

Introduction

Characteristics and performance of Compact NSX circuit breakers from 100 to 630 A



Compact NSX100/160/250.



Compact NSX400/630.

Common characteristics

Rated voltages		
Insulation voltage (V)	Ui	800
Impulse withstand voltage (kV)	Uimp	8
Operational voltage (V)	Ue	AC 50/60 Hz 690
Suitability for isolation	IEC/EN 60947-2	yes
Utilisation category		A
Pollution degree	IEC 60664-1	3

Circuit breakers

Breaking capacity levels

Electrical characteristics as per IEC 60947-2

Rated current (A)	In	40 °C
Number of poles		

Breaking capacity (kA rms)

Icu	AC 50/60 Hz	220/240 V 380/415 V 440 V 500 V 525 V 660/690 V
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Service breaking capacity (kA rms)

Ics	AC 50/60 Hz	220/240 V 380/415 V 440 V 500 V 525 V 660/690 V
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Durability (C-O cycles)	Mechanical	
	Electrical	440 V In/2 In 690 V In/2 In

Characteristics as per Nema AB1

Breaking capacity (kA rms)	AC 50/60 Hz	240 V 480 V 600 V
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Characteristics as per UL 508

Breaking capacity (kA rms)	AC 50/60 Hz	240 V 480 V 600 V
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Protection and measurements

Short-circuit protection	Magnetic only
Overload / short-circuit protection	Thermal magnetic
	Electronic
	with neutral protection (Off-0.5-1-OSN) ⁽¹⁾
	with ground-fault protection
	with zone selective interlocking (ZSI) ⁽²⁾
Display / I, U, f, P, E, THD measurements / interrupted-current measurement	
Options	Power Meter display on door
	Operating assistance
	Counters
	Histories and alarms
	Metering Com
	Device status/control Com
Earth-leakage protection	By Vigì module
	By Vigirex relay

Installation / connections

Dimensions and weights

Dimensions (mm)	Fixed, front connections	2/3P
W x H x D		4P
Weight (kg)	Fixed, front connections	2/3P 4P

Connections

Connection terminals	Pitch	With/without spreaders
Large Cu or Al cables	Cross-section	mm ²

⁽¹⁾ OSN: Over Sized Neutral protection for neutrals carrying high currents (e.g. 3rd harmonics).

⁽²⁾ ZSI: Zone Selective Interlocking using pilot wires.

⁽³⁾ 2P circuit breaker in 3P case for B and F types, only with thermal-magnetic trip unit.

Protection of distribution systems

TM thermal-magnetic and MA magnetic trip units

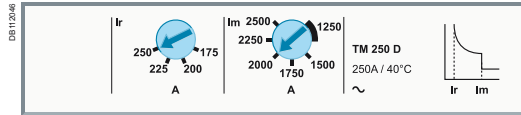
TM thermal-magnetic and MA magnetic trip units can be used on Compact NSX100/160/250 circuit breakers with performance levels B/F/H/N/S/L.

TM trip units are available in 2 versions:

- TM-D, for the protection of distribution cables
- TM-G, with a low threshold, for the protection of generators or long cable lengths.

Vigi modules or Vigirex relays can be added to all the circuit breakers to provide external earth-leakage protection.

TM-D and TM-G thermal-magnetic trip units



Circuit breakers equipped with thermal-magnetic trip units are used mainly in industrial and commercial electrical distribution applications:

- TM-D, for protection of cables on distribution systems supplied by transformers
- TM-G, with a low pick-up for generators (lower short-circuit currents than with transformers) and distribution systems with long cable lengths (fault currents limited by the impedance of the cable).

Protection

Thermal protection (Ir)

Thermal overload protection based on a bimetal strip providing an inverse time curve I^2t , corresponding to a temperature rise limit. Above this limit, the deformation of the strip trips the circuit breaker operating mechanism.

This protection operates according to:

- Ir that can be adjusted in amps from 0.7 to 1 times the rating of the trip unit (16 A to 250 A), corresponding to settings from 11 to 250 A for the range of trip units
- a non-adjustable time delay, defined to ensure protection of the cables.

Magnetic protection (Im)

Short-circuit protection with a fixed or adjustable pick-up Im that initiates instantaneous tripping if exceeded.

- TM-D: fixed pick-up, Im, for 16 to 160 A ratings and adjustable from 5 to 10 x In for 200 and 250 A ratings
- fixed pick-up for 16 to 63 A ratings.

Protection against insulation faults

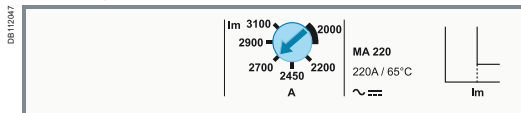
Two solutions are possible by adding:

- a Vigi module acting directly on the trip unit of the circuit breaker
- a Vigirex relay connected to an MN or MX voltage release.

Protection versions

- 3-pole:
 - 3P 3D: 3-pole frame (3P) with detection on all 3 poles (3D)
 - 3P 2D: 3-pole frame (3P) with detection on 2 poles (2D).
- 4-pole:
 - 4P 3D: 4-pole frame (4P) with detection on 3 poles (3D).
 - 4P 4D: 4-pole frame (4P) with detection on all 4 poles (same threshold for phases and neutral).

MA magnetic trip units



In distribution applications, circuit breakers equipped with MA magnetic-only trip units are used for:

- short-circuit protection of secondary windings of LV/LV transformers with overload protection on the primary side.
- as an alternative to a switch-disconnector at the head of a switchboard in order to provide short-circuit protection.

Their main use is however for motor protection applications, in conjunction with a thermal relay and a contactor or motor starter (see "Motor protection", page A-36).

Protection

Magnetic protection (Im)

Short-circuit protection with an adjustable pick-up Im that initiates instantaneous tripping if exceeded.

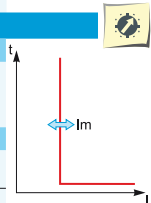
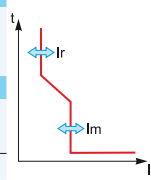
- $I_m = I_n \times \dots$ set in amps on an adjustment dial covering the range 6 to 14 x In for 2.5 to 100 A ratings or 9 to 14 In for 150 to 220 A ratings.

Protection versions

- 3-pole (3P 3D): 3-pole frame (3P) with detection on all 3 poles (3D).
- 4-pole (4P 3D): 4-pole frame (4P) with detection on 3 poles (3D).

Note: All the trip units have a transparent lead-sealable cover that protects access to the adjustment dials.

Thermal-magnetic trip units		TM16D to 250D										TM16G to 63G							
Ratings (A)	In at 40 °C ⁽¹⁾	16	25	32	40	50	63	80	100	125	160	200	250	16	25	40	63		
Circuit breaker	Compact NSX100	■	■	■	■	■	■	■	■	■	-	-	-	■	■	■	■		
	Compact NSX160	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	Compact NSX250	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Thermal protection																			
Pick-up (A) tripping between 1.05 and 1.20 I _r	I _r = I _n x ...	adjustable in amps from 0.7 to 1 x I _n																	
Time delay (s)	t _r	non-adjustable												non-adjustable					
	t _r at 1.5 x I _n	120 to 400												120 to 400					
	t _r at 6 x I _r	15												-					
Magnetic protection																			
Pick-up (A)	I _m	fixed										adjustable		fixed					
accuracy ±20 %	Compact NSX100	190	300	400	500	500	500	640	800	5 to 10xI _n		63	80	80	125				
	Compact NSX160/250	190	300	400	500	500	500	640	800	1250	1250	63	80	80	125				
Time delay	t _m	fixed																	
Neutral protection																			
Unprotected neutral	4P 3D	no detection												no 4P3D version					
Fully protected neutral	4P 4D	1 x I _r																	
Magnetic trip units		MA 2.5 to 220																	
Ratings (A)	In at 65 °C	2.5	6.3	12.5	25	50	100	150	220										
Circuit breaker	Compact NSX100	■	■	■	■	■	■	-	-										
	Compact NSX160	-	-	-	-	-	-	-	-										
	Compact NSX250	-	-	-	-	-	-	-	-										
Instantaneous magnetic protection																			
Pick-up (A) accuracy ±20 %	I _m = I _n x ...	adjustable in amps from 6 to 14 x I _n (9 settings)					adjustable in amps from 9 to 14 x I _n												
Time delay (ms)	t _m	none																	



(1) For temperatures greater than 40°C, the thermal protection characteristics are modified. See the temperature derating table.