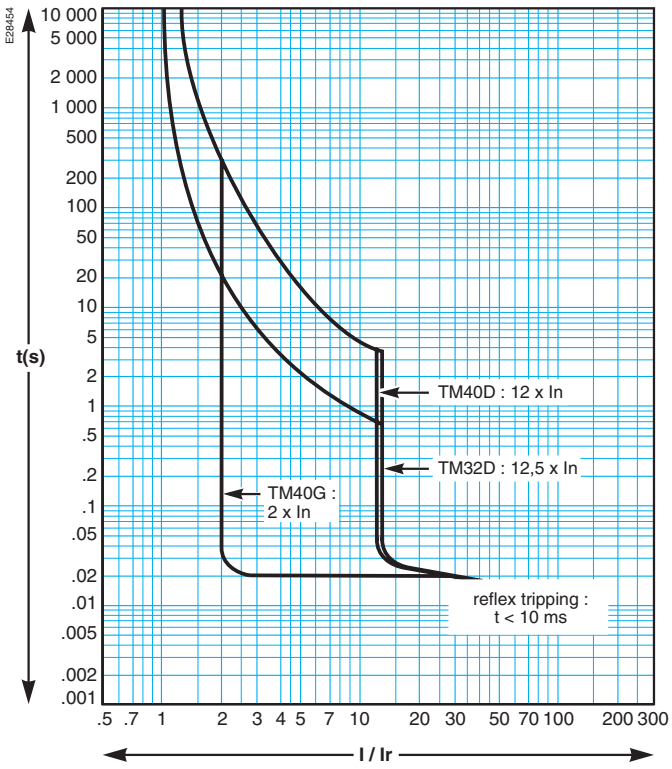
TM16D / TM16G



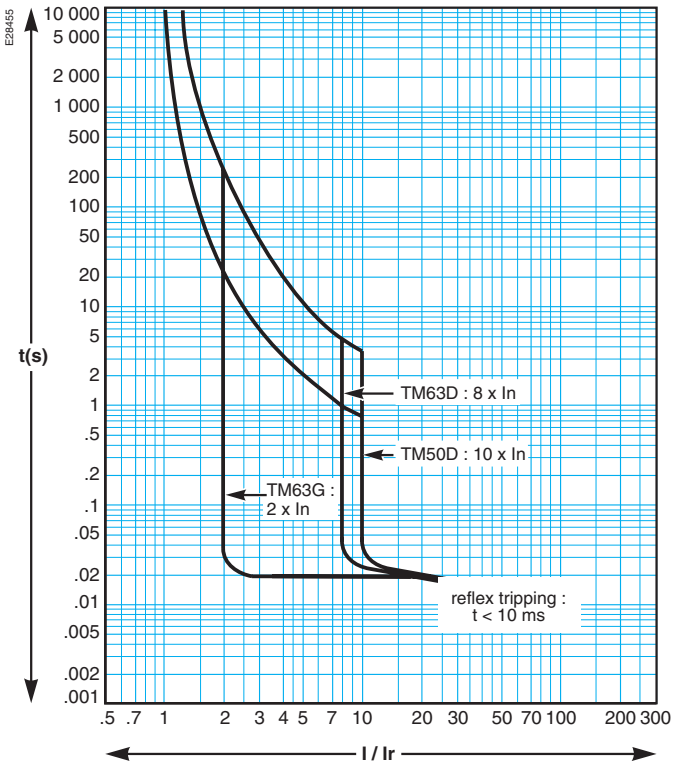
TM25D / TM25G



TM32D / TM40D / TM40G

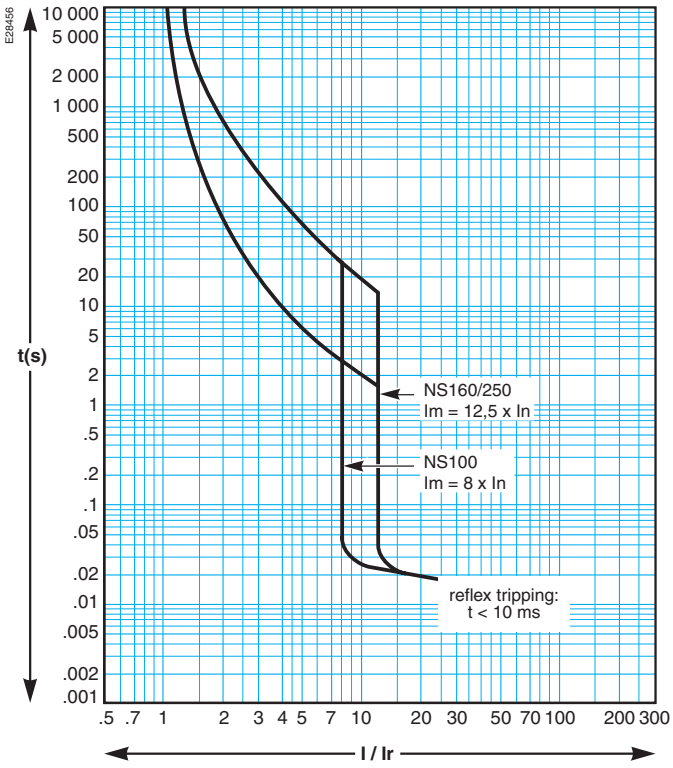


TM50D / TM63D / TM63G

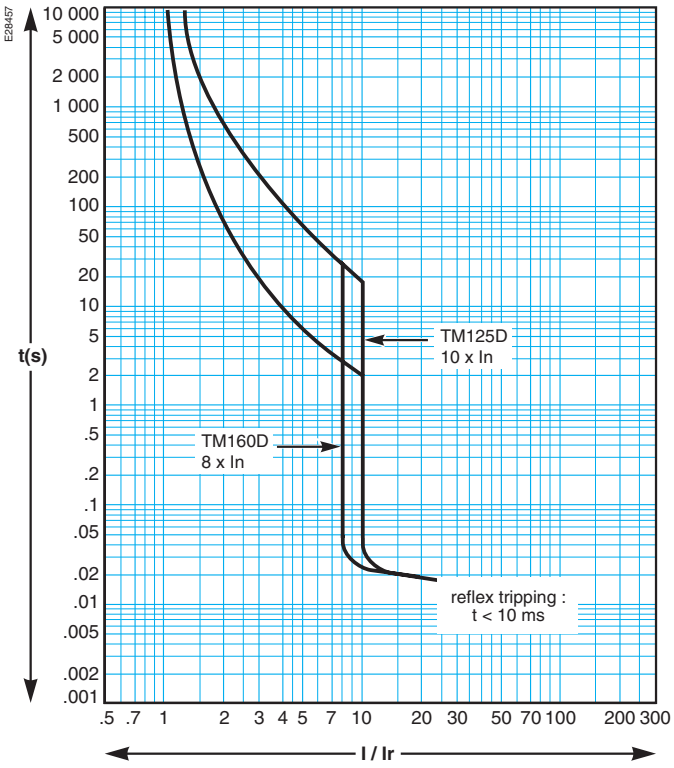


TM magnetic trip units (cont.)

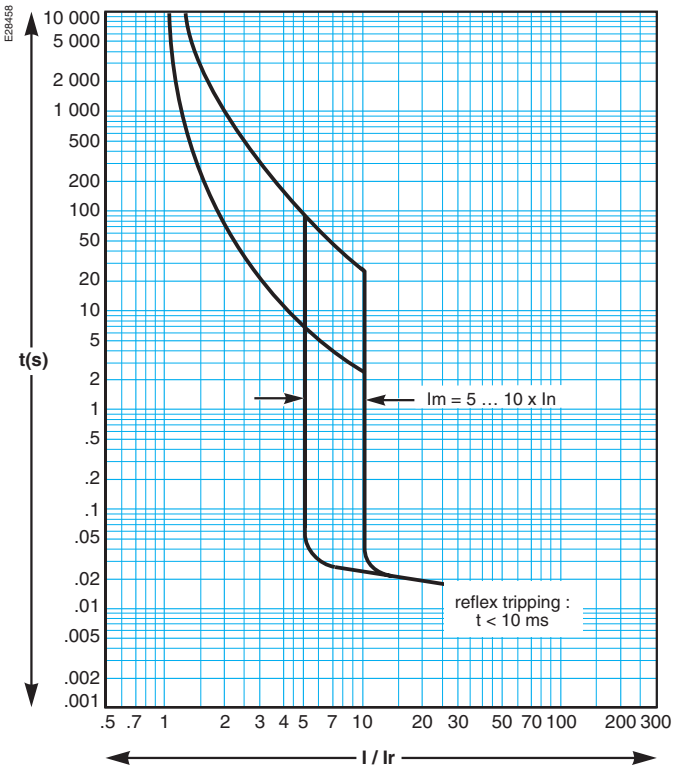
TM80D / TM100D



TM125D / TM160D



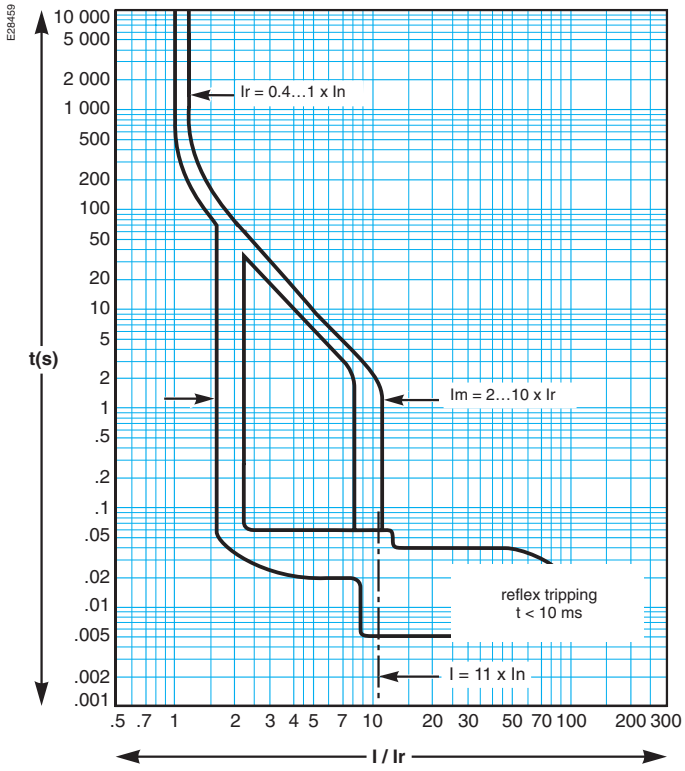
TM200D / TM250D



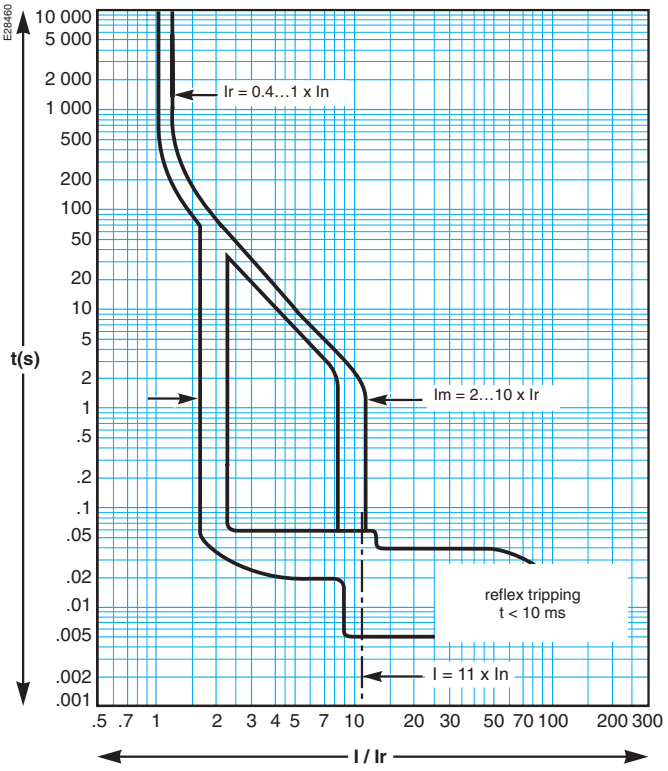
Tripping curves
Compact NS100 to 250
Protection of distribution systems (cont.)

STR22SE and STR22GE electronic trip units

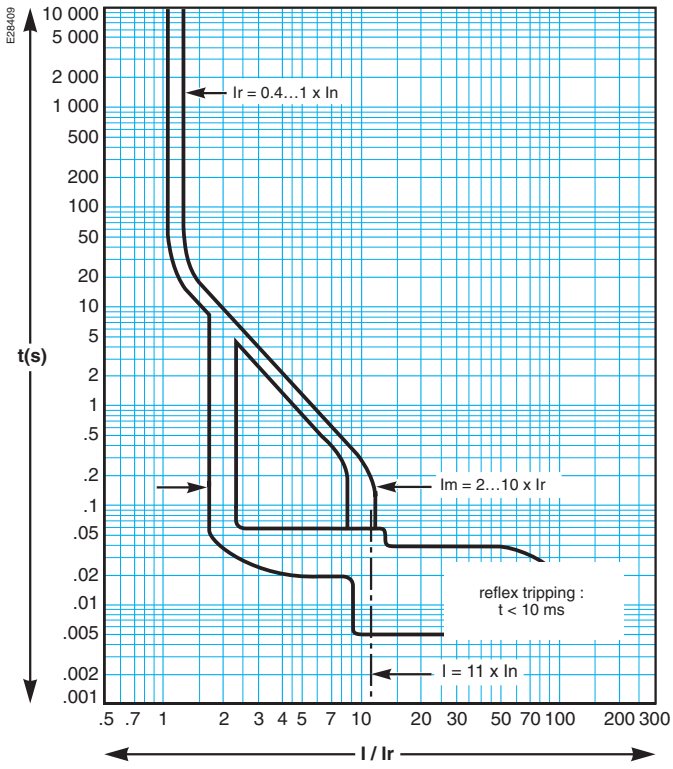
STR22SE - 40...100 A



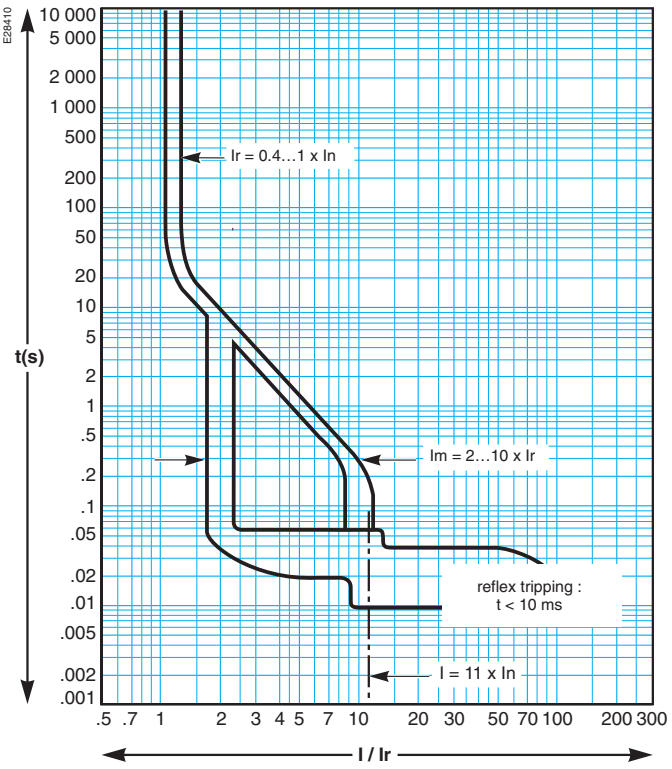
STR22SE - 160...250 A



STR22GE - 40...100 A

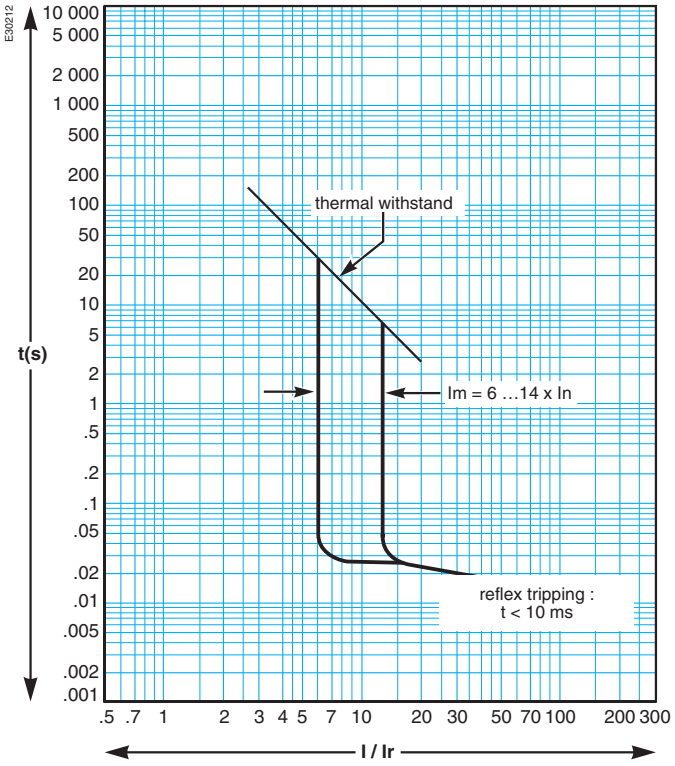


STR22GE - 160...250 A

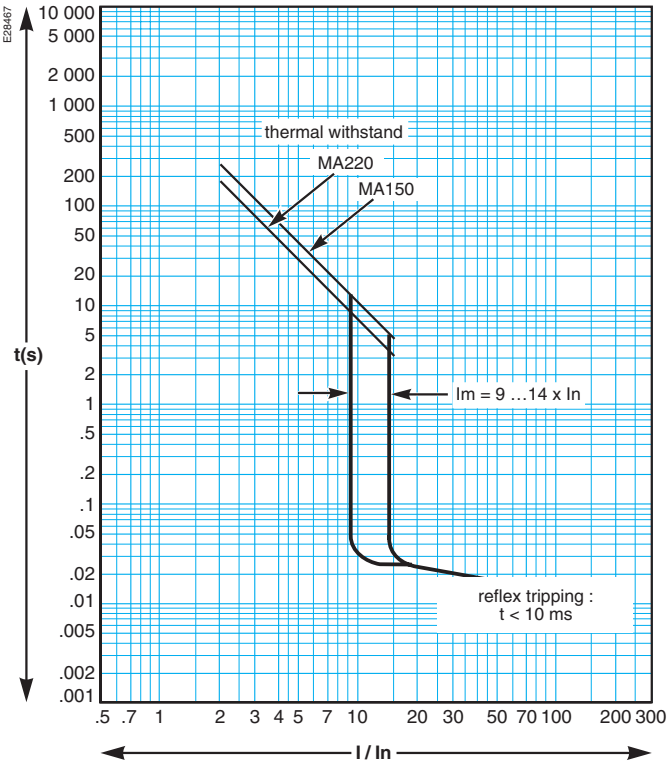


MA magnetic trip units

MA2,5…MA100

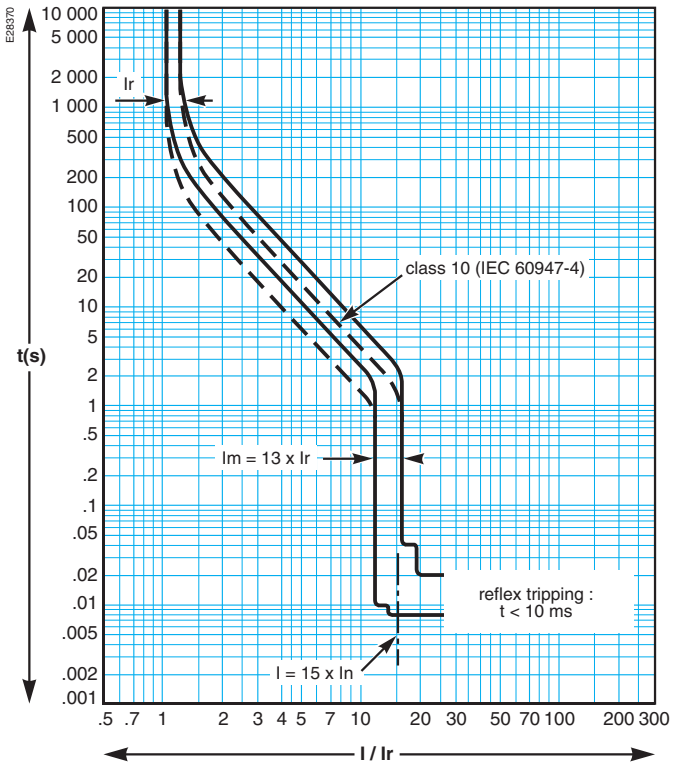


MA150 and MA220



STR22ME electronic trip units

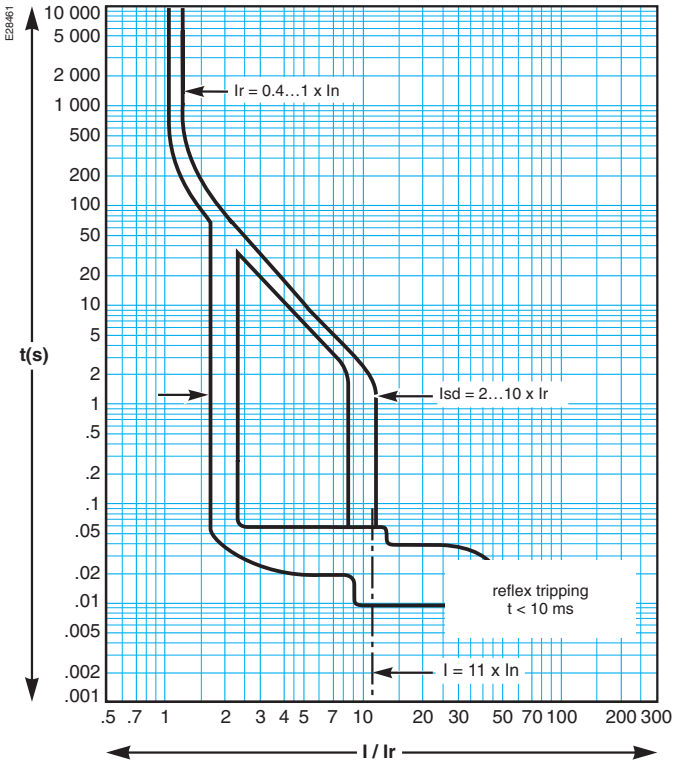
STR22ME - 10…220 A



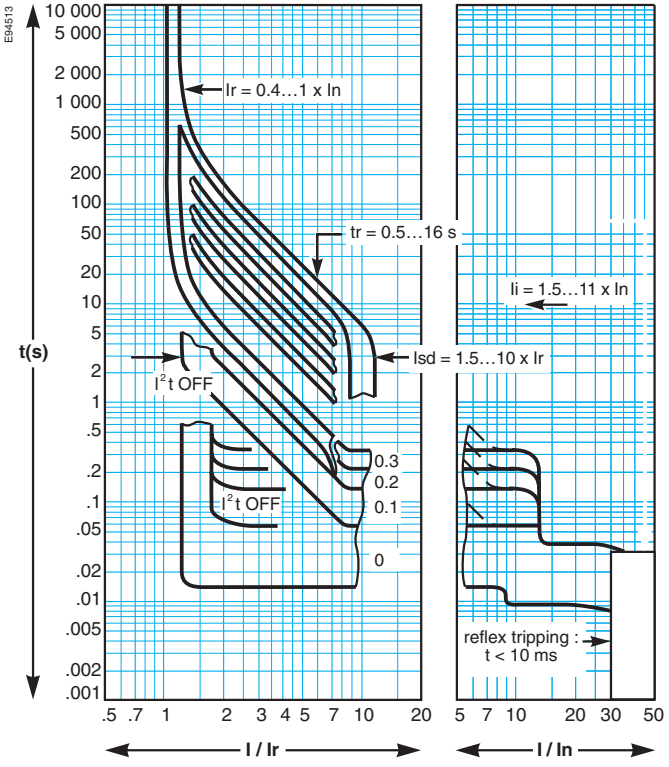
Tripping curves
Compact NS400 to 630
Protection of distribution systems

STR23 and STR53 electronic trip units

STR23SE / STR23SV

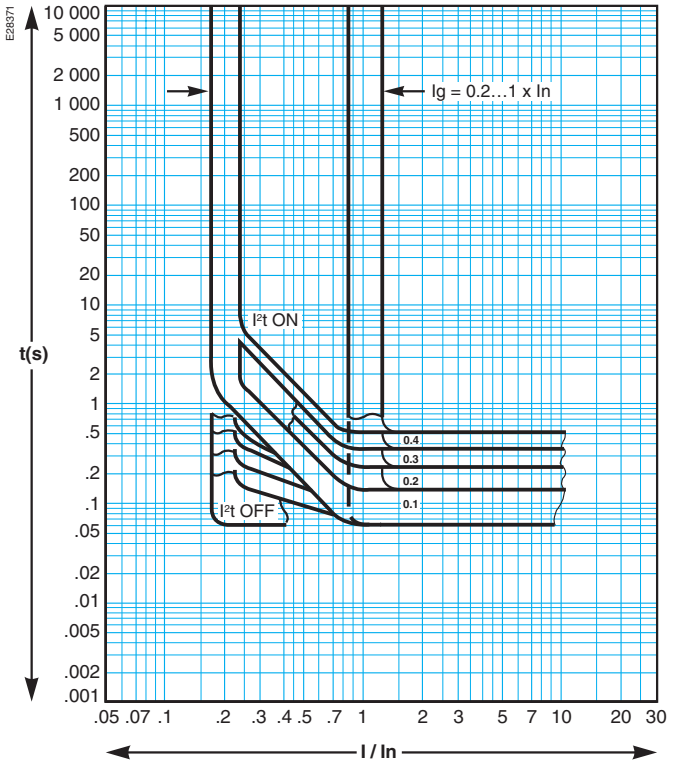


STR53UE / STR53SV



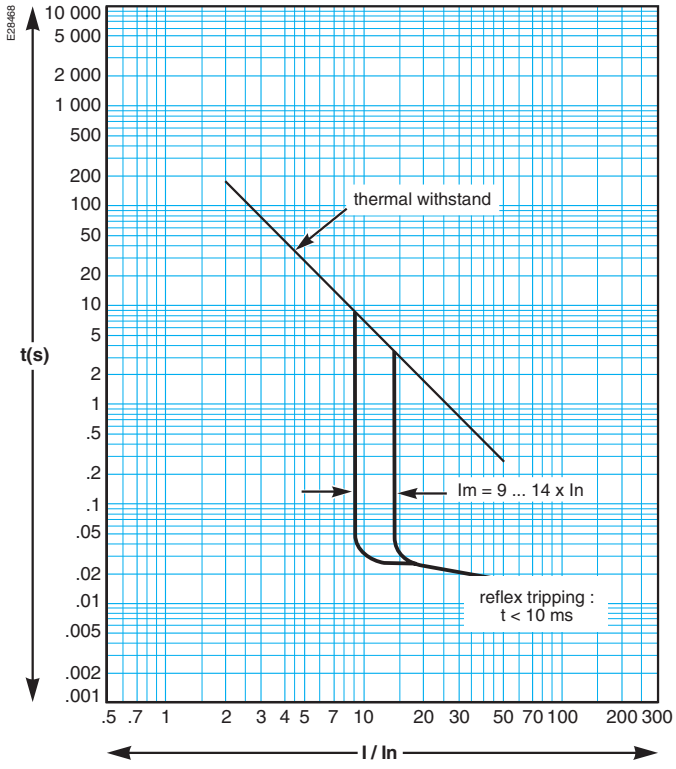
Options for STR53UE

Earth-fault protection

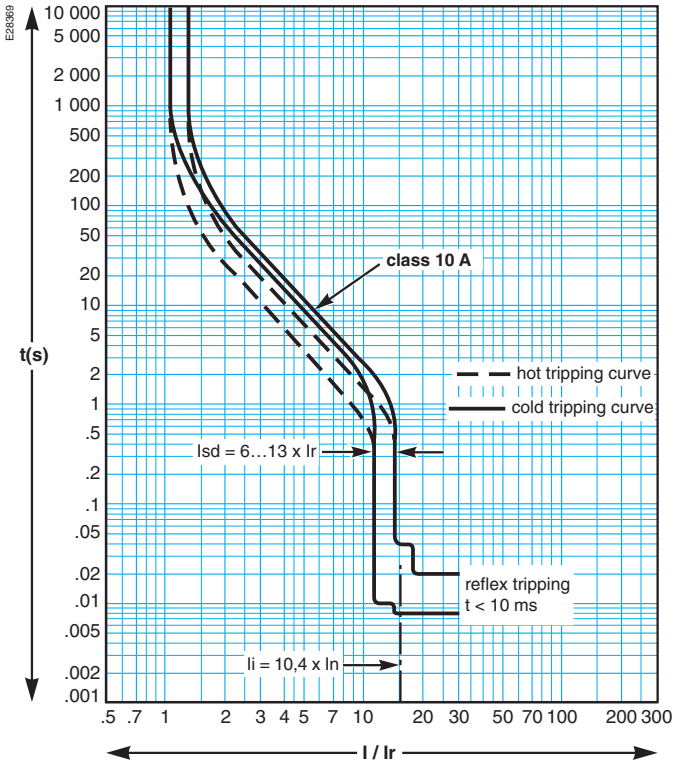


MA magnetic and STR43ME electronic trip units

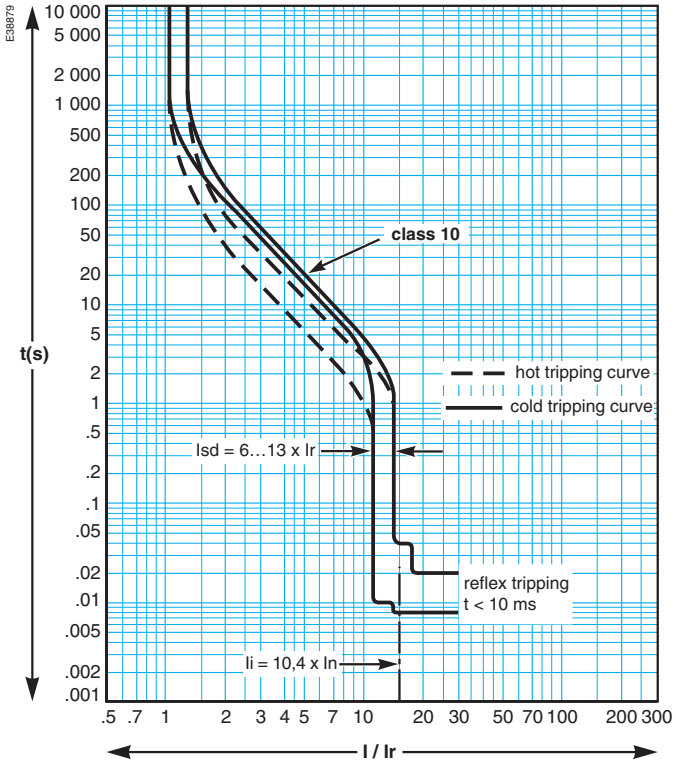
MA320...MA500



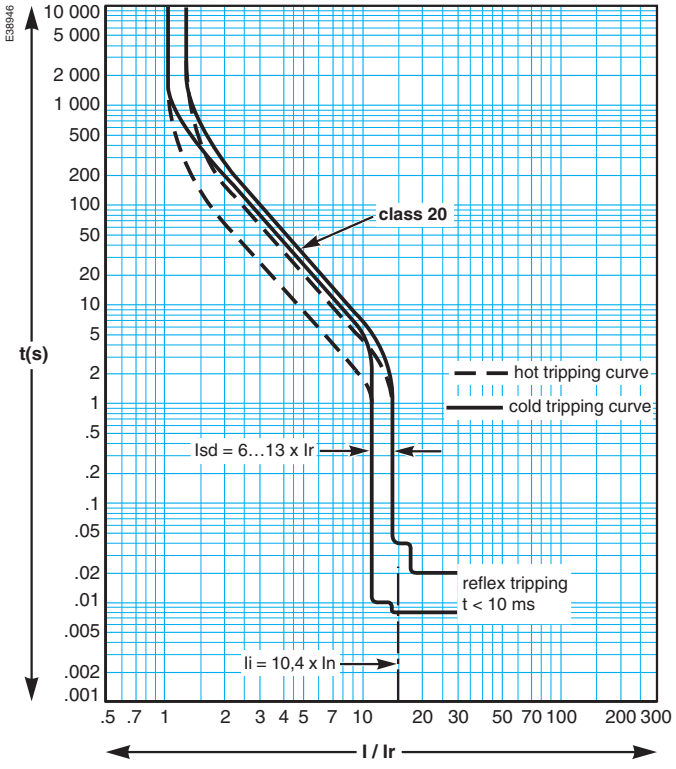
STR43ME - 120 to 500 A - class 10 A



STR43ME - 120 to 500 A - class 10



STR43ME - 120 to 500 A - class 20

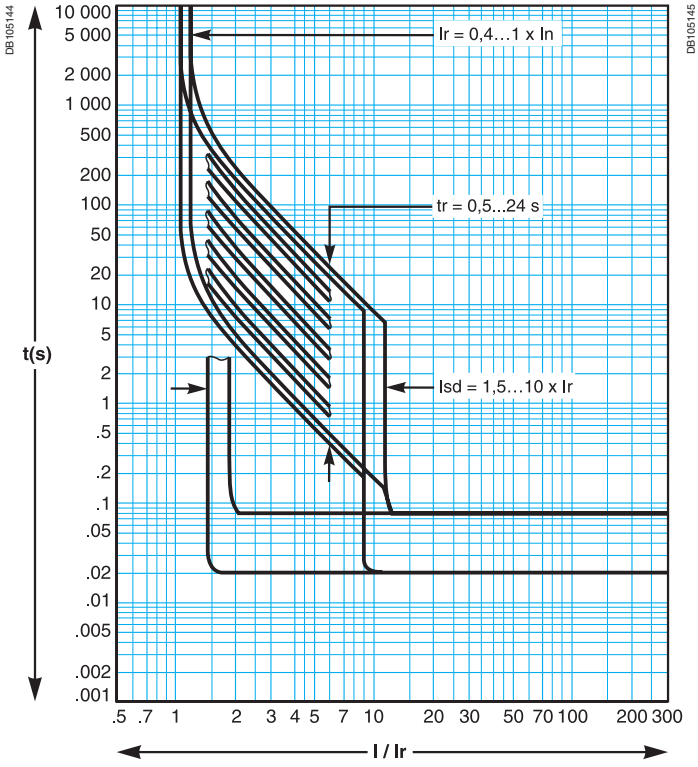


Thermal-withstand capacities are given for circuit breakers operating in an ambient temperature of 65 °C.

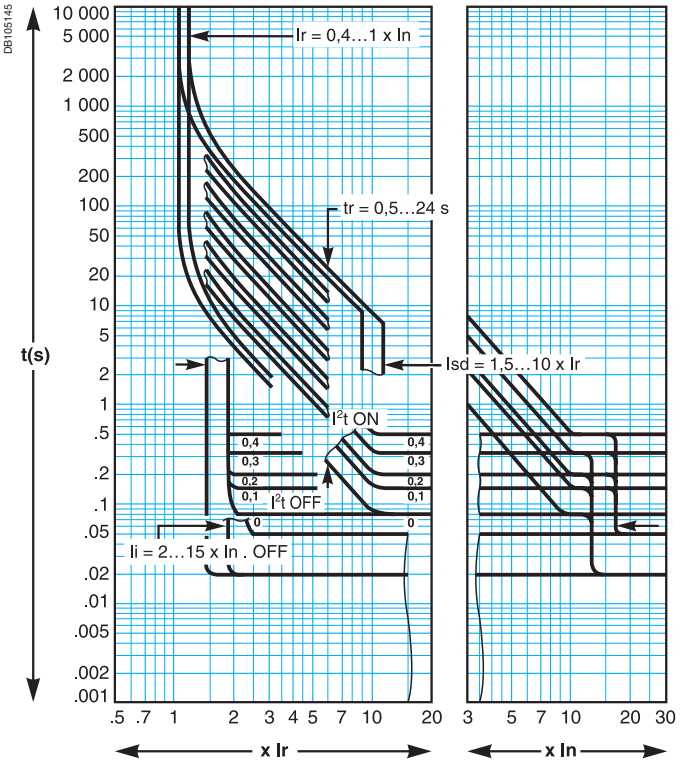
Tripping curves
Compact NS630b to 3200

Micrologic electronic control units

Micrologic 2.0

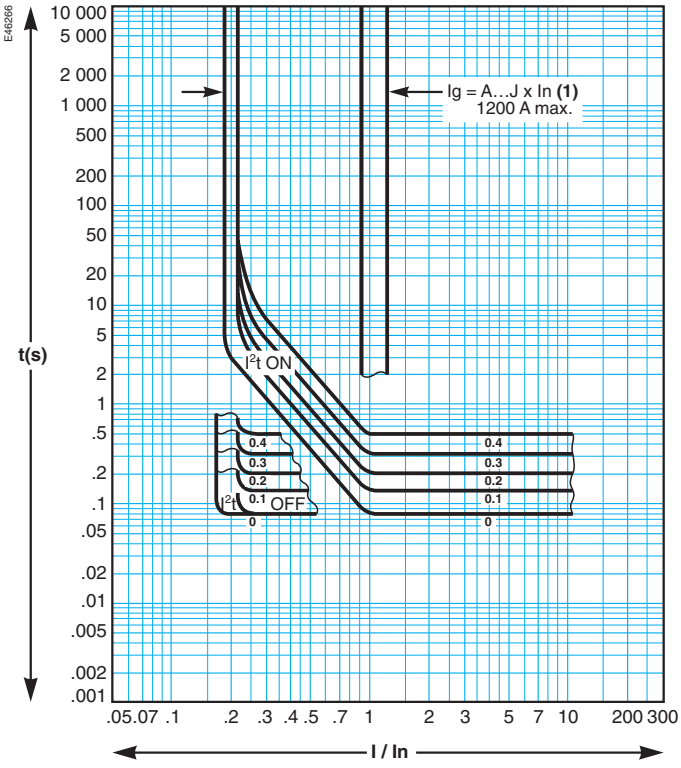


Micrologic 5.0, 6.0, 7.0



Options for Micrologic electronic control units

Earth-fault protection (Micrologic 6.0)

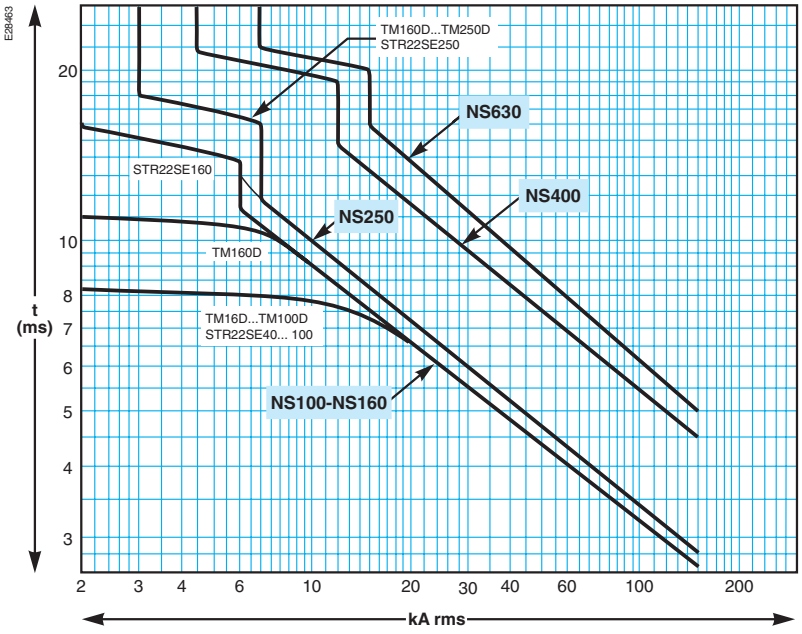


(1)

Ig = In x...	A	B	C	D	E	F	G	H	J
Ig < 400 A	0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
400 A ⩽ Ig ⩽ 1200 A	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
Ig > 1200 A	500	640	720	800	880	960	1040	1120	1200

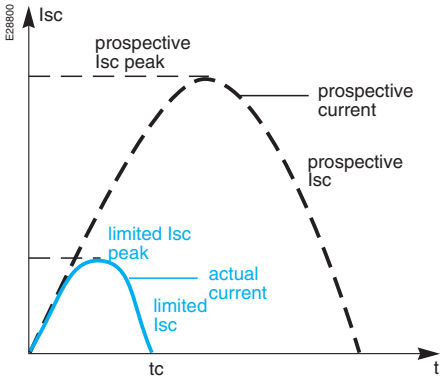
Reflex tripping

Compact NS100 to 630 devices incorporate the exclusive reflex-tripping system.
This system breaks very high fault currents by mechanically tripping the device via a "piston" actuated directly by the pressure produced in the breaking units resulting from a short-circuit.
For high short-circuits, this system provides a faster break and a trip guarantee, as well as natural total discrimination.
Reflex-tripping curves are exclusively a function of the circuit-breaker rating.



Current-limiting curves

The limiting capacity of a circuit breaker is its aptitude to limit short-circuit currents.



The exceptional limiting capacity of the Compact NS range is due to the rotating double-break technique (very rapid natural repulsion of contacts and the appearance of two arc voltages in-series with a very steep wave front).

Ics = 100 % Icu

The exceptional limiting capacity of the Compact NS range greatly reduces the forces created by fault currents in devices.
The result is a major increase in breaking performance. In particular, the service breaking capacity Ics is equal to 100% of Icu.
The Ics value, defined by IEC standard 60947-2, is guaranteed by tests comprising the following operations:
- break three times consecutively a fault current equal to 100 % of Icu
- check that the device continues to function normally:
  - it conducts the rated current without abnormal temperature rise
  - protection functions perform within the limits specified by the standard
  - suitability for isolation is not impaired.

Longer service life of electrical installations

Current-limiting circuit breakers greatly reduce the negative effects of short-circuits on installations.

Thermal effects
Less temperature rise in conductors, therefore longer service life for cables.

Mechanical effects
Reduced electrodynamic forces, therefore less risk of electrical contacts or bus bars being deformed or broken.

Electromagnetic effects
Less disturbances for measuring devices located near electrical circuits.

Economy by means of cascading

Cascading is a technique directly derived from current limiting. Circuit breakers with breaking capacities less than the prospective short-circuit current may be installed downstream of a limiting circuit breaker. The breaking capacity is reinforced by the limiting capacity of the upstream device.
It follows that substantial savings can be made on downstream equipment and enclosures.

Current-limiting curves

The current-limiting capacity of a circuit breaker is expressed by two curves which are a function of the prospective short-circuit current (the current which would flow if no protection devices were installed):
- the actual peak current (limited current),
- thermal stress (A^2s), i.e. the energy dissipated by the short-circuit in a conductor with a resistance of 1 Ω.

Example
What is the real value of a 150 kA rms prospective short-circuit (i.e. 330 kA peak) limited by an NS250L upstream ?
Answer: 30 kA peak (see next page).

Maximum permissible cable stresses

The table below indicates the maximum permissible thermal stresses for cables depending on their insulation, conductor (Cu or Al) and their cross-sectional area (CSA). CSA values are given in mm^2 and thermal stresses in A^2s.

CSA (mm^2)		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
CSA (mm^2)		**16**	**25**	**35**	**50**	
PVC	Cu	3.4×10^6	8.26×10^6	1.62×10^7	3.31×10^7	
	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	

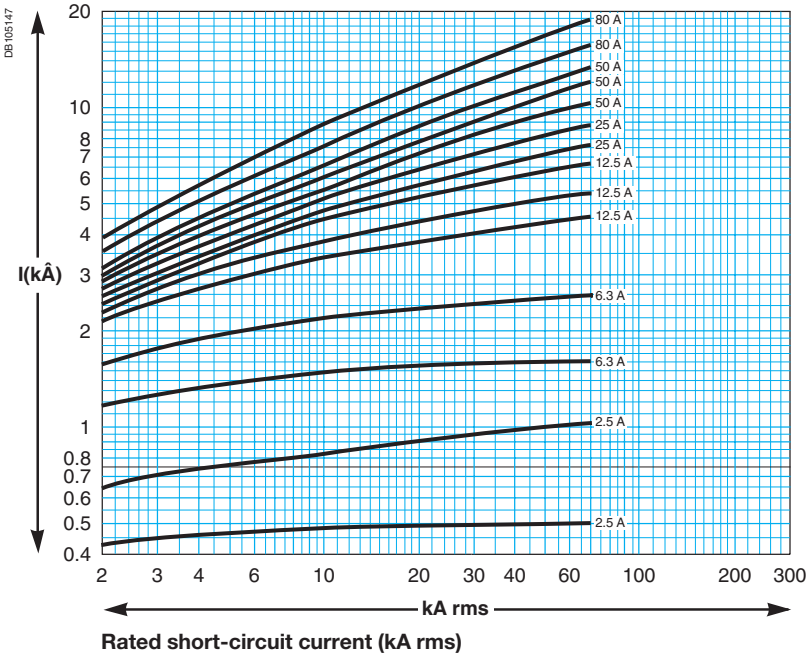
Example
Is a Cu/PVC cable with a CSA of 10 mm^2 adequately protected by an NS160N?
The table above indicates that the permissible stress is 1.32×10^6 A^2s.
All short-circuit currents at the point where an NS160N (Icu = 35 kA) is installed are limited with a thermal stress less than 6×10^5 A^2s (see next page).
Cable protection is therefore ensured up to the limit of the breaking capacity of the circuit breaker.

Current-limiting curves

Circuit breaker NS80H-MA	Thermal relay		Contactor	
Cal. 80 A	LRD-33	63	63/80	LC1-D80
Cal. 80 A	LRD-33	59	48/65	LC1-D65
Cal. 50 A	LRD-33	57	37/50	LC1-D65
Cal. 50 A	LRD-33	55	30/40	LC1-D65
Cal. 50 A	LRD-33	53	23/32	LC1-D65
Cal. 25 A	LRD-33	22	17/25	LC1-D65
Cal. 25 A	LRD-13	21	12/18	LC1-D65
Cal. 12.5 A	LRD-13	16	09/13	LC1-D65
Cal. 12.5 A	LRD-13	14	07/10	LC1-D65
Cal. 12.5 A	LRD-13	12	5.5/08	LC1-D32
Cal. 6.3 A	LRD-13	10	04/06	LC1-D65
Cal. 6.3 A	LRD-13	08	2.5/04	LC1-D65
Cal. 2.5 A	LRD-13	07	1.6/2.5	LC1-D65
Cal. 2.5 A	LRD-13	06	01/1.6	LC1-D09

Voltage 400/440 V AC (1)

Limited short-circuit current (kÂ peak)



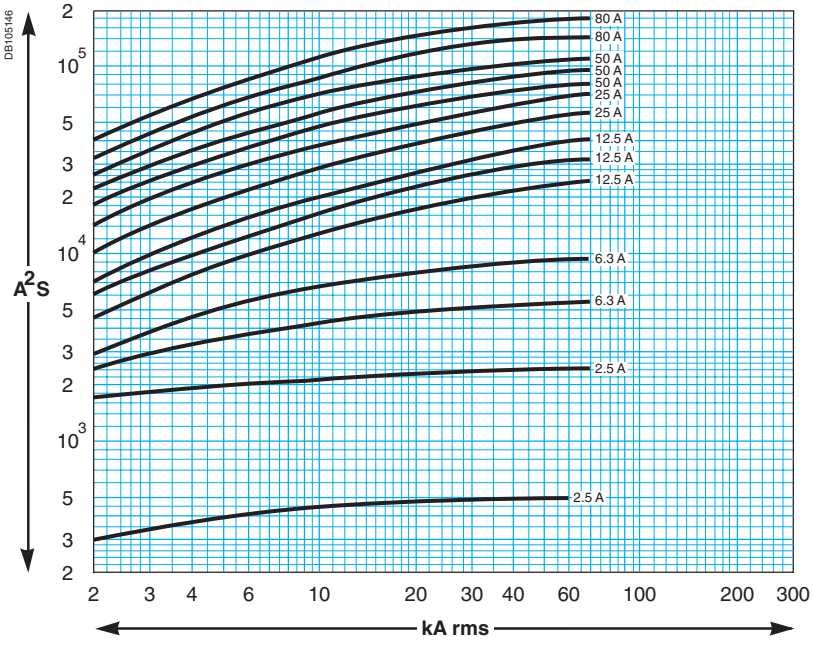
Rated short-circuit current (kA rms)

Thermal-stress curves

Circuit breaker NS80H-MA	Thermal relay		Contactor	
Cal. 80 A	LRD-33	63	63/80	LC1-D80
Cal. 80 A	LRD-33	59	48/65	LC1-D65
Cal. 50 A	LRD-33	57	37/50	LC1-D65
Cal. 50 A	LRD-33	55	30/40	LC1-D65
Cal. 50 A	LRD-33	53	23/32	LC1-D65
Cal. 25 A	LRD-33	22	17/25	LC1-D65
Cal. 25 A	LRD-13	21	12/18	LC1-D65
Cal. 12.5 A	LRD-13	16	09/13	LC1-D65
Cal. 12.5 A	LRD-13	14	07/10	LC1-D65
Cal. 12.5 A	LRD-13	12	5.5/08	LC1-D32
Cal. 6.3 A	LRD-13	10	04/06	LC1-D65
Cal. 6.3 A	LRD-13	08	2.5/04	LC1-D65
Cal. 2.5 A	LRD-13	07	1.6/2.5	LC1-D65
Cal. 2.5 A	LRD-13	06	01/1.6	LC1-D09

Voltage 400/440V AC (1)

Limited energy



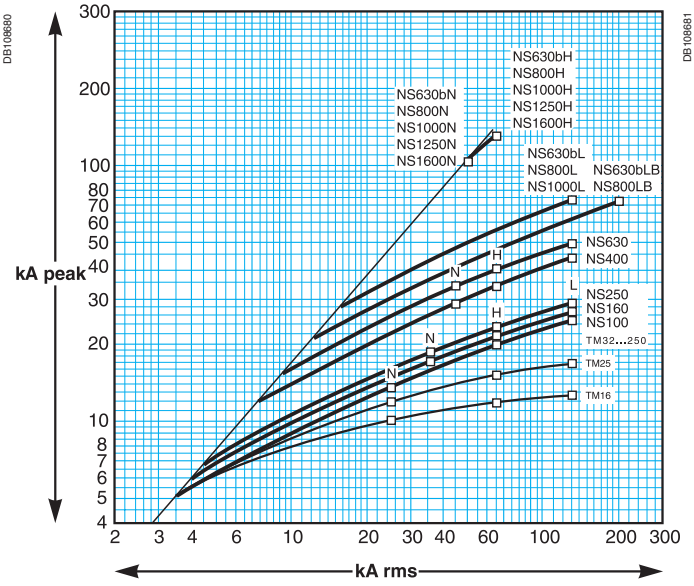
Rated short-circuit current (kA rms)

(1) Valid for 480 V Nema.

Current-limiting curves

Voltage 400/440 V AC (1)

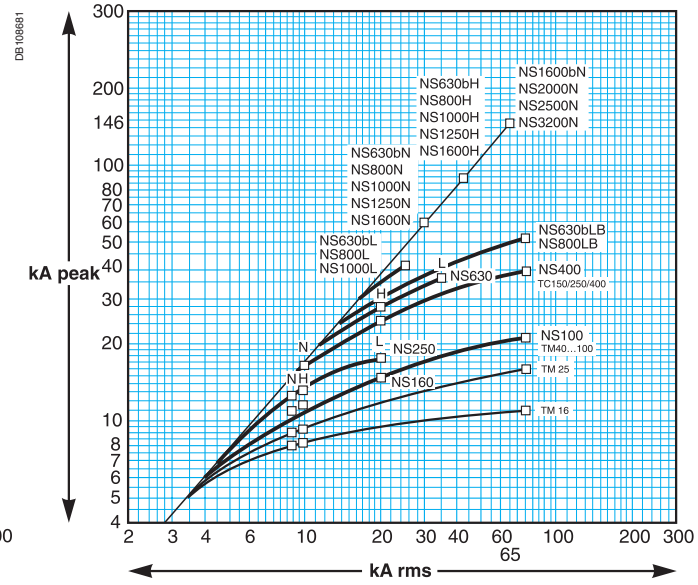
Limited short-circuit current (kÂ peak)



Rated short-circuit current (kA rms)

Voltage 660/690 V AC

Limited short-circuit current (kÂ peak)

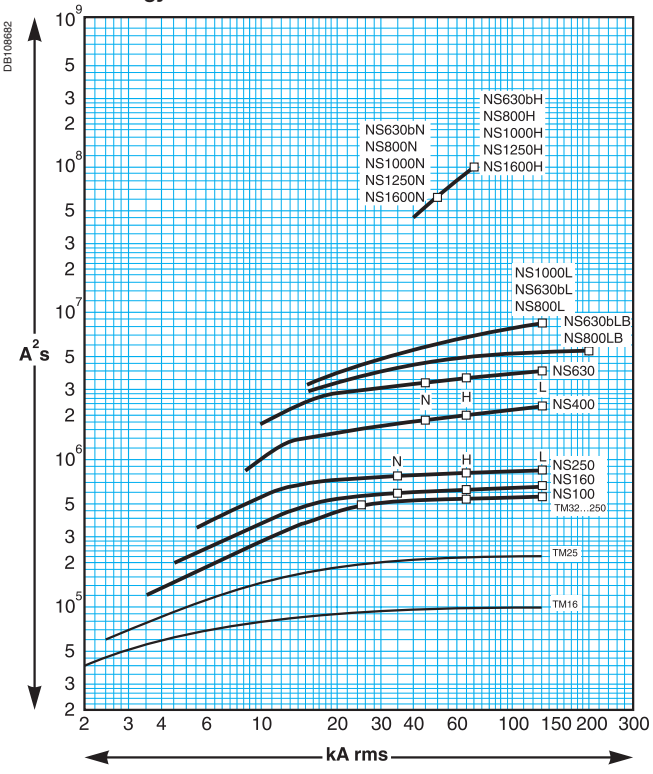


Rated short-circuit current (kA rms)

Thermal-stress curves

Voltage 400/440 V AC (1)

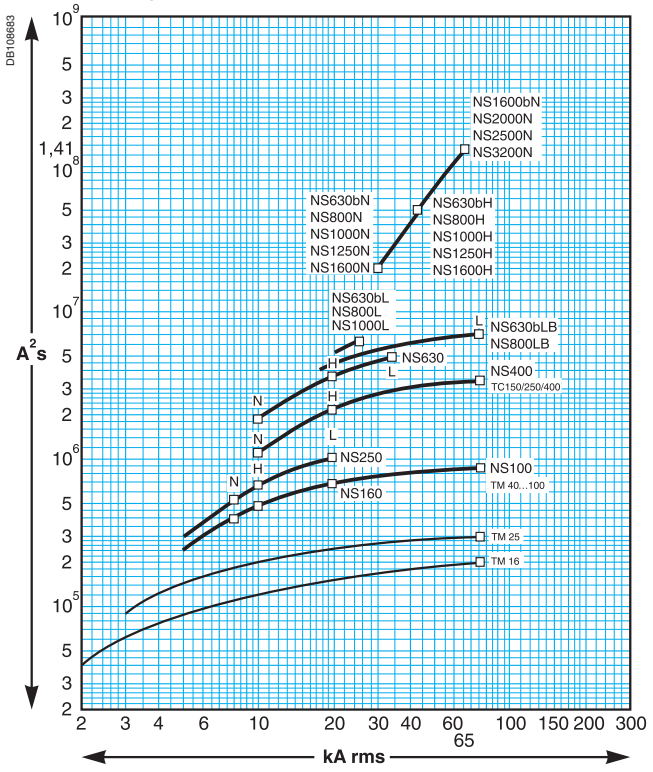
Limited energy



Rated short-circuit current (kA rms)

Voltage 660/690 V AC

Limited energy



Rated short-circuit current (kA rms)

(1) Valid for 480 V Nema.