

# 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)	<b>Ui</b>		800
Impulse withstand voltage (kV)	<b>Uimp</b>		8
Operational voltage (V)	<b>Ue</b>	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)	<b>In</b>		40 °C
Number of poles			
Breaking capacity (kA rms)			
	<b>Icu</b>	AC 50/60 Hz	220/240 V 380/415 V 440 V 500 V 525 V 660/690 V

##### Service breaking capacity (kA rms)

	<b>Ics</b>	AC 50/60 Hz	220/240 V 380/415 V 440 V 500 V 525 V 660/690 V
Durability (C-O cycles)			
		Mechanical	
		Electrical	440 V In/2 690 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) <sup>(1)</sup> with ground-fault protection with zone selective interlocking (ZSI) <sup>(2)</sup>
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 Vigi 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 <sup>2</sup>

(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.

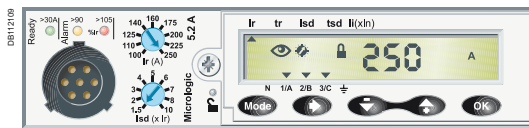
Common characteristics				
Control				
Manual	With toggle		■	
	With direct or extended rotary handle		■	
Electrical	With remote control		■	
Versions				
Fixed		■		
Withdrawable	Plug-in base		■	
	Chassis		■	

NSX100						NSX160						NSX250						NSX400					NSX630						
B	F	N	H	S	L	B	F	N	H	S	L	B	F	N	H	S	L	F	N	H	S	L	F	N	H	S	L		
<b>100</b>						<b>160</b>						<b>250</b>						<b>400</b>					<b>630</b>						
2 <sup>(3)</sup> , 3, 4						2 <sup>(3)</sup> , 3, 4						2 <sup>(3)</sup> , 3, 4						3, 4					3, 4						
40	85	90	100	120	150	40	85	90	100	120	150	40	85	90	100	120	150	40	85	100	120	150	40	85	100	120	150		
25	36	50	70	100	150	25	36	50	70	100	150	25	36	50	70	100	150	36	50	70	100	150	36	50	70	100	150		
20	35	50	65	90	130	20	35	50	65	90	130	20	35	50	65	90	130	30	42	65	90	130	30	42	65	90	130		
15	25	36	50	65	70	15	30	36	50	65	70	15	30	36	50	65	70	25	30	50	65	70	25	30	50	65	70		
-	22	35	35	40	50	-	22	35	35	40	50	-	22	35	35	40	50	20	22	35	40	50	20	22	35	40	50		
-	8	10	10	15	20	-	8	10	10	15	20	-	8	10	10	15	20	10	10	20	25	35	10	10	20	25	35		
40	85	90	100	120	150	40	85	90	100	120	150	40	85	90	100	120	150	40	85	100	120	150	40	85	100	120	150		
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20	35	50	65	90	130	20	35	50	65	90	130	20	35	50	65	90	130	30	42	65	90	130	30	42	65	90	130		
7.5	12.5	36	50	65	70	15	30	36	50	65	70	15	30	36	50	65	70	25	30	50	65	70	25	30	50	65	70		
-	11	35	35	40	50	-	22	35	35	40	50	-	22	35	35	40	50	10	11	11	12	12	10	11	11	12	12		
-	4	10	10	15	20	-	8	10	10	15	20	-	8	10	10	15	20	10	10	10	12	12	10	10	10	12	12		
50000						40000						20000						15000						15000					
50000						20000						20000						12000						8000					
30000						10000						10000						6000						4000					
20000						15000						10000						6000						6000					
10000						7500						5000						3000						2000					
40	85	90	100	120	150	40	85	90	100	120	150	40	85	90	100	120	150	40	85	100	120	150	40	85	100	120	150		
20	35	50	65	90	130	20	35	50	65	90	130	20	35	50	65	90	130	30	42	65	90	130	30	42	65	90	130		
-	8	20	35	40	50	-	20	20	35	40	50	-	20	20	35	40	50	-	20	35	40	50	-	20	35	40	50		
-	85	85	85	-	-	-	85	85	85	-	-	-	85	85	85	-	-	85	85	85	-	-	85	85	85	-	-		
-	25	50	65	-	-	-	35	50	65	-	-	-	35	50	65	-	-	35	50	65	-	-	35	50	65	-	-		
-	10	10	10	-	-	-	10	10	10	-	-	-	15	15	15	-	-	20	20	20	-	-	20	20	20	-	-		
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105 x 161 x 86						105 x 161 x 86						105 x 161 x 86						140 x 255 x 110						140 x 255 x 110					
140 x 161 x 86						140 x 161 x 86						140 x 161 x 86						185 x 255 x 110						185 x 255 x 110					
2.05						2.2						2.4						6.05						6.2					
2.4						2.6						2.8						7.90						8.13					
35/45 mm						35/45 mm						35/45 mm						45/52.5 mm						45/52.5 mm					
300						300						300						4 x 240						4 x 240					

# Protection of distribution systems

## Micrologic 5 / 6 A or E trip units

Micrologic 5 / 6 A (Ammeter) or E (Energy) trip units can be used on Compact NSX100 to 630 circuit breakers with performance levels B/F/H/N/S/L. They all have a display unit. They offer basic LSI protection (Micrologic 5) or LSI and ground-fault protection G (Micrologic 6). They also offer measurement, alarm and communication functions.



### Protection

Settings can be adjusted in two ways, using the dials and/or the keypad. The keypad can be used to make fine adjustments in 1 A steps below the maximum value defined by the setting on the dial. Access to setting modifications via the keypad is protected by a locking function displayed on the screen and controlled by a microswitch. The lock is activated automatically if the keypad is not used for 5 minutes. Access to the microswitch is protected by a transparent lead-sealable cover. With the cover closed, it is still possible to display the various settings and measurements using the keypad.

#### Overloads: Long time protection (Ir)

Inverse time protection against overloads with an adjustable current pick-up Ir set using a dial or the keypad for fine adjustments. The time delay tr is set using the keypad.

#### Short-circuits: Short-time protection (I<sub>sd</sub>)

Short-circuit protection with an adjustable pick-up I<sub>sd</sub> and adjustable time delay tsd, with the possibility of including a portion of an inverse time curve (I<sup>2</sup>t On).

#### Short-circuits: Instantaneous protection (Ii)

Instantaneous protection with adjustable pick-up Ii.

#### Additional ground fault protection (I<sub>g</sub>) on Micrologic 6

Residual type ground-fault protection with an adjustable pick-up I<sub>g</sub> (with Off position) and adjustable time delay tg. Possibility of including a portion of an inverse time curve (I<sup>2</sup>t On).

#### Neutral protection

On 4-pole circuit breakers, this protection can be set via the keypad:

- Off: neutral unprotected
- 0.5: neutral protection at half the value of the phase pick-up, i.e. 0.5 x Ir
- 1.0: neutral fully protected at Ir
- OSN: Oversized neutral protection at 1.6 times the value of the phase pick-up. Used when there is a high level of 3rd order harmonics (or orders that are multiples of 3) that accumulate in the neutral and create a high current. In this case, the device must be limited to Ir = 0.63 x In for the maximum neutral protection setting of 1.6 x Ir.
- With 3-pole circuit breakers, the neutral can be protected by installing an external neutral sensor with the output (T1, T2) connected to the trip unit.

#### Zone selective interlocking (ZSI)

A ZSI terminal block may be used to interconnect a number of Micrologic control units to provide zone selective interlocking for short-time (I<sub>sd</sub>) and ground-fault (I<sub>g</sub>) protection, without a time delay. For Compact NSX 100 to 250, the ZSI function is available only in relation to the upstream circuit breaker (ZSI out).

### Display of type of fault

On a fault trip, the type of fault (Ir, I<sub>sd</sub>, Ii, I<sub>g</sub>), the phase concerned and the interrupted current are displayed. An external power supply is required.

### Indications

#### Front indications

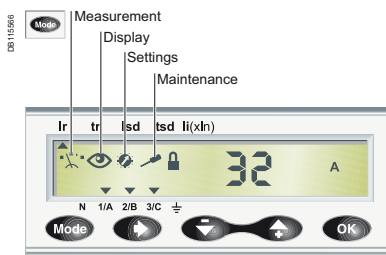


- Green "Ready" LED: flashes slowly when the circuit breaker is ready to trip in the event of a fault.
- Orange overload pre-alarm LED: steady on when I > 90 % Ir
- Red overload LED: steady on when I > 105 % Ir

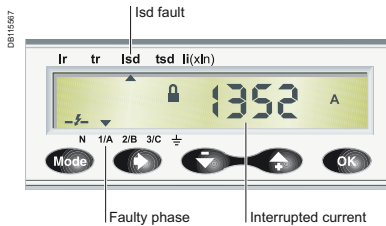
#### Remote indications

An SDx relay module installed inside the circuit breaker can be used to remote the following information:

- overload trip
  - overload prealarm (Micrologic 5) or ground fault trip (Micrologic 6).
- This module receives the signal from the Micrologic electronic trip unit via an optical link and makes it available on the terminal block. The signal is cleared when the circuit breaker is closed.
- These outputs can be reprogrammed to be assigned to other types of tripping or alarm. The module is described in detail in the section dealing with accessories.



Trip unit menus.



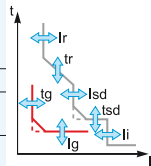
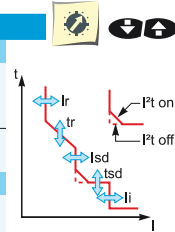
Display of interrupted current.



SDx remote indication relay module with its terminal block.

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

Protection		Micrologic 5 / 6 A or E trip units										
Ratings (A)	In at 40 °C (1)	40 (2)	100	160	250	400	630					
Circuit breaker	Compact NSX100	■	■	-	-	-	-					
	Compact NSX160	■	■	-	-	-	-					
	Compact NSX250	■	■	■	■	-	-					
	Compact NSX400	-	-	-	-	■	-					
	Compact NSX630	-	-	-	-	-	■					
<b>L Long-time protection</b>												
Pick-up (A) tripping between 1.05 and 1.20 Ir	Ir = ...	dial setting	value depending on trip unit rating (In) and setting on dial									
	In = 40 A	Io =	18	18	20	23	25	28	32	36	40	
	In = 100 A	Io =	40	45	50	55	63	70	80	90	100	
	In = 160 A	Io =	63	70	80	90	100	110	125	150	160	
	In = 250 A	Io =	100	110	125	140	160	175	200	225	250	
	In = 400 A	Io =	160	180	200	230	250	280	320	360	400	
	In = 630 A	Io =	250	280	320	350	400	450	500	570	630	
		keypad setting	Fine adjustment in 1 A steps below maximum value set on dial									
Time delay (s) accuracy 0 to -20 %	tr = ...	keypad setting	0.5	1	2	4	8	16				
		1.5 x Ir	15	25	50	100	200	400				
		6 x Ir	0.5	1	2	4	8	16				
		7.2 x Ir	0.35	0.7	1.4	2.8	5.5	11				
Thermal memory			20 minutes before and after tripping									
<b>S Short-time protection with adjustable time delay</b>												
Pick-up (A) accuracy ±10 %	Isd = Ir x ...	dial setting for Micrologic 5	1.5	2	3	4	5	6	7	8	10	
		keypad settings for micrologic 6	Adjustment in steps of 0.5 x Ir over the range 1.5 x Ir to: 15 x Ir (40 to 160 A), 12 x Ir (250 to 400 A) or 11 x Ir (630 A)									
Time delay (s)	tsd = ...	keypad setting	i <sup>2</sup> Off	0	0.1	0.2	0.3	0.4				
			i <sup>2</sup> On	-	0.1	0.2	0.3	0.4				
			Non-tripping time (ms)	20	80	140	230	350				
			Maximum break time (ms)	80	140	200	320	500				
<b>I Instantaneous protection</b>												
Pick-up (A) accuracy ±15 %	Ii = In x	keypad setting	Adjustment in steps of 0.5 x In over the range 1.5 x In to: 15 x In (40 to 160 A), 12 x In (250 to 400 A) or 11 x In (630 A)									
			Non-tripping time	10 ms								
			Maximum break time	50 ms for I > Ii								
<b>G Ground-fault protection - for Micrologic 6 A or E</b>												
Pick-up (A) accuracy ±10 %	Ig = In x	dial setting										
	In = 40 A		0.4	0.4	0.5	0.6	0.7	0.8	0.9	1	Off	
	In > 40 A		0.2	0.3	0.4	0.5	0.6	0.7	0.8	1	Off	
			Fine adjustment in 0.05 A steps using the keypad									
Time delay (s)	tg = ...	keypad setting	i <sup>2</sup> Off	0	0.1	0.2	0.3	0.4				
			i <sup>2</sup> On	-	0.1	0.2	0.3	0.4				
			Non-tripping time (ms)	20	80	140	230	350				
			Maximum break time (ms)	80	140	200	320	500				
Test	Ig function		built-in									



(1) If the trip units are used in high-temperature environments, the Micrologic setting must take into account the thermal limitations of the circuit breaker. See the temperature derating table.  
(2) For 40 A rating, the neutral N/2 adjustment is not possible.