# Compact NSX

Moulded-case circuit breakers and switch-disconnectors Measurement and communication from 100 to 630 A - up to 690 V







# Intelligent outlook



# Compact NSX Next-generation circuit breakers

The Compact<sup>™</sup> range of circuit breakers set tomorrow's standards today and help exacting organisations achieve more from their LV infrastructure. An extended breaking capacity, the highest in its class, is available across the entire Compact NSX range.

A power monitoring unit also enhances their outstanding protective functions. For the first time, users can monitor both energy and power, offering new performance in a remarkably compact device.



# Combine safety and performance

The Compact NSX range is innovative - it incorporates monitoring and communication functions, from 40 A upward, combined with impeccable protection.

# **Expert technology**

A roto-active contact breaking principle provides better limitation and endurance performance:

- > Very high breaking capacity in a very small device.
- > Exceptional fault current limitation for extended system life.

# Reduced installation costs

Achieve up to 30 % savings:

- > Total discrimination is ensured particulary in the case of miniature circuit breakers for considerable savings at the time of installation.
- > Smaller devices mean more economical switchboards for a significant impact on overall cost of installation - no need for over-calibration.

# New breaking capacities

New performance levels improve application targeting:

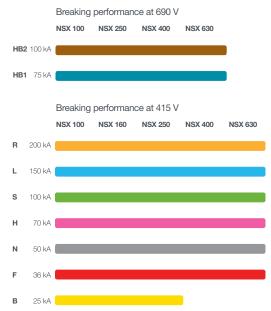
- > 25 kA Standard low short-circuit level applications, e.g., in service businesses.
- > 36-50 kA Standard applications (industrial plants, buildings, and hospitals).
- > 70-100 kA High performance at controlled cost.
- > 150 kA Marine ready, with an lcs rating meeting IACS requirements for emergency, essential, and MCC loads.
- > 200 kA at up to 440 V Industry-leading breaking capacity for high-density applications in oil and gas extraction and processing, mining operations, metals and minerals production, and data centres.
- > 100 kA from 500 to 690 V The world's highest rated breaking capacity for the most demanding electrical environments, and ideal for high-efficiency, cost-effective 690 V systems.

# Enhanced protection for motors

The Compact NSX range meets the requirements of IEC 60947-4-1 standards for protection of motors:

- > Well adapted to motor-starting solutions up to 315 kW at 400 V, providing protection against short circuits, overloads, phase unbalance, and phase loss.
- Set up additional protection systems for starting and braking with the motor running, reverse braking, jogging, or reversing in complete safety.
- > Used in conjunction with a Schneider Electric contactor, the Compact NSX provides Type II coordination for motor applications.







# Measure the difference

Compact NSX circuit breakers provide outstanding protection as well as an integrated measurement unit to help you monitor power conditions and manage energy consumption.

# Integrated monitoring

A Micrologic electronic tripping device with next-generation sensors:

- > An 'iron' sensor for the power supply to the electronics.
- > An 'air' sensor (Rogowski coils) for the measurement part.

The originality lies in how Compact NSX measures, processes, and displays data, either directly on screen, on the switchboard front panel, or via a monitoring system.

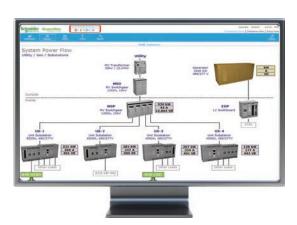
# Accessibility of information

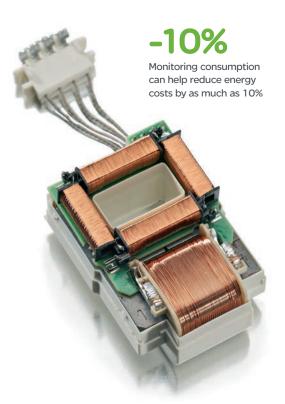
To keep costs under control and ensure service continuity, relevant information must be available in real time:

- > A kilowatt-hour meter helps optimise costs and their allocation.
- > Harmonic distortion rate shows the quality of electrical supply.
- > Alarm notification secures operational control and maintenance planning.
- > Event logs and tables, activated continuously, ensure the installed equipment base operates correctly, so energy efficiency is maximized.

# Installation supervision

Used in conjunction with software, Compact NSX provides users with a set of parameters and tools to make it easy to monitor installations.







Electronics (ASIC), independent of measurement, manage protection functions. The high degree of integration in electronics guarantees protection against conducted or radiated interference



# Opt for service continuity

The Compact NSX range provides exceptional discrimination that minimizes the impact of short circuits and ensures maximum service continuity.





Direct access to maintenance indicators

# Discrimination

Schneider Electric leverages over 30 years of experience and expertise in discrimination to ensure customers of maximum service continuity:

> The downstream circuit breaker trips as close as possible to the fault, so that the upstream circuit breaker is not overloaded.

# Total service continuity

The Compact NSX range offers innovative capabilities to ensure maximum continuity and uptime for your facilities:

- > R, HB1, and HB2 high breaking capacity levels enable the circuit breakers to withstand demanding fault conditions, staying reliably in service after 3 faults. After a fault is cleared, remote control reclosing functionality puts circuits back into operation quickly.
- > SDTAM module allows remote indication of motor overloads and actuation of a contact switch. The SDTAM switches the contact instead of tripping the circuit breaker. The module allows for machine restart directly from the contact switch without having to operate circuit breakers.

# Preventive maintenance

Maintenance indicators provide information on the number of operations, level of wear on contacts, and total load rates. Maintenance is now preventive, avoiding faults.





# Added simplicity

The Compact NSX range incorporates the same principles of easy installation and use that made its predecessor so successful, and takes these to a higher level.



time savings in installation compared with a classic monitoring solution



The green 'Ready' LED flashes to show that all is well



LTS installation system

# Simple in design

- > Installers mount and wire Compact NSX in the same way as Compact NS, which makes engineering for a retrofit or extension simple.
- > Design is simplified using support software that helps you with parameter settings and planning switchboard installation.

# Simple to install

- > A Limited Torque Screw (LTS) system ensures proper installation of the tripping device for added flexibility.
- > A transparent sealed flap protects access to tripping device switches and prevents settings from being changed.
- > New electrical control adjustment also has a transparent sealable cover to prevent it from being operated accidentally.
- > Pre-wired connectivity and plug-and-play interface modules allow for easy integration with

# communication networking.

# Simple to use

- > Users customize alarms for all parameters, assign them to indicator lights, choose display priorities, and configure time delay thresholds and modes.
- > A wealth of information, including continuously-activated event logs and tables, helps you ensure that the installed equipment base is operating correctly and that settings are optimized.



Transparent protective cover



# Choose the expertise of Schneider Electric

Whether in buildings, factories or mission-critical infrastructures, Schneider Electric commits to helping you reduce energy costs and CO<sub>2</sub> emissions. We offer products, solutions, and services that integrate with all levels of the energy value chain.

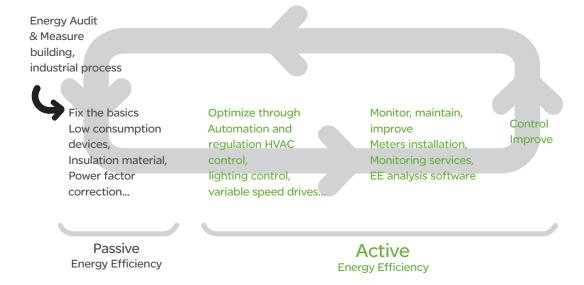
# Solutions adapted to all needs

Through flexible solutions for commercial and industrial buildings, Schneider Electric commits to help customers gradually move towards an active approach to their energy efficiency. We help you get more return from investments and future design solutions.

# **Energy performance contracts**

Schneider Electric offers innovative service to modernise technical installations. Our objective is: to dramatically reduce energy costs, whilst improving comfort and safety, all in an environmentally friendly way.

- > Diagnosis
- > Proposals
- > Implementation
- > Follow-up



# Environmentally responsible

Compact NSX circuit breakers are part and parcel of the Schneider Electric energy efficiency approach. Designed for easy disassembly and recycling at end of life, Compact NSX complies with environmental directives RoHS\* and WEEE\*\*, and with ISO 14001 standards, thanks to nonpolluting factories.

<sup>\*</sup> RoHS = Restriction of Hazardous Substances

<sup>\*\*</sup> WEEE = Waste Electrical and Electronic Equipment



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# Compact NSX

# Overview of applications

# **Functions**

# **Applications**

Compact NSX100 to 630 offers high performance and a wide range of interchangeable trip units to protect most applications. Electronic versions provide highly accurate protection with wide setting ranges and can integrate measurement, metering and communication functions. They can be combined with the FDM switchboard display unit to provide all the functions of a Power Meter as well as operating assistance.



# **Power Meter**

# ▶ page A-22

Compact NSX equipped with Micrologic 5 / 6 trip units offer type A (ammeter) or E (energy) metering functions as well as communication. Using Micrologic sensors and intelligence, Compact NSX provides access to measurements of all the main electrical parameters on the built-in screen, on a dedicated FDM display unit or via the communication system.

# Operating assistance

# page A-24

Integration of measurement functions provides operators with operating assistance functions including alarms tripped by user-selected measurement values, time-stamped event tables and histories, and maintenance indicators.

# Switchboard display unit

# page A-26

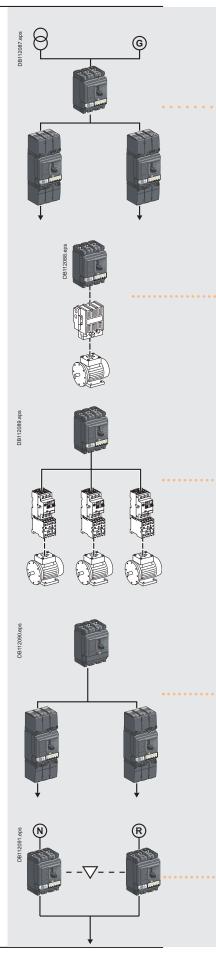
The main measurements can be read on the built-in screen of Micrologic 5 / 6 trip units.

They can also be displayed on the FDM switchboard display unit along with pop-up windows signalling the main alarms.

### Communication

### page A-28

Compact NSX equipped with Micrologic provide communication capabilities. Simple RJ45 cords connect to a Modbus interface module.



**Protection** of distribution systems (AC 220/690 V)

**>** page A-16

page A-58

Compact NSX devices are equipped with MA or TM thermal-magnetic trip units or Micrologic 2 / 5 / 6 electronic trip units to provide protection against short-circuits and overloads for:

- distribution systems supplied by transformers
- distribution systems supplied by engine generator sets
- long cables in IT and TN systems.

They can be easily installed at all levels in distribution systems, from the main LV switchboard to the subdistribution boards and enclosures.

All Compact NSX devices can protect against insulation faults by adding a Vigi module or Vigirex relay.

# Protection of motors (AC 220/690 V)

➤ page A-38

The Compact NSX range includes a number of versions to protect motor applications:

- basic short-circuit protection with MA magnetic trip units or the electronic Micrologic 1-M version, combined with an external relay to provide thermal protection
- protection against overloads, short-circuits and phase unbalance or loss with Micrologic 2-M trip units

■ more complete protection against overloads and short-circuits with additional motor-specific protection (phase unbalance, locked rotor, underload and long start) with Micrologic 6 E-M trip units. These versions also offer communication, metering and operating assistance.

The exceptional limiting capacity of Compact NSX circuit breakers automatically provides type-2 coordination with the motor starter, in compliance with standard IEC 60947-4-1.

# Protection of special applications

➤ page A-50

Special applications:

The Compact NSX range offers a number of versions for special protection applications:

- service connection to public distribution systems
- generators > page A-52
- industrial control panels > page A-54 with:

□ compliance with international standards IEC 60947-2 and UL 508 / CSA 22-2 N14 □ compliance with US standard UL 489

- □ installation in universal and functional enclosures.
- 16 Hz 2/3 systems > page A-55
- 400 Hz systems > page A-56

For all these applications, circuit breakers in the Compact NSX range offer positive contact indication and are suitable for isolation in accordance with standards IEC 60947-1 and 2.

# Control and isolation using switch-disconnectors

➤ page A-60

A switch-disconnector version of Compact NSX circuit breakers is available for circuit control and isolation. All add-on functions of Compact NSX circuit breakers may be combined with the basic switch-disconnector function, including:

- earth-leakage protection
- motor mechanism
- ammeter, etc.

For information on other switch-disconnector ranges, see the Compact INS/INV (offering positive contact indication and visible break) and Fupact (fusegear) catalogues.

# Source changeover systems

> page A-64

To ensure a continuous supply of power, some electrical installations are connected to two power sources:

- a normal source
- a replacement source to supply the installation when the normal source is not available.

A mechanical and/or electrical interlocking system between two circuit breakers or switch-disconnectors avoids all risk of parallel connection of the sources during switching.

A source-changeover system can be:

- manual with mechanical device interlocking
- remote controlled with mechanical and/or electrical device interlocking
- automatic by adding a controller to manage switching from one source to the other on the basis of external parameters.

# Protection, measurement and communication...

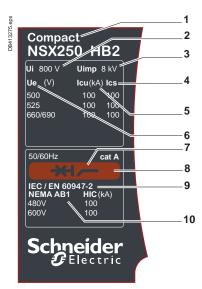


Installation recommendations

# **Functions and characteristics**

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# General characteristics of the Compact NSX range



Standardised characteristics indicated on the rating plate:

- Type of device: frame size and breaking capacity class
- Ui: rated insulation voltage.
  Uimp: rated impulse withstand voltage.
- Ics: service breaking capacity.
- Icu: ultimate breaking capacity for various values of the rated operational voltage Ue
- Ue: operational voltage.
- Colour label indicating the breaking capacity class.
- Circuit breaker-disconnector symbol.
- Reference standard.
- 10 Main standards with which the device complies.

Note: when the circuit breaker is equipped with an extended rotary handle, the door must be opened to access the rating

# Compliance with standards

Compact NSX circuit breakers and auxiliaries comply with the following:

- international recommendations:
- □ IEC 60947-1: general rules
- □ IEC 60947-2: circuit breakers
- □ IEC 60947-3: switch-disconnectors
- ☐ IEC 60947-4: contactors and motor starters
- □ IEC 60947-5.1 and following: control circuit devices and switching elements; automatic control components
- European (EN 60947-1 and EN 60947-2) and corresponding national standards:
- □ France NF
- □ Germany VDE
- □ United Kingdom BS
- □ Australia AS
- □ Italy CEI
- the specifications of the marine classification companies (Veritas, Lloyd's Register of Shipping, Det Norske Veritas, etc.), standard NF C 79-130 and recommendations issued by the CNOMO organisation for the protection of machine tools. For U.S. UL, Canadian CSA, Mexican NOM and Japanese JIS standards, please consult us.

## Pollution degree

Compact NSX circuit breakers are certified for operation in pollution-degree 3 environments as defined by IEC standards 60947-1 and 60664-1 (industrial environments).

# Climatic withstand

Compact NSX circuit breakers have successfully passed the tests defined by the following standards for extreme atmospheric conditions:

- IEC 60068-2-1: dry cold (-55 °C)
- IEC 60068-2-2: dry heat (+85 °C)
- IEC 60068-2-30: damp heat (95 % relative humidity at 55 °C)
- IEC 60068-2-52 severity level 2: salt mist.

# **Environment**

Compact NSX respects the European environment directive EC/2002/95 concerning the restriction of hazardous substances (RoHS).

Product environment profiles (PEP) have been prepared, describing the environmental impact of every product throughout its life cycle, from production to the end of its service life.

All Compact NSX production sites have set up an environmental management system certified ISO 14001.

Each factory monitors the impact of its production processes. Every effort is made to prevent pollution and to reduce consumption of natural resources.

# **Ambient temperature**

- Compact NSX circuit breakers may be used between -25 °C and +70 °C. For temperatures higher than 40 °C (65 °C for circuit breakers used to protect motor feeders), devices must be derated (pages B-8 and B-9).
- Circuit breakers should be put into service under normal ambient, operatingtemperature conditions. Exceptionally, the circuit breaker may be put into service when the ambient temperature is between -35 °C and -25 °C.
- The permissible storage-temperature range for Compact NSX circuit breakers in the original packing is -50 °C (1) and +85 °C.

(1) -40 °C for Micrologic control units with an LCD screen.

# **Electromagnetic compatibility**

Compact NSX devices are protected against:

- overvoltages caused by circuit switching (e.g. lighting circuits)
- overvoltages caused by atmospheric disturbances
- devices emitting radio waves such as mobile telephones, radios, walkie-talkies, radar, etc.
- electrostatic discharges produced by users.

Immunity levels for Compact NSX comply with the standards below.

- IEC/EN 60947-2: Low-voltage switchgear and controlgear, part 2: Circuit breakers:
- □ Annex F: Immunity tests for circuit breakers with electronic protection
- ☐ Annex B. Immunity tests for residual current protection
- IEC/EN 61000-4-2: Electrostatic-discharge immunity tests
- IEC/EN 61000-4-3: Radiated, radio-frequency, electromagnetic-field immunity tests
- IEC/EN 61000-4-4: Electrical fast transient/burst immunity tests
- IEC/EN 61000-4-5: Surge immunity tests
- IEC/EN 61000-4-6: Immunity tests for conducted disturbances induced by radio-frequency fields
- CISPR 11: Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment.

#### Discrimination

Compact NSX reinforces the discrimination capabilities of the Compact NS range by applying the rapid calculation capacity of the Micrologic trip units.

Total discrimination is now possible between NSX100 and modular Multi 9 circuit breakers rated ≤ 63 A (see page A-10).

# Suitable for isolation with positive contact indication

All Compact NSX circuit breakers are suitable for isolation as defined in IEC standard 60947-2:

- The isolation position corresponds to the O (OFF) position.
- The operating handle cannot indicate the OFF position unless the contacts are effectively open.
- Padlocks may not be installed unless the contacts are open.

Installation of a rotary handle or a motor mechanism does not alter the reliability of the position-indication system.

The isolation function is certified by tests guaranteeing:

- the mechanical reliability of the position-indication system
- the absence of leakage currents
- overvoltage withstand capacity between upstream and downstream connections.

The tripped position does not insure isolation with positive contact indication.

Only the OFF position guarantees isolation.

#### Installation in class II switchboards

All Compact NSX circuit breakers are class II front face devices. They may be installed through the door of class II switchboards (as per IEC standards 61140 and 60664-1) without downgrading switchboard insulation. Installation requires no special operations, even when the circuit breaker is equipped with a rotary handle or a motor mechanism.

## Degree of protection

The following indications are in accordance with standards IEC 60529 (IP degree of protection) and IEC 62262 (IK protection against external mechanical impacts).

## Bare circuit breaker with terminal shields

- With toggle: IP40, IK07.
- With standard direct rotary handle / VDE: IP40 IK07

#### Circuit breaker installed in a switchboard

- With toggle: IP40, IK07.
- With direct rotary handle:
- □ standard / VDE: IP40, IK07
- □ MCC: IP43 IK07
- □ CNOMO: IP54 IK08
- With extended rotary handle: IP56 IK08
- With motor mechanism: IP40 IK07.







# Functions and characteristics

# Introduction

# Characteristics and performance of Compact NSX circuit breakers from 100 to 250 A up to 690 V



Compact NSX single-pole.



Compact NSX two-pole

Compact circuit bro	eakers				
Number of poles					
Control	manual		toggle direct or ex	xtended rotary handle	
	electric			·	
Connections	fixed		front conn	ection	
			rear conne		
	withdrawable		front conn	ection	
			rear conne		
Electrical characteristics as	s per IEC 6094	17-2 and EN 609	947-2		
Rated current (A)		In	40 °C		
Rated insulation voltage (V)		Ui			
Rated impulse withstand volta	ge kV)	Uimp			
Rated operational voltage (V)		Ue	AC 50/60 I DC	Hz 	
Type of circuit breaker					
Ultimate breaking capacity (kA	(rms)	lcu	AC	220/240 V	
			50/60 Hz	380/415 V	
				440 V 500/525 V	
				660/690 V	
			DC	250 V (1P)	
			DO	500 V (2P)	
Service breaking capacity (kA	rms)	Ics	% Icu	(2. )	
Suitability for isolation					
Utilisation category					
Durability (C-O cycles)	mechanical				
	electrical		277 V	In/2 In	
Electrical characteristics as	s per NEMA A	B1			
Breaking capacity (kA)	-		240 V		
V AC 50/60 Hz			277 V		
			480 V		
B			600 V		
Protection and measureme	nts				
Type of trip units Ratings			In		
Overload protection (thermal)		long time	lr		
e veneda proteotion (triormai)		threshold			
Short-circuit protection (magne	etic)	instantaneous	lm		
		pickup		value indicated for AC (1)	
				real value for DC	
Add-on earth-leakage protecti	on	add-on Vigi mo combination wi		elay	
Additional indication and co	ontrol auxilia	ries			
Indication contacts					
Voltages releases		MX shunt relea MN undervoltage			
Installation			,		
Accessories		terminal extens	ions and sp	oreaders	
		terminal shields	s and interp	hase barriers	
Dimensions (mm)		escutcheons W x H x D			
Weight (kg)		WALLAD	-		
Source changeover system	1				
Interlocking systems					

(1) The thresholds for TMD and TMG 1-pole and 2-pole magnetic trip units up to 63 A are indicated for AC. The real DC thresholds are indicated on the following line.

NS	X100								NS	(160						NSX250
1					2				1				2			1
													•			•
-					-				-				-			-
-					-				-				-			-
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-													•			•
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-					-				-				-			-
100					100				160				160			250
800		_	-	_	800	_			800				800			800
8 277					8 690				8 277				8 690			8 277
250					500				250				500			-
 <b>F</b>	N	М			<b>F</b>	M	S		<b>F</b>	N	М		<b>F</b>	M	S	N
 18	25	40			36	85	100		18	25	40		36	85	100	25
-	-	-			18	25	70		-	-	-		18	25	70	-
-	-	-			15	25	65		-	-	-		15	25	65	-
-	-	-			10	18	35		-	-	-		10	18	35	-
-	-	-			5	8	10		-	-	-		5	8	10	-
36	50	85			36	85	100		36	50	85		36	85	100	-
-	-	-			36	85	100		-	-	-		36	85	100	-
100 9	%				100 %	%			100 %	, D			100 %	, D		100 %
-									•				•			
Α					Α				Α				Α			A
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2000					2000				20000				20000			10000
1000					1000				10000				10000			5000
F	N	M			F	M	S		F	N	M		F	M	S	N
18	25	40			36	85	100		18	25	40		36	85	100	25
18	25	40			-	-			18	25	40		-	-	-	25
-	-	-			10	18	35		-	-	-		10	18	35	-
-	-	-			5	8	10		-	-	-		5	8	10	-
عانديط	in thern		an atia						harrita ii	a 4b a ro	nal-magnetio					built-in thermal-magnetic
16	20	<u>1121-11129</u> 25	30	40	50	63	80	100	125	160	nai-magneud	;				 160 200 250
fixed			30	40	30	03	00	100	fixed	100						fixed
16	20	25	30	40	50	63	80	100	125	160						160 200 250
fixed								100	fixed	100						 fixed
190	190	300	300	500	500	500	640	800	1000	1250	)					850 850 850
260	260	400	400	700	700	700	800	1000		1250						
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0.7					1.2				0.7				1.2			0.7
-					-				-				-			-

# **Functions** and characteristics

# Introduction

# Characteristics and performance of Compact NSX circuit breakers from 100 to 250 A up to 690 V



Compact NSX100/160/250.



Compact NSX250 R.



Compact NSX250 HB2.

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

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

  (3) Vigi module is not available for breaking capacity levels HB1/HB2.
- (4) There is no 160 A frame, use 250 A frame with lower
- amperage trip units for R, HB1, HB2.

  (5) 2P circuit breaker in 3P case for B and F types, only with thermal-magnetic trip unit.

Commo	n characteristics			
Rated voltag	es			
	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 cate	egory			Α
Pollution deg	ree		IEC 60664-1	3
Circuit b	reakers			

Utilisation category			А	
Pollution degree	IEC	60664-1	3	
Circuit breakers				
Breaking capacity levels				
Electrical characteristics as per IE	C 60947-2			
Rated current (A)	In	40 °C		
Number of poles				
Breaking capacity (kA rms)				
	lcu	AC 50/60 Hz		
			380/415 V 440 V	
			500 V	
			525 V	
			660/690 V	
Service breaking capacity (kA rms)				
	lcs	AC 50/60 Hz		
			380/415 V	
			440 V 500 V	
			525 V	
			660/690 V	
Durability (C-O cycles)		Mechanical		
		Electrical	440 V	In/2
				ln
			690 V	In/2 In
Characteristics as per Nema AB1				III
Breaking capacity (kA rms)		AC 50/60 Hz	240 V	
, , ,			480 V	
			600 V	
Characteristics as per UL 508				
Breaking capacity (kA rms)		AC 50/60 Hz		
			480 V 600 V	
Protection and measurements			000 V	
Short-circuit protection	Magnetic on	ly		
Overload / short-circuit protection	Thermal mag	gnetic		
	Electronic			0.5.4.0001) (4)
			ault protection	0.5-1-OSN) (1)
		with zone sele		
		interlocking (2		
Display / I, U, f, P, E, THD measurements / in		ent measurem display on doo		
Options	Operating as		)I	
	Counters	70.010.100		
	Histories and	d alarms		
	Metering Co			
= 1111		s/control Com		
Earth-leakage protection	By Vigi modu By Vigirex re			
Installation / connections	by vigitex te	iay		
Dimensions and weights				
Dimensions (mm) W x H x D	Fixed, front of	connections	2/3P 4P	
Weight (kg)	Fixed, front of	connections	2/3P 4P	
Connections				
Connection terminals	Pitch		With/without	spreaders
Large Cu or Al cables	Cross-sectio	n	mm²	

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

NSX100									NSX160						NSX250								
В	F	N	Н	S	L	R	HB1	HB2		F	N	Н	S	L	В	F	N	Н	S	L	R	HB1	HB2
							(4)															(4)	
400						400			460						250						250		
100	0.4					100	0 4		160	0.4			-		250	0.4					250	0.4	
2 (5),	3, 4					2 (5),	3, 4		2 (5),	3, 4					2 <sup>(5)</sup> ,	3, 4					2 (5),	3, 4	
40	85	90	100	120	150	200	_	-	40	85	90	100	120	150	40	85	90	100	120	150	200	_	_
25	36	50	70	100	150	200	_	_	25	36	50	70	100	150	25	36	50	70	100	150	200	_	_
20	35	50	65	90	130	200	-	-	20	35	50	65	90	130	20	35	50	65	90	130	200	-	-
15	25	36	50	65	70	80	85	100	15	30	36	50	65	70	15	30	36	50	65	70	80	85	100
-	22	35	35	40	50	65	80	100	-	22	35	35	40	50	-	22	35	35	40	50	65	80	100
-	8	10	10	15	20	45	75	100	-	8	10	10	15	20	-	8	10	10	15	20	45	75	100
40	85	90	100	120	150	200	-	-	40	85	90	100	120	150	40	85	90	100	120	150	200	-	-
25	36	50	70	100	150	200	-	-	25	36	50	70	100	150	25	36	50	70	100	150	200	-	-
20	35	50	65	90	130	200	-	-	20	35	50	65	90	130	20	35	50	65	90	130	200	-	-
7.5	12.5	36	50	65	70 50	80	85	100	15	30	36	50	65	70 50	15	30	36	50	65	70 50	80	85	100
-	11 4	35 10	35 10	40 15	50 20	65 45	80 75	100 100	-	22 8	35 10	35 10	40	50 20	-	22 8	35 10	35 10	40 15	50 20	65 45	80 75	100 100
5000		10	10	15	20			100	4000		10	10	15	20	2000		10	10	15	20			100
5000						2000			4000						2000						2000		
3000						1000			2000						1000						1000		
2000						1000			1500						1000						1000		
1000						5000			7500						5000						5000		
40	85	90	100	120	150	200	-	-	40	85	90	100	120	150	40	85	90	100	120	150	200	-	-
20	35	50	65	90	130	150	85	100	20	35	50	65	90	130	20	35	50	65	90	130	150	85	100
-	8	20	35	40	50	50	75	100	-	20	20	35	40	50	-	20	20	35	40	50	50	75	100
-	85	85	85	-	-	-	-	-	-	85	85	85	-	-	-	85	85	85	-	-	-	-	-
-	25	50	65	-	-	-	-	-	-	35	50	65	-	-	-	35	50	65	-	-	-	-	-
-	10	10	10	-	-	-	-	-	-	10	10	10	-	-	-	15	15	15	-	-	-	-	-
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-		-		-					-														
-							-		-			-			-								
105 x	(161 x	86				105 x	161 x 8	36	105	x 161 x	86				105 >	(161 x	86						
	(161 x						161 x 8			x 161 x						(161 x							
2.05						2.4			2.2						2.4								
2.4						2.8			2.6						2.8								
	5 mm					35/45	5 mm			5 mm					_	5 mm							
300						300			300						300								

Durability (C-O cycles)

Short-circuit protection

# Characteristics and performance of Compact NSX circuit breakers from 400 to 630 A up to 690 V



Compact NSX400/630.



Compact NSX630 R.



Compact NSX630 HB2.

- (1) OSN: Over Sized Neutral protection for neutrals carrying high currents (e.g. 3rd harmonics).
  (2) ZSI: Zone Selective Interlocking using pilot wires.
- (3) Vigi module is not available for breaking capacity levels HB1/HB2.

Comm	non characteristics				
Rated vol	tages				
	Insulation voltage (V)	Ui		80	00
	Impulse withstand voltage (kV)	Uimp		8	
	Operational voltage (V)	Ue	AC 50/60 Hz	69	90
Suitability	for isolation		IEC/EN 60947-2	ye	es
Utilisation of	category			А	
Pollution	degree		IEC 60664-1	3	
Breakin	t breakers g capacity levels al characteristics as per IE	C 60947	7-2		
Breakin	g capacity levels al characteristics as per IE	C 60947 In	<b>7-2</b> 40 °C		
Breakin Electric Rated curre Number of	g capacity levels al characteristics as per IE ent (A) poles				
Breakin Electric Rated curre Number of	g capacity levels al characteristics as per IE ent (A)	In	40 °C	000/040	
Breakin Electric Rated curre Number of	g capacity levels al characteristics as per IE ent (A) poles			220/240 V 380/415 V 440 V 500 V 525 V 660/690 V	1
Breakin Electrica Rated curre Number of Breaking	g capacity levels al characteristics as per IE ent (A) poles	In	40 °C	380/415 V 440 V 500 V 525 V	1

500 V 525 V 660/690 V

440 V

690 V

In/2

In

In/2

Mechanical

Electrical

Characteristics as per Nema AB1	
Breaking capacity (kA rms)	AC 50/60 Hz 240 V
	480 V

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

480 V 600 V **Protection and measurements** 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

Power Meter display on door Options Operating assistance Counters

Histories and alarms Metering Com Device status/control Com By Vigi module (3)

Earth-leakage protection By Vigirex relay Installation / connections

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

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

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

Nev	400 -							Nev	C20									
NSX	400							NSX	630				Ir = 2	25 - 500	0 A	Ir = 5	01 - 630	Α
F	N	Н	S	L	R	HB1	HB2	F	N	Н	S	L	R	HB1	HB2	R	HB1	HB2
400					400			630					630					
3, 4					3, 4			3, 4					3, 4					
5, 4					5, 4			3, 4					3, 4					
40	85	100	120	150	200	_	_	40	85	100	120	150	200	-	_	200	-	-
36	50	70	100	150	200	-	-	36	50	70	100	150	200	-	-	200	-	-
30	42	65	90	130	200	-	-	30	42	65	90	130	200	-	-	200	-	-
25	30	50	65	70	80	85	100	25	30	50	65	70	80	85	100	80	85	100
20	22	35	40	50	65	80	100	20	22	35	40	50	65	80	100	65	80	100
10	10	20	25	35	45	75	100	10	10	20	25	35	45	75	100	45	75	100
40	85	100	120	150	200	-	-	40	85	100	120	150	200	-	-	200	-	-
36	50	70	100	150	200	-	-	36	50	70	100	150	200	-	-	200	-	-
30	42	65	90	130	200	-	-	30	42	65	90	130	200	-	-	200	-	-
25	30	50	65	70	80	85	100	25	30	50	65	70	80	85	100	80	85	100
10	11	11	12	12	65	80	100	10	11	11	12	12	65	80	100	-	-	-
10	10	10	12	12	45	75	100	10	10	10	12	12	45	75	100	-	-	-
15000					15000			15000					15000					
12000					12000			8000					8000					
6000					6000			4000					4000					
6000					6000			6000					6000					
3000					3000			2000					2000					
40	0.5	400	400	450	000			140	0.5	400	400	450	000			000		
40	85	100	120	150	200	-	-	40	85	100	120	150	200	-	-	200	-	-
30	42	65 25	90 40	130	150	85	100	30 -	42	65 25	90	130	150	85	100 100	150	85 75	100
-	20	35	40	50	50	75	100	-	20	35	40	50	50	75	100	50	75	100
85	85	85	_				_	85	85	85	-							
35	50	65	-	-		-	-	35	50	65	-	_		-	-	-	-	-
20	10	20	_	_	_	_	_	20	20	20	_	_	_	_	_	_	_	_
20	10	20						20		20								
								-										
-								-										
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								•										
		-						-										
140 x 2	255 x 110	)			105 x 1	81 x 86		140 x 2	255 x 11	0								
	255 x 110					61 x 86			255 x 11									
6.05					6.05			6.2										
					7.90			8.13										
7.90																		
7.90																		
45/52.5					45/52.5			45/52.										
	nm				45/52.5 45/70 r 4 x 240	nm		45/52. 45/70 4 x 240	mm									

# Compact NSX trip units

With Micrologic electronic trip units, Compact NSX stands out from the crowd. Thanks to the new generation of sensors and its processing capability, protection is enhanced even further. It also provides measurements and operating information.

# Thermal-magnetic or electronic trip unit?

Thermal-magnetic trip units protect against overcurrents and short-circuits using tried and true techniques. But today, installation optimisation and energy efficiency have become decisive factors and electronic trip units offering more advanced protection functions combined with measurements are better suited to these needs. Micrologic electronic trip units combine reflex tripping and intelligent operation. Thanks to digital electronics, trip units have become faster as well as more accurate and reliable. Wide setting ranges make installation upgrades easier. Designed with processing capabilities, Micrologic trip units can provide measurement information and device operating assistance. With this information, users can avoid or deal more effectively with disturbances and can play a more active role in system operation. They can manage the installation, anticipate on events and plan any necessary servicing.

# Accurate measurements for complete protection

Compact NSX devices take advantage of the vast experience acquired since the launch of Masterpact NW circuit breakers equipped with Micrologic trip units. From 40 amperes on up to the short-circuit currents, they offer excellent measurement accuracy. This is made possible by a new generation of current transformers combining "iron-core" sensors for self-powered electronics and "air-core" sensors (Rogowski toroids) for measurements.

The protection functions are managed by an ASIC component that is independent of the measurement functions. This independence ensures immunity to conducted and radiated disturbances and a high level of reliability.

# **Numerous security functions**

#### **Torque-limiting screws**

The screws secure the trip unit to the circuit breaker. When the correct tightening torque is reached, the screw heads break off. Optimum tightening avoids any risk of temperature rise. A torque wrench is no longer required.

#### Easy and sure changing of trip units

All trip units are interchangeable, without wiring. A mechanical mismatch-protection system makes it impossible to mount a trip unit on a circuit breaker with a lower rating.

#### "Ready" LED for a continuous self-test

The LED on the front of the electronic trip units indicates the result of the self-test runs continuously on the measurement system and the tripping release. As long as the green LED is flashing, the links between the CTs, the processing electronics and the Mitop release are operational. The circuit breaker is ready to protect. No need for a test kit. A minimum current of 15 to 50 A, depending on the device, is required for this indication function.

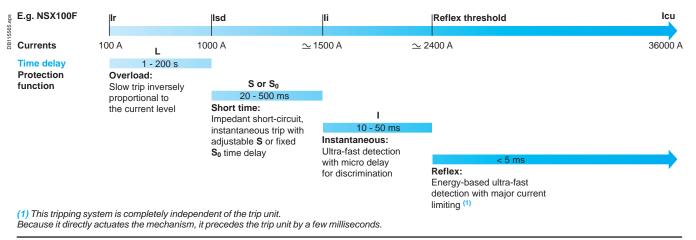
## A patented dual adjustment system for protection functions.

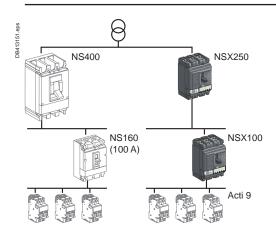
Available on Micrologic 5 / 6, the system consists of:

- an adjustment using dials sets the maximum value
- an adjustment, made via the keypad or remotly, fine-tunes the setting. This setting may not exceed the first one. It can be read directly on the Micrologic screen, to within one ampere and a fraction of a second.

## Coordinated tripping systems

Compact NSX detects faults even faster and its tripping time is reduced. It protects the installation better and limits contact wear.





Compact NSX100 with Micrologic for total discrimination with Acti 9 devices rated ≤ 40 A or a C60. Better coordination between protection functions reduces the difference in ratings required for total discrimination.

#### **Unmatched discrimination**

#### Discrimination

Compact NSX provides maximum continuity of service and savings through an unmatched level of discrimination:

- given the high accuracy of measurements, overload discrimination is ensured even between very close ratings
- for major faults, the fast processing of the Micrologic trip units means the upstream device can anticipate the reaction of the downstream device. The upstream breaker adjusts its tripping delay to provide discrimination
- for very high faults, the energy of the arc dissipated by the short-circuit in the downstream breaker causes reflex tripping. The current seen by the upstream device is significantly limited. The energy is not sufficient to cause tripping, so discrimination is maintained whatever the short-circuit current.

For total discrimination over the entire range of possible faults, from the long-time pick-up Ir to the ultimate short-circuit current lcu, a ratio of 2.5 must be maintained between the ratings of the upstream and downstream devices.

This ratio is required to ensure selective reflex tripping for high short-circuits.

Understanding the na	mes of Micrologic ele	ectronic trip units		
	Protection	Frame	Measurements	Applications
		•	•	
	1: I 2: LS <sub>0</sub> I 5: LSI 6: LSIG	2: NSX100/160/250	A: Ammeter  See See See See See See See See See Se	Distribution, otherwise  G: Generator  AB: Public distribution (1)  M: Motors  Z: 16 Hz 2/3 (1)
	I: Instantaneous L: Long time S <sub>0</sub> : Short time (2) (fixed delay) S: Short time G: Ground fault	3: NSX400/630	E: Energy  SO 997  Tr v lad ted lijoho)  Tr v lad ted lijoho)  R v la 25 5 MW  R v la 25 5 MW  R v la 25 5 MW	
		÷	÷	÷
Examples				
Micrologic 1.3	Instantaneous only	400 or 630 A		Distribution
Micrologic 2.3	LS <sub>0</sub> I	400 or 630 A		Distribution
Micrologic 5.2 A	LSI	100, 160 or 250 A	Ammeter	Distribution
Micrologic 6.3 E-M	LSIG	400 or 630 A	Energy	Motor

(1) AB-Z: except NSX R, HB1, HB2.

(2) LS<sub>0</sub>I protection is standard on Micrologic 2. To ensure discrimination, it offers short-time protection S<sub>0</sub> with a non-adjustable delay and instantaneous protection.

# Overview of trip units for Compact NSX

Compact NSX offers a range of trip units in interchangeable cases, whether they are magnetic, thermal-magnetic or electronic. Versions 5 and 6 of the electronic trip unit offer communication and metering. Using Micrologic sensors and intelligence, Compact NSX supplies all the information required to manage the electrical installation and optimise energy use.

# Type of protection and applications

# DB112028.eps

**MA** magnetic

TM-D thermal-magnetic

■ Distribution and motors

■ Distribution

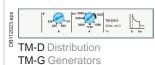
# ■ Generators

# Compact NSX100/160/250



# Circuit breakers and trip units





# Compact NSX400/630





1.3 M Distribution and motors

# **Settings and indications**



Adjustment and reading Pick-up set in amps using dials

Non-adjustable time delay



Adjustment and reading

Pick-up set in amps using dials Non-adjustable time

delay

#### Micrologic 2 electronic

# LS<sub>0</sub>I DB112030.eps

- Distribution
- Service connection (public distribution)
- Generators
- Motors (I only)
- Motors

#### Micrologic 5 / 6 A or E electronic trip units

#### 5 A or E



■ Distribution and generators LSIG

■ Distribution and generators



■ Motors



2.2 Distribution

2.2 AB Service connection (public distribution)

2.2 G Generators

2.2 M Motors



A: current metering functions

E:current and energy metering functions.

5.2 A Distribution and generators 5.2 E Distribution





2.3 Distribution

2.3 AB Service connection (public distribution)

1.3 M Motors (I only)

2.3 M Motors



\$ 010 un 

5.3 A Distribution

and generators

5.3 E Distribution and generators

5.3 A-Z 16 Hz 2/3 networks

6.3 A Distribution and generators 6.3 E Distribution and generators

6.2 E Distribution

and generators



6.3 E-M Motors



# Adjustment and reading

Pick-up set in amps with fine adjustment using dials Non-adjustable time delay



Front indications



**Test connector** 

Self test





#### Adjustment and reading Pick-up set in amps

N 10. 20 20 0

Fine adjustment via keypad



Adjustable time delays



Front indications

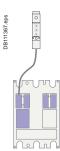


**Test connector** 

Self test



#### Connection to switchboard display unit



**Communication to Modbus** 

# Overview of trip units for Compact NSX

The capabilities of Micrologic 5 / 6 A and E trip units come into full play with the FDM121 switchboard display unit.

When the two are connected via a simple cord with RJ45 connectors, the combination offers full Power Meter capabilities and all the measurements required to monitor the electrical installation.



# **Ammeter Micrologic (A)**

#### I measurements

#### **Current measurements**

- Phase and neutral currents I1, I2, I3, IN
- Average current of the 3 phases lavg
- Highest current of the three phases Imax
- Ground-fault current Ig (Micrologic 6.2 / 6.3 A)
- Maximeter/minimeter for I measurements

#### Operating and maintenance assistance

### Indications, alarms and histories

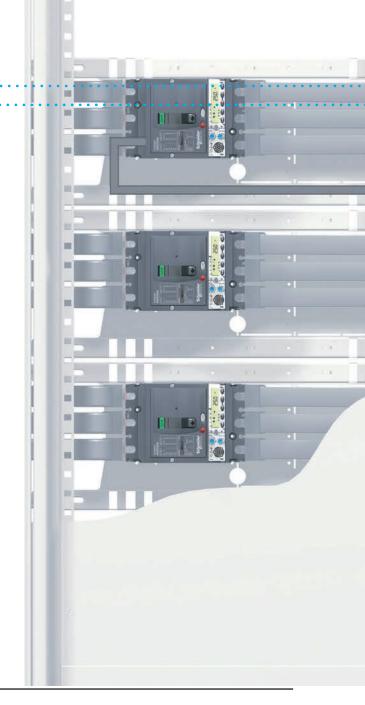
- Indication of fault types
- Alarms for high/low alarm thresholds linked to I measurements
- Trip, alarm and operating histories
- Time-stamped tables for settings and maximeters

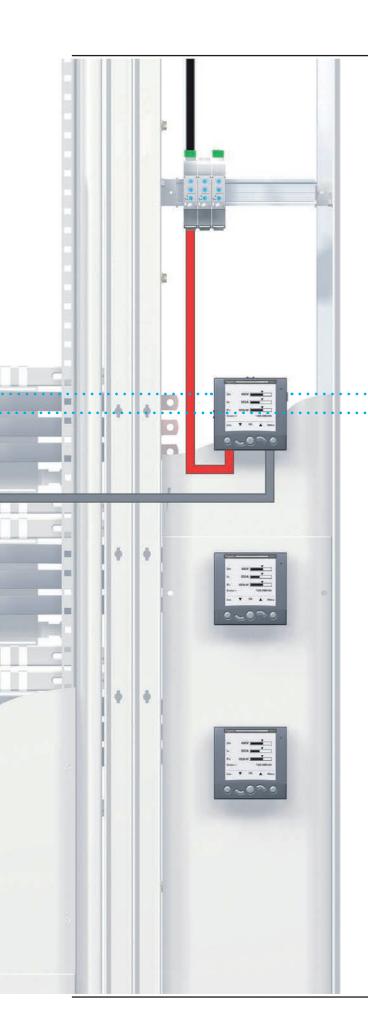
#### **Maintenance indicators**

- Operation, trip and alarm counters
- Operating hours counter
- Contact wear
- Load profile and thermal image

#### Communication

■ Modbus with add-on module







# **Energy Micrologic (E)**

### I, U, f, P, E, THD measurements

#### **Current measurements**

- Phase and neutral currents I1, I2, I3, IN
- Average current of the 3 phases lavg
- Highest current of the three phases Imax
- Ground-fault current Ig (Micrologic 6.2 / 6.3 A)
- Maximeter/minimeter for I measurements
- Current unbalance between phases

#### Voltage measurements

- Phase-to-phase (U) et phase-to-neutral (V) voltages
- Average voltages Úavg, Vavg
- Ph-Ph (U) and Ph-N (V) voltage unbalance

## Frequency measurements

■ Frequency (f)

# Power-quality indicators

■ Total harmonic distortion (THD) for current and voltage

#### **Power measurements**

- Active, reactive and apparent power, total and per phase
- $\blacksquare$  Power factor and cos  $\phi$

## Maximeters/minimeters

■ For all I, U, f, P, E measurements

# Demand current and power measurements

- Demand values, total and per phase
- Maximum demand

#### **Energy metering**

■ Active, reactive and apparent energy, total and per phase

### Operating and maintenance assistance

## Indications, alarms and histories

- Indication of fault types
- Alarms for high/low thresholds linked to I, U, f, P, E measurements
- Trip, alarm and operating histories
- Time-stamped tables for settings and I, U, f, P, E maximeters

#### **Maintenance indicators**

- Operation, trip and alarm counters
- Operating hours counter
- Contact wear
- Load profile and thermal image

#### Communication

■ Modbus with add-on module

# Functions and characteristics

# **Protection of distribution** systems

TM thermal-magnetic and MA magnetic trip units

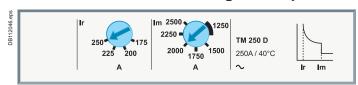
TM thermal-magnetic and MA magnetic trip units can be used on Compact NSX100/160/250 circuit breakers with performance levels B/F/H/N/S/L.

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.....

# <u>\</u>

#### 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

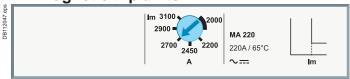
Two solutions are possible by adding:

- 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).
- $\Box$  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-38).

# Protection



# Magnetic protection (Im)

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

■ Im = In x ... 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-magne	etic trip units	TM	16D	to 25	50D									
Ratings (A)	In at 40 °C (1)	16	25	32	40	50	63	80	100	125	160	200	250	
Circuit breaker	Compact NSX100	-		•	•	•	•	-		-	-	-	-	t <sub>A</sub>
	Compact NSX160	-	-									-	-	
	Compact NSX250	-	-	-	-	-								T
Thermal protection														
Pick-up (A) tripping between 1.05 and 1.20 Ir	<b>ir</b> = ln x	adju	stable	in amp	s from 0	.7 to 1	x In							<b>→</b> Ir
Time delay (s)	tr	non-	adjust	able										
	tr at 1.5 x In	120	120 to 400											
	tr at 6 x Ir	15												
Magnetic protection	n													
Pick-up (A)	lm	fixed	i									adjus	stable	
accuracy ±20 %	Compact NSX100	190	300	400	500	500	500	640	800					
	Compact NSX160/250	190	300	400	500	500	500	640	800	1250	1250	5 to	10xIn	
Time delay	tm	fixed	i											
Neutral protection		· ·												
Unprotected neutral	4P 3D	no d	etectio	n										
Fully protected neutral	4P 4D	1 x l	r											
Magnetic trip ur	nits	MA	2.5	to 22	0									
Ratings (A)	In at 65 °C	2.5	(	6.3	12.5	; ;	25	50	1	100	150	2	220	t,
Circuit breaker	Compact NSX100	-	-	•	•	- 1	•	-			-	-		Ţ
	Compact NSX160	-			-		•					-		
	Compact NSX250	-	_		-	-		-			•			. Im
Instantaneous mag	netic protection													
Pick-up (A) accuracy ±20 %	<b>Im</b> = In x	adju	stable	in amp	s from 6	to 14	x In (9 s	settings	s)					
Time delay (ms)	tm	none	9											

Thermal-magnetic trip units		TM <sup>2</sup>	TM16G to 250G									E
Ratings (A)	In at 40 °C (1)	16	25	40	63	80	100	125	160	200	250	
Circuit breaker	Compact NSX100	-	-	•	-							t
	Compact NSX160	-										
	Compact NSX250	-	-	-	-							T
Thermal protection												
Pick-up (A) ripping between 1.05 and 1.20 Ir	<b>Ir</b> = ln x	adjus	table in	amps fi	rom 0.7 to	1 x ln						Im
Time delay (s)	tr	non-a	adjustab	le								
	tr at 1.5 x In	120 t	o 400									
	tr at 6 x Ir	-										
Magnetic protection	1											
Pick-up (A)	lm	fixed										
accuracy ±20 %	Compact NSX100	64	80	80	125							
	Compact NSX160	-	80	80	125							
	Compact NSX250	-	-	-	-							
Time delay	tm	fixed										
Neutral protection												
Jnprotected neutral	4P 3D	no 4F	3D ver	sion								
Fully protected neutral	4P 4D	1 x lr										-
Magnetic trip ur	nits	MA	2.5 to	220								
Ratings (A)	In at 65 °C	2.5	6.	3	12.5	25	50	100	) 1	50	220	t,
Circuit breaker	Compact NSX100	-							-		-	
	Compact NSX160	-	-		-						-	
	Compact NSX250	-	-		-	-	-				-	_   ↓   Im
Instantaneous mag	netic protection											
Pick-up (A) accuracy ±20 %	<b>Im</b> = In x	adjus	table in	amps f	rom 9 to	14 x In						
Time delay (ms)	tm	none										

<sup>(1)</sup> For temperatures greater than 40 °C, the thermal protection characteristics are modified. See the temperature derating table. (a) New: available october 2013.

# Functions and characteristics

# Protection of distribution systems

Micrologic 2 and 1.3 M trip units

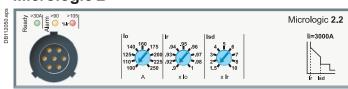
Micrologic 2 trip units can be used on Compact NSX100 to 630 circuit breakers with performance levels B/F/H/N/S/L.

#### They provide:

- standard protection of distribution cables
- indication of:
- □ overloads (via LEDs)

□ overload tripping (via the SDx relay module). Circuit breakers equipped with Micrologic 1.3 M trip units, without thermal protection, are used in certain applications to replace switch-disconnectors at the head of switchboards. Micrologic 1.3 M trip units are dedicated to Compact NSX400/630 A circuit breakers.

# Micrologic 2



Circuit breakers equipped with Micrologic 2 trip units can be used to protect distribution systems supplied by transformers. For generators and long cables, Micrologic 2 G trip units offer better suited low pick-up solutions (see page A-52).

# Protection.....

<u>\</u>

Settings are made using the adjustment dials with fine adjustment possibilities.

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

Inverse time protection against overloads with an adjustable current pick-up Ir set using a dial and a non-adjustable time delay tr.

## Short-circuits: Short-time protection with fixed time delay (Isd)

Protection with an adjustable pick-up Isd. Tripping takes place after a very short delay used to allow discrimination with the downstream device.

# Short-circuits: Non-adjustable instantaneous protection

Instantaneous short-circuit protection with a fixed pick-up.

#### **Neutral protection**

- On 3-pole circuit breakers, neutral protection is not possible.
- On four-pole circuit breakers, neutral protection may be set using a three-position switch:
- □ 4P 3D: neutral unprotected
- $\Box$  4P 3D + N/2: neutral protection at half the value of the phase pick-up, i.e. 0.5 x Ir
- ☐ 4P 4D: neutral fully protected at Ir.



# 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.

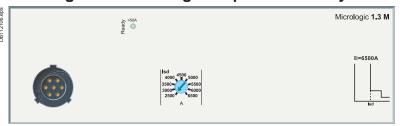


#### Remote indications

An overload trip signal can be remoted by installing an SDx relay module inside the circuit breaker.

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 reclosed. For description, see page A-83.

# Micrologic 1.3 M for magnetic protection only



Micrologic 1.3 M trip units provide magnetic protection only, using electronic technology. They are dedicated to 400/630 A 3-pole (3P 3D) circuit breakers or 4-pole circuit breakers with detection on 3 poles (4P, 3D) and are used in certain applications to replace switch-disconnectors at the head of switchboards. They are especially used in 3-pole versions for motor protection, see page A-42.



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.

Micrologic 2												
Ratings (A)	In at 40 °C <sup>(1)</sup>		40	100	160	250	400	630				
Circuit breaker	Compact NSX100			-	-	-	-	-				
	Compact NSX160			-		-	-	-				
	Compact NSX250		•				-	-				
	Compact NSX400		-	-	-			-				
	Compact NSX630		-	-	-	•		•				
Long-time pro	tection											
ick-up (A)		lo	value	dependir	ng on trip	unit ratino	g (In) and	setting o	n dial			
ripping between	In = 40 A	lo=	18	18	20	23	25	28	32	36	40	
1.05 and 1.20 Ir	In = 100 A	lo=	40	45	50	55	63	70	80	90	100	
	In = 160 A	lo=	63	70	80	90	100	110	125	150	160	
	In = 250 A (NSX250)	lo=	100	110	125	140	160	175	200	225	250	
	In = 250 A (NSX400)	lo=	70	100	125	140	160	175	200	225	250	
	In = 400 A	lo=	160	180	200	230	250	280	320	360	400	
	In = 630 A	lo=	250	280	320	350	400	450	500	570	630	
	Ir = lo x				ent setting for each			9 - 0.92 -	0.93 - 0.	94 - 0.95	- 0.96 -	
îme delay (s)	tr		non-a	djustable								
ccuracy 0 to -20%		1.5 x lr	400									
		6 x Ir	16									
		7.2 x lr	11									
hermal memory			20 mir	nutes bef	ore and a	fter trippi	ng					
Short-time pro	tection with fixed tim	e delay										
Pick-up (A) accuracy ±10 %	<b>Isd</b> = Ir x		1.5	2	3	4	5	6	7	8	10	
īme delay (ms)	tsd		non-a	djustable								
	Non-tripping time		20									
	Maximum break time		80									
Instantaneous	protection											
Pick-up (A)	li non-adjustable		600	1500	2400	3000	4800	6900				
accuracy ±15 %	Non-tripping time Maximum break time		10 ms 50 ms	for I > 1.	5 li							

<sup>(1)</sup> 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.

Micrologic 1.	3 M			
Ratings (A)	In at 65 °C	320	500	t
Circuit breaker	Compact NSX400	•	-	` <b>^</b>
	Compact NSX630	•		
S Short time pr	otection			Isd
Pick-up (A)	Isd	adjustable directly in amps		Tisu
accuracy ±15 %		9 settings: 1600, 1920, 2440, 2560, 2880, 3200, 3520, 3840, 4160 A	9 settings: 2500, 3000, 3500, 4000, 4500, 5000, 5500, 6000, 6500 A	
Time delay (ms)	tsd	non-adjustable		
	Non-tripping time Maximum break time	10 60		
Instantaneou	is protection			
Pick-up (A)	li non-adjustable	4800	6500	
accuracy ±15 %	Non-tripping time Maximum break time	0 30 ms		

# Functions and characteristics

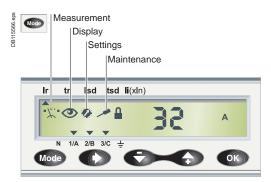
# Protection of distribution systems

Micrologic 5 / 6 A or E trip units

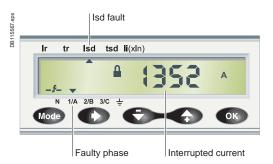
Micrologic 5 / 6 A (Ammeter) or E (Energy) trip units can be used on Compact NSX100 to 630 circuit breakers with performance levels B/F/H/N/S/L. They all have a display unit.

They offer basic LSI protection (Micrologic 5) or LSI and ground-fault protection G (Micrologic 6).

They also offer measurement, alarm and communication functions.



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....



Settings can be adjusted in two ways, using the dials (a) and/or the keypad (b). 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 (a) displayed on the screen and controlled by a microswitch (a). 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  ${\bf lr}$  set using a dial or the keypad for fine adjustments. The time delay  ${\bf tr}$  is set using the keypad.

### Short-circuits: Short-time protection (Isd)

Short-circuit protection with an adjustable pick-up **Isd** 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 li.

### Additional ground fault protection (Ig) on Micrologic 6

Residual type ground-fault protection with an adjustable pick-up **Ig** (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
- $\Box$  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
- $\square$  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 (Isd) and ground-fault (Ig) 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, Isd, Ii, Ig), 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.

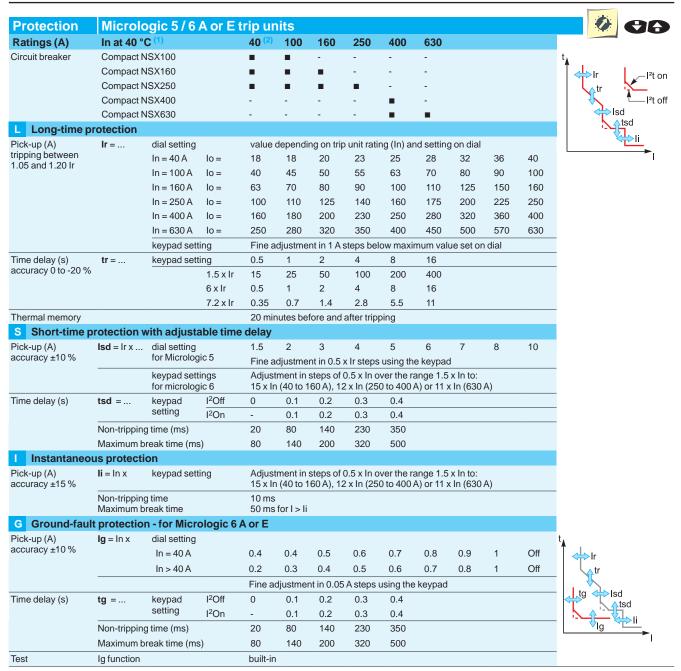
### Remote indications

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.



<sup>(1)</sup> 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.

### **Functions** and characteristics

### **Power Meter functions**

# Electronic Micrologic 5 / 6 A or E

In addition to protection functions, Micrologic 5 / 6 trip units offer all the functions of Power Meter products as well as operating-assistance for the circuit breaker.

- display of settings
- measurement functions:

□ Ammeter (A)

- □ Energy (E)
- alarms
- time-stamped histories and event tables
- maintenance indicator
- communication
- Refer to: user manual "ULP system" TRV99101.



Micrologic built-in LCD display showing an energy



FDM121 display: navigation.



Current



DB112134.eps

Voltage

Power.

Consumption.

Examples of measurement screens on the FDM121 display unit.

Micrologic A and E measurement functions are made possible by Micrologic intelligence and the accuracy of the sensors. They are handled by a microprocessor that operates independent of protection functions.

### Display.....



### Micrologic LCD

The user can display all the protection settings and the main measurements on the LCD screen of the trip unit.

- Micrologic A: instantaneous rms current measurements.
- Micrologic E: voltage, frequency and power measurements and energy metering, in addition to the measurements offered by Micrologic A

To make the display available under all conditions and increase operating comfort, an external power supply is recommended for Micrologic A. It is indispensable to:

- display faults and interrupted current measurements
- use all the functions of Micrologic E (e.g. metering of low power and energy
- ensure operation of the communication system.

The external power supply can be shared by several devices. For description, see page A-34.

### FDM121 display unit

An FDM121 switchboard display unit can be connected to a Micrologic trip unit using a prefabricated cord to display all measurements on a screen. The result is a veritable 96 x 96 mm Power Meter.

In addition to the information displayed on the Micrologic LCD, the FDM121 screen shows demand, power quality and maximeter/minimeter values along with alarms, histories and maintenance indicators.

The FMD121 display unit requires a 24 V DC power supply. The Micrologic trip unit is supplied by the same power supply via the cord connecting it to the FDM121.

When the Micrologic, with or without an FDM121 switchboard display unit, is connected to a communication network, all information can be accessed via a PC.

### Measurements .....



### Instantaneous rms measurements

The Micrologic A and E continuously display the RMS value of the highest current of the three phases and neutral (Imax). The navigation buttons on the used to scroll through the main measurements.

In the event of a fault trip, the current interrupted is memorised.

The Micrologic A measures phase, neutral, ground fault currents.

The Micrologic E offers voltage, frequency and power measurements in addition to the measurements provided by Micrologic A.

### Maximeters / minimeters

Every instantaneous measurement provided by Micrologic A or E can be associated with a maximeter/minimeter. The maximeters for the highest current of the 3 phases and neutral, the demand current and power can be reset via the trip unit keypad, the FDM121 display unit or the communication system.

### **Energy metering**

The Micrologic E also measures the energy consumed since the last reset of the meter. The active energy meter can be reset via the keypad and the FDM121 display unit or the communication system.

### Demand and maximum demand values

Micrologic E also calculates demand current and power values. These calculations can be made using a block or sliding interval that can be set from 5 to 60 minutes in steps of 1 minute. The window can be synchronised with a signal sent via the communication system. Whatever the calculation method, the calculated values can be recovered on a PC via Modbus communication.

Ordinary spreadsheet software can be used to provide trend curves and forecasts based on this data. They will provide a basis for load shedding and reconnection operations used to adjust consumption to the subscribed power.

### Power quality

Micrologic E calculates power quality indicators taking into account the presence of harmonics up to the 15th order, including the total harmonic distortion (THD) of current and voltage.





Micrologic 5 / 6 i	ntegrated Power Meter function	tions		•	Display	
			Α	E	Micrologic LCD	FDM12 display
Display of protection	n settings					
Pick-ups (A) and delays	All settings can be displayed	Ir, tr, Isd, tsd, Ii, Ig, tg	-	-	-	-
Measurements						
Instantaneous rms mea	asurements					
Currents (A)	Phases and neutral	I1, I2, I3, IN			=	
	Average of phases	lavg = (I1 + I2 + I3) / 3			-	
	Highest current of the 3 phases and neutral	Imax of I1, I2, I3, IN			-	
	Ground fault (Micrologic 6)	% Ig (pick-up setting)			-	
	Current unbalance between phases	% lavg	-		-	
Voltages (V)	Phase-to-phase	U12, U23, U31	-		-	
	Phase-to-neutral	V1N, V2N, V3N	-		-	
	Average of phase-to-phase voltages	Uavg = (U12 + U21 + U23) / 3	-		-	
	Average of phase-to-neutral voltages	Vavg = (V1N + V2N + V3N) / 3	-		-	
	Ph-Ph and Ph-N voltage unbalance	% Uavg and % Vavg	-		-	
	Phase sequence	1-2-3, 1-3-2	-		-	
Frequency (Hz)	Power system	f	-	-	-	
Power	Active (kW)	P, total / per phase	-/-	<b>=</b> / <b>=</b>	<b>■</b> /-	■/■
	Reactive (kVAR)	Q, total / per phase	-/-	<b>=</b> / <b>=</b>	<b>■</b> /-	■/■
	Apparent (kVA)	S, total / per phase	-/-	<b>=</b> / <b>=</b>	<b>■</b> /-	■/■
	Power factor and cos φ (fundamental)	PF and cos φ, total and per phase	-	-	-	
Maximeters / minimeter	rs					
	Associated with instantaneous rms measurements	Reset via Micrologic or FDM121 display unit	•	•	-	-
Energy metering						
Energy	Active (kW), reactive (kVARh), apparent	Total since last reset	-	-		-
	(kVAh)	Absolute or signed mode (1)				
Demand and maximum	demand values					
Demand current (A)	Phases and neutral	Present value on the selected window	-	•	-	-
		Maximum demand since last reset	-	•	-	=
Demand power	Active (kWh), reactive (kVAR),	Present value on the selected window	-	•	-	-
	apparent (kVA)	Maximum demand since last reset	-	•	-	=
Calculation window	Sliding, fixed or com-synchronised	Adjustable from 5 to 60 minutes in 1 minute steps (2)	-	•	-	-
Power quality						
Total harmonic	Of voltage with respect to rms value	THDU,THDV of the Ph-Ph and Ph-N voltage	-	•	-	=
distortion (%)	Of current with respect to rms value	THDI of the phase current	-		-	

<sup>(1)</sup> Absolute mode: E absolute = E out + E in; Signed mode: E signed = E out - E in. (2) Available via the communication system only.

### Additional technical characteristics

Measurement accuracy
Accuracies are those of the entire measurement system, including the sensors:

current: Class 1 as per IEC 61557-12

voltage: 0.5 %

power and energy: Class 2 as per IEC 61557-12

frequency: 0.1 %.

# **Operating-assistance functions**

### Micrologic 5 / 6 A or E trip units

### Personalised alarms with time-stamping .....



### Alarm types

The user can assign an alarm to all Micrologic A or E measurements or events:

- up to 12 alarms can be used together:
- □ two alarms are predefined and activated automatically:
- Micrologic 5: overload (Ir)
- Micrologic 6: overload (Ir) and ground fault (Ig)
- □ thresholds, priorities and time delays can be set for ten other alarms.
- the same measurement can be used for different alarms to precisely monitor certain values, e.g. the frequency or the voltage
- alarms can also be assigned to various states: phase lead/lag, four quadrants, phase sequence
- selection of display priorities, with pop-up possibility
- alarm time-stamping.

### Alarm settings

Alarms cannot be set via the keypad or the FDM121 display unit. They are set via communication with the PC. Set-up includes the threshold, priority, activation delay before display and deactivation delay. It is also possible to reprogram the standard assignment for the two SDx relay outputs to user-selected alarms.

### Alarm reading

Remote alarm indications.

- Reading on FDM121 display unit or on PC via the communication system.
- Remote indications via SDx relay with two output contacts for alarms.

### Histories and event tables



Micrologic A and E have histories and event tables that are always active.

### Three types of time-stamped histories

- Tripping due to overruns of Ir, Isd, Ii, Ig: last 17 trips
- Alarms: last 10 alarms
- Operating events: last 10 events

Each history record is stored with:

- indications in clear text in a number of user-selectable languages
- time-stamping: date and time of event
- status: pick-up / drop-out

### Two types of time-stamped event tables

- Protection settings.
- Minimeters / maximeters.

### Display of alarms and tables

The time-stamped histories and event tables may be displayed on a PC via the communication system.

### **Embedded memory**

Micrologic A and E have a non-volatile memory that saves all data on alarms, histories, event tables, counters and maintenance indicators even if power is lost.

### Maintenance indicators.....



Micrologic A and E have indicators for, among others, the number of operating cycles, contact wear and operating times (operating hours counter) of the Compact NSX circuit breaker.

It is possible to assign an alarm to the operating cycle counter to plan maintenance. The various indicators can be used together with the trip histories to analyse the level of stresses the device has been subjected to.

The information provided by the indicators cannot be displayed on the Micrologic LCD. It is displayed on the PC via the communication system.

### Management of installed devices

Each circuit breaker equipped with a Micrologic 5 or 6 trip unit can be identified via the communication system:

- serial number
- firmware version
- hardware version
- device name assigned by the user.

This information together with the previously described indications provides a clear view of the installed devices.



Micrologic built-in LCD display.



FDM121 display: navigation.



Overpower alarm.



Phase unbalance alarm.





Alarm pick-up and drop-out.

Examples of operating-assistance screens on the FDM121 display unit.





Micrologic 5/	6 operating assistance fu	nctions	Туре		Display	
			Α	E	Micrologic LCD	FDM12 display
Operating assist	ance					
Personalised alarm	ıs					
Settings	Up to 10 alarms assigned to all A and	d E measurements (2)		•	-	-
	Phase lead/lag, four quadrants, pha	se sequence, display priority selection (2)	-		-	-
Display	Alarms / tripping			•	-/ <b>=</b>	■/■
Remote indications	Activation of two dedicated contacts	on SDx module		•	-	-
Time-stamped histo	ories (ms)					
Trips	Cause of tripping	Ir, Isd, Ii (Micrologic 5, 6)			-	-
(last 17)		Ig (Micrologic 6)			-	-
		Phase fault			-	-
		Interrupted current value			-	=
Alarms (last 10)			•	•	-	-
Operating events	Event types	Modification of protection setting by dial	-	•	-	-
(last 10)		Opening of keypad lock	-		-	-
		Test via keypad	-		-	-
		Test via external tool	-		-	-
		Time setting (date and time)	-		-	-
		Reset for maximeter/minimeter and energy meter			-	-
Time stamping (date	and time, text, status)			•	-	-
Time-stamped ever	nt tables					
Protection settings	Setting modified (value displayed)	Ir tr Isd tsd Ii Ig tg (2)		•	-	-
	Time-stamping	Date and time of modification (2)			-	-
	Previous value	Value before modification (2)			-	-
Min/Max	Values monitored	I1 I2 I3 IN	•	•	-	-
		U12 U23 U31 f	-		-	=
	Time-stamping of each value	Date and time of min/max record			-	-
	Current min/max value	Min/max value			-	-
Maintenance indica	ators					
Counter	Mechanical cycles (1)	Assignable to an alarm	•		-	-
	Electrical cycles (1)	Assignable to an alarm			-	-
	Trips	One per type of trip (2)			-	-
	Alarms	One for each type of alarm (2)			-	-
	Hours	Total operating time (hours) (2)			-	-
Indicator	Contact wear	%	•		-	-
Load profile	Hours at different load levels	% of hours in four current ranges: 0-49 % In, 50-79 % In, 80-89 % In and ≥ 90 % In	•	•	-	•

<sup>(1)</sup> The BSCM module (page A-29) is required for these functions. (2) Also available via the communication system.

### Additional technical characteristics

### Contact wear

Each time Compact NSX opens, the Micrologic 5/6 trip unit measures the interrupted current and increments the contact-wear indicator as a function of the interrupted current, according to test results stored in memory. Breaking under normal load conditions results in a very slight increment. The indicator value may be read on the FDM121 display. It provides an estimation of contact wear calculated on the basis of the cumulative forces affecting the circuit breaker. When the indicator reaches 80 %, it is advised to replace the circuit breaker to ensure the availability of the protected equipment.

Circuit breaker load profile

Micrologic 5 / 6 calculates the load profile of the circuit breaker protecting a load circuit. The profile indicates the percentage of the total operating time at four current levels (% of breaker ln):

- 0 to 49 % In
- 50 to 79 % In
- 80 to 89 % In

This information can be used to optimise use of the protected equipment or to plan ahead for extensions.

# Functions and characteristics

# Switchboard-display functions Micrologic 5 / 6 A or E trip units

Micrologic measurement capabilities come into full play with the FDM121 switchboard display. It connects to Compact NSX via a simple cord and displays Micrologic information. The result is a true integrated unit combining a circuit breaker and a Power Meter. Additional operating assistance functions can also be displayed.

### FDM121 switchboard display

The FDM121 is a switchboard display unit that can be integrated in the Compact NSX100 to 630 A system. It uses the sensors and processing capacity of the Micrologic trip unit. It is easy to use and requires no special software or settings. It is immediately operational when connected to the Compact NSX by a simple cord. The FDM121 is a large display, but requires very little depth. The anti-glare graphic screen is backlit for very easy reading even under poor ambient lighting and at sharp angles.

### Display of Micrologic measurements and alarms

The FDM121 is intended to display Micrologic 5/6 measurements, alarms and operating information. It cannot be used to modify the protection settings.

Measurements may be easily accessed via a menu.

All user-defined alarms are automatically displayed. The display mode depends on the priority level selected during alarm set-up:

- high priority: a pop-up window displays the time-stamped description of the alarm and the orange LED flashes
- medium priority: the orange "Alarm" LED goes steady on
- low priority: no display on the screen.

All faults resulting in a trip automatically produce a high-priority alarm, without any special settings required.

In all cases, the alarm history is updated.

Micrologic saves the information in its non-volatile memory in the event of an FDM121 power failure..

### Status indications and remote control

When the circuit breaker is equipped with the BSCM module (page A-29), the FDM121 display can also be used to view circuit breaker status conditions:

- O/F: ON/OFF
- SD: trip indication
- SDE: Fault-trip indication (overload, short-circuit, ground fault).

### Main characteristics

- 96 x 96 x 30 mm screen requiring 10 mm behind the door (or 20 mm when the 24 volt power supply connector is used).
- White backlighting.
- Wide viewing angle: vertical ±60°, horizontal ±30°.
- $\blacksquare$  High resolution: excellent reading of graphic symbols.
- Alarm LED: flashing orange for alarm pick-up, steady orange after operator reset if alarm condition persists.
- Operating temperature range -10 °C to +55 °C.
- CE / UL / CSA marking (pending).
- 24 V DC power supply, with tolerances 24 V -20 % (19.2 V) to 24 V +10 % (26.4 V). When the FDM121 is connected to the communication network, the 24 V DC can be supplied by the communication system wiring system (see paragraph "Connection").
- Consumption 40 mA.



FDM121 display.

Surface mount accessory.

Connection with FDM121 display unit.

### Mounting

The FDM121 is easily installed in a switchboard.

- Standard door cut-out 92 x 92 mm.
- Attached using clips.

To avoid a cut-out in the door, an accessory is available for surface mounting by drilling only two 22 mm diameter holes.

The FDM121 degree of protection is IP54 in front. IP54 is maintained after switchboard mounting by using the supplied gasket during installation.

### Connection

The FDM121 is equipped with:

- a 24 V DC terminal block:
- □ plug-in type with 2 wire inputs per point for easy daisy-chaining
  □ power supply range of 24 V DC -20 % (19.2 V) to 24 V DC +10 % (26.4 V).
  A 24 V DC type auxiliary power supply must be connected to a single point on the ULP system. The FDM121 display unit has a 2-point screw connector on the rear panel of the module for this purpose. The ULP module to which the auxiliary power supply is connected distributes the supply via the ULP cable to all the ULP modules connected to the system and therefore also to Micrologic.
- two RJ45 jacks.

The Micrologic connects to the internal communication terminal block on the Compact NSX via the pre-wired NSX cord. Connection to one of the RJ45 connectors on the FDM121 automatically establishes communication between the Micrologic and the FDM121 and supplies power to the Micrologic measurement functions.

When the second connector is not used, it must be fitted with a line terminator.



- Escape
- 2 3 4 5 Down
- OK
- Up
- Context
- Alarm LED







Quick view.



Metering: sub-menu.



Metering: U average.



Metering: meter.



Services.

### **Navigation**

Five buttons are used for intuitive and fast navigation.

The "Context" button may be used to select the type of display (digital, bargraph,

The user can select the display language (Chinese, English, French, German, Italian, Portuguese, Spanish, etc.).

### **Screens**

### Main menu

When powered up, the FDM121 screen automatically displays the ON/OFF status of the device.





Services.

When not in use, the screen is not backlit. Backlighting can be activated by pressing one of the buttons. It goes off after 3 minutes.

### Fast access to essential information

■ "Quick view" provides access to five screens that display a summary of essential operating information (I, U, f, P, E, THD, circuit breaker On / Off).

### Access to detailed information

- "Metering" can be used to display the measurement data (I, U-V, f, P, Q, S, E, THD, PF) with the corresponding min/max values.
- Alarms displays active alarms and the alarm history.
- Services provides access to the operation counters, energy and maximeter reset function, maintenance indicators, identification of modules connected to the internal bus and FDM121 internal settings (language, contrast, etc.)

# **Compact NSX communication**

### Communications modules

All Compact NSX devices can be equipped with the communication function via a prewired connection system and a Modbus network interface.

The interface can be connected directly or via the FDM121 switchboard display unit. Four functional levels can be combined to adapt to all supervision requirements.

### Four functional levels

The Compact NSX can be integrated in a Modbus communication environment. Four functional levels can be used separately or combined.

### Communication of status indications

This level is compatible with all Compact NSX circuit breakers, whatever the trip unit, and with all switch-disconnectors. Using the BSCM module, the following information is accessible:

- ON/OFF position (O/F)
- trip indication (SD)
- fault-trip indication (SDE).

### **Communication of commands**

Also available on all circuit breakers and switch-disconnectors, this level (communicating remote control) can be used to:

- open
- close
- reset.

### Communication of measurements with Micrologic 5 / 6 A or E

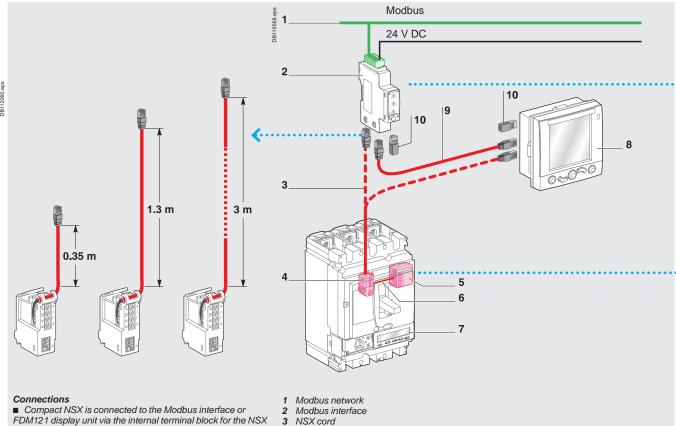
This level provides access to all available information:

- instantaneous values A, E
- demand values E
- maximeters/minimeters A, E
- energy metering E
- demand current and power E
- power quality E.

### Communication of operating assistance with Micrologic 5 / 6 A or E

- protection and alarm settings A, E
- time-stamped histories A, E
- event tables A. E
- maintenance indicators A, E.

### Communication components and connections



- cord equipped with an RJ45 connector.
- $\ \square$  cord available in three lengths: 0.35 m, 1.3 m and 3 m.
- □ insulated 1.3 m version for installations > 480 V AC
- □ lengths up to 10 m possible using extensions.
- The FDM121 display unit is connected to the Modbus interface by a communication cable with RJ45 connectors on both ends.
- Internal terminal block for communication via NSX cord
- BSCM module
- Prefabricated wiring
- Micrologic trip unit
- FDM121 display
- RJ45 cable
- 10 Line terminator (on unused connector if applicable)

### Modbus interface module

### **Functions**

This module, required for connection to the network, contains the Modbus address (1 to 99) declared by the user via the two dials in front. It automatically adapts (baud rate, parity) to the Modbus network in which it is installed.

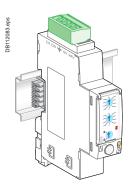
It is equipped with a lock-out switch to enable or disable operations involving writing to Micrologic, i.e. reset, counter reset, setting modifications, device opening and closing commands, etc.

There is a built-in test function to check the connections of the Modbus interface module with the Micrologic and FDM121 display unit.

### Mounting

The module is mounted on a DIN rail. A number of modules may be clipped one next to the other. For this, a stacking accessory is available for fast clip-connection of both the Modbus link and the 24 V DC supply.

The Modbus interface module supplies 24 V DC to the corresponding Micrologic, FDM121 display and BSCM module. Module consumption is 60 mA / 24 V DC.



Modbus interface module.

### **BSCM** module

### **Functions**

The optional BSCM Breaker Status & Control Module is used to acquire device status indications and control the communicating remote-control function.

It includes a memory used to manage the maintenance indicators.

### Status indications

Indication of device status:

O/F, SD and SDE.

### **Maintenance indicators**

The BSCM module manages the following indicators:

- mechanical operation counter
- electrical operation counter
- history of status indications.

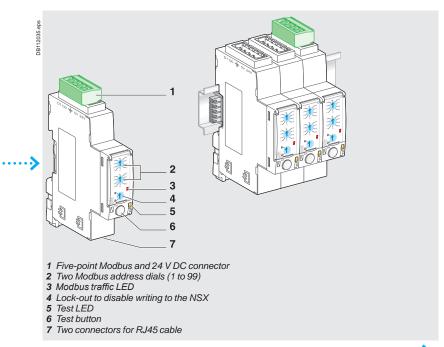
It is possible to assign an alarm to the operation counters.

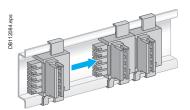
### Controls

The module can be used to carry out communicating remote control operations: (open, close and reset) in different modes (manual, auto).

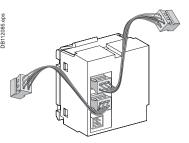
### Mounting

The BSCM module can be installed on all Compact NSX circuit breakers and switch-disconnectors. It simply clips into the auxiliary contact slots. It occupies the slots of one O/F contact and one SDE contact. The BSCM is supplied with 24 V DC power automatically via the NSX cord when the communication system is installed.





Mounting with stacking accessory.



BSCM module.

# **Compact NSX communication**

### Networks and software

Compact NSX uses the Modbus communication protocol, compatible with ION-Enterprise PowerLogic supervision system.

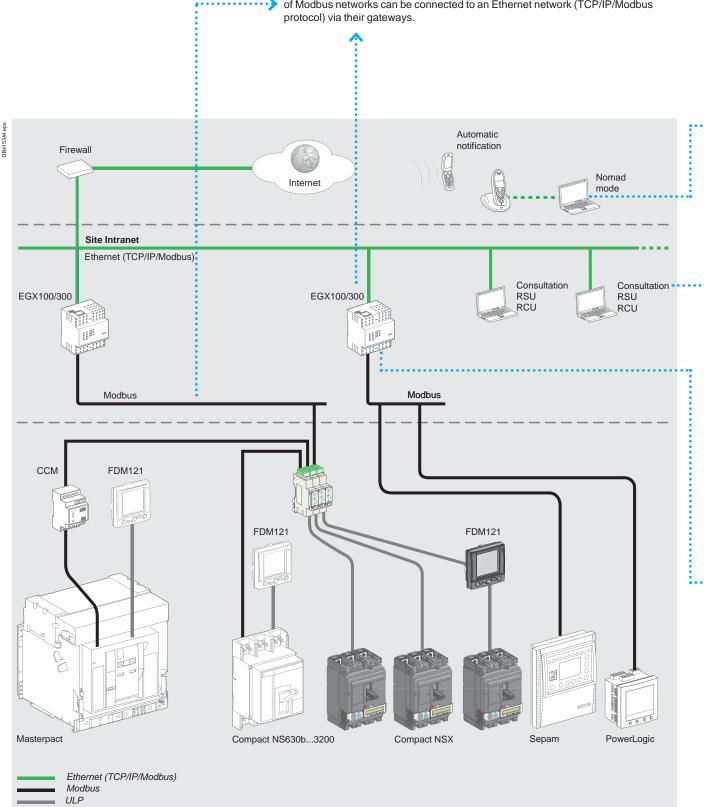
Also available Micrologic utilities RSU and RCU.

### **Modbus**

Modbus is the most widely used communication protocol in industrial networks. It operates in master-slave mode. The devices (slaves) communicate one after the other with a gateway (master).

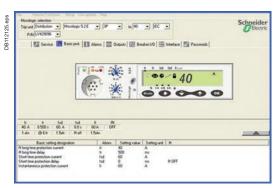
Masterpact, Compact NSX, PowerLogic and Sepam products all operate with this protocol. A Modbus network is generally implemented on an LV or MV switchboard scale

Depending on the data monitored and the desired refresh rate, a Modbus network connected to a gateway can serve 4 to 16 devices. For larger installations, a number of Modbus networks can be connected to an Ethernet network (TCP/IP/Modbus protocol) via their gateways.



### Micrologic utilities

- Two utilities, RSU and RCU, presented on the next page, are available to assist in starting up a communicating installation. Intended for Compact NSX and Masterpact, the software can be downloaded from the Schneider Electric internet site.
- The "Live update" function enables immediate updating to obtain the most recent upgrades. These easy-to-use utilities include starting assistance and on-line help. They are compatible with Microsoft Windows 2000, XP and Vista.



RSU configuration screen for a Micrologic.



RCU mini-supervision screen for current measurements.

### **Gateway**

The gateway has two functions:

- access to the company intranet (Ethernet) by converting Modbus frames to the TCP/IP/Modbus protocol
- optional web-page server for the information from the devices. Examples include EGX300 and EGX100.

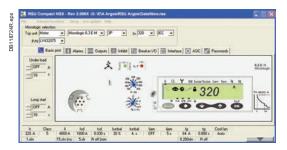


# Compact NSX communication

**RSU** and **RCU** utilities

Two utilities, RSU and RCU, are available to assist in starting up a communicating installation.

They can be downloaded from the Schneider Electric internet site and include a "Live update" function that enables immediate updating.





RSU: Micrologic Remote Setting Utility.

### RSU (Remote Setting Utility)

This utility is used to set the protection functions and alarms for each Masterpact and Compact NSX device.

After connection to the network and entry of the circuit-breaker Modbus address, the software automatically detects the type of trip unit installed.

There are two possible operating modes.

# Off-line with the software disconnected from the communication network

For each selected circuit breaker, the user can do the following.

### Determine the protection settings

The settings are carried out on a screen that shows the front of the trip unit. The Micrologic setting dials, keypad and screen are simulated for easy use of all Micrologic setting functions.

### Save and duplicate the protection settings

Each configuration created can be saved for subsequent device programming. It can also be duplicated and used as the basis for programming another circuit breaker.

### On-line with the software connected to the network

Similarly, for each selected circuit breaker, the user can do the following.

### Display the current settings

The software displays the trip unit and provides access to all settings.

### View the corresponding protection curves

A graphic curve module in the software displays the protection curve corresponding to the settings. It is possible to lay a second curve over the first for discrimination studies.

### Modify settings in a secure manner

- There are different levels of security:
- $\hfill \Box$  password: by default, it is the same for all devices, but can be differentiated for each device
- □ locking of the Modbus interface module which must be unlocked before the corresponding device can be set remotely
- $\hfill \square$  maximum settings limited by the positions of the two dials on the trip unit.

These dials, set by the user, determine the maximum settings that can be made via the communication system.

- Settings are modified by:
- □ either direct, on-line setting of the protection settings on the screen
- $\hfill \square$  or by loading the settings prepared in off-line mode. This is possible only if the positions of the dials allow the new settings.

All manual settings made subsequently on the device have priority.

### **Program alarms**

- Up to 12 alarms can be linked to measurements or events.
- two alarms are predefined and activated automatically:
- ☐ Micrologic 5: overload (Ir)
- ☐ Micrologic 6: overload (Ir) and ground fault (Ig)
- thresholds, priorities and time delays can be set for 10 other alarms. They may be selected from a list of 91 alarms

### Set the outputs of the SDx relays

This is required when the user wants to change the standard configuration and assign different signals to the 2 outputs of the SDx relay.

# Picter Etrices disjorates Setup Langue Aids | Record | Picter | P

RCU: Remote Control Utility for communication tests.

### RCU (Remote Control Utility)

The RCU utility can be used to test communication for all the devices connected to the Modbus network. It is designed for use with Compact NSX, Masterpact, Advantys OTB and Power Meter devices. It offers a number of functions.

### Mini supervisor

- Display of I, U, f, P, E and THD measurements for each device, via navigation.
- Display of ON/OFF status.

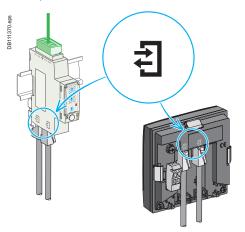
### Open and close commands for each device

A common or individual password must first be entered.

When all functions have been tested, this utility is replaced by the supervision software selected for the installation.

### Supervision software

Schneider Electric electrical installation supervision, management and expert system software integrates Compact NSX identification modules.



Connection symbol for Compact NSX compatible modules.



EGX300



ION.E software screen.

**Types of software**Compact NSX, Compact and Masterpact communication functions are designed to interface with software dedicated to electrical installations:

- switchboard supervision
- electrical installation supervision
- power system management: electrical engineering expert systems
- process control
- SCADA (Supervisory Control & Data Acquisition), EMS (Enterprise Management System) or BMS (Building Management System) type software.

### Integration of Compact NSX

Compact NSX devices are integrated via Modbus interface modules connected via FDM121 display units or NSX cords.

For easy connection of the different modules, the prefabricated cables are identified by ULP (Universal Logic Plug) symbols. The connection points on compatible modules are marked in the same manner.

### Schneider Electric solutions

### Electrical switchboard supervision via EGX300 Web servers

A simple solution for customers who want to consult the main electrical parameters of switchboard devices without dedicated software.

Up to 16 switchboard devices are connected via Modbus interfaces to EGX300 Ethernet gateway integrating the functions of a web page server. The embedded Web pages can be easily configured with just a few mouse clicks. The information they provide is updated in real time.

The Web pages can be consulted using a standard Web browser on a PC connected via Ethernet to the company Intranet or remotely via a modem. Automatic notification of alarms and threshold overruns is possible via e-mail or SMS (Short Message Service).

### ION.E electrical engineering expert system software

PowerLogic® ION.E is a family of web-enabled software products for high-end power-monitoring applications. It is designed for large power systems. SMS products offer detailed analysis of electrical events, long-duration data logging and extensive, economical report-building capabilities (e.g. consumption monitoring and tariff management).

A wide variety of screens can be displayed in real time, including more than 50 tables, analogue meters, bargraphs, alarms logs with links to display waveforms and predefined reports on energy quality and service costs.

### Other software

Compact, Masterpact and Compact NSX devices can forward their measurement and operating information to special software integrating the electrical installation and other technical facilities:

- SCADA process control software: Vijeo CITECT
- BMS Building Management System software: Vista. Please consult us.

# Accessories for Micrologic trip units



External neutral current transformers.



External neutral voltage tap (cat. no. LV434208).



External 24 V DC power-supply module.

### External neutral current transformer (ENCT)

The external transformer is a sensor required for a three-pole circuit breaker in a system with a distributed neutral to measure the neutral current in order to:

- protect the neutral conductor
- protect against insulation faults.

This current transformer can be connected to Micrologic 5 / 6 trip units. The transformer rating must be compatible with that of the circuit breaker.

### Required current transformers for different circuit breaker models

Type of circuit breaker	Rating	Catalogue number
NSX100/160/250	25 – 100 A	LV429521
	150 – 250 A	LV430563
NSX400/630	400 – 630 A	LV432575

### External neutral voltage tap (ENVT)

The neutral voltage transformer is required for Micrologic E power metering with a three-pole circuit breaker in a system with a distributed neutral. It is used to connect the neutral to the Micrologic trip unit to measure phase-to-neutral (Ph-N) voltages.

### External 24 V DC power-supply module

### Use

An external 24 V DC power supply is required for installations with communication, whatever the type of trip unit.

On installations without communication, it is available as an option for Micrologic 5/6 in order to make it possible to:

- modify settings when the circuit breaker is open
- display measurements when the current flowing through the circuit breaker is low (15 to 50 A depending on the rating)
- maintain the display of the cause of tripping and interrupted current.

### Characteristics

A single external 24 V DC supply may be used for the entire switchboard.

The required characteristics are:

- output voltage: 24 V DC ±5 %
- ripple: ±1 %.
- overvoltage category: OVC IV as per IEC 60947-1.

External 24 V DC power-supply modules with an output current of 1 A are available:

		·		
Available extern	al power-supply modules		Cat. no.	
Power supply	V DC (±5 %)	24/30	54440	
		48/60	54441	
		100/125	54442	
	V AC (+10 %, -15 %)	110/130	54443	
		200/240	54444	
		380/415	54445	
Output voltage		24 V DC (±5 %)		
Ripple		±1 %		
Overvoltage categ	ory (OVC)	OVC IV - as per IEC 60947-1		

An external 24 V DC power-supply module with an output current of 3  $\rm A$  is also available:

Available extern	al power-supply mo	odules	Cat. no.
Power supply	V DC	110/230	ABL8RPS24030
	VAC	110/240	ADL0KP324030
Output voltage		24 V DC (±5 %)	
Ripple		±1 %	
Overvoltage categ	ory (OVC)	OVC II	

### Total consumption

To determine the required output current of the 24 V DC power supply, it is necessary to sum up the currents consumed by the different loads supplied:

Consumption of Compact NSX modules Module	Consumption (mA)
Micrologic 5/6	20
BSCM module	10
FDM121	40
Modbus communication interface	60
NSX cord U > 480 V AC	30



Test battery (cat. no. LV434206).



Battery module (cat. no. 54446).



24 V DC power-supply terminal block (cat. no. LV434210).



NSX cord U > 480 V (cat. no. LV434204).



Maintenance case (cat. no. TRV00910).



Configuration and maintenance module (cat. no. TRV00911)



Using the configuration and maintenance module.

### Test battery

This pocket battery connects to the Micrologic test connector. It powers up the Micrologic and the Ready LED. It supplies the screen and allows settings to be made via the keypad.

### **Battery module**

The battery module is a back-up supply for the external power-supply module. The input/output voltages are 24 V DC and it can supply power for approximately three hours (100 mA).

### 24 V DC power-supply terminal block

The 24 V DC power-supply terminal block can be installed only on Micrologic 5/6 trip units. It is required to power the trip unit when the trip unit is not connected to an FDM121 display unit or to the communication system. When used, it excludes connection of an NSX cord.

### **NSX** cord

- For voltage U ≤ 480 V, available in 3 prefabricated lengths: 0.35 m, 1.3 m and 3 m.
- For voltages U > 480 V, a special 1.3 m cord with an insulation accessory is required.
- A set of cords with RJ45 connectors is available to adapt to different distances between devices.

### Maintenance case

The case includes:

- configuration and maintenance module
- power supply (110...220 V AC / 50-60 Hz 24 V DC 1 A)
- special cable for connection to the trip-unit test connector
- standard USB cable
- standard RJ45 cable
- user manual
- optional Bluetooth link (to PC).

### Configuration and maintenance module

Included in the maintenance kit, this module tests Micrologic operation and provides access to all parameters and settings. It connects to the Micrologic test connector and can operate in two modes.

- Stand-alone mode to:
- □ supply the Micrologic and check operation via the Ready LED
- □ check mechanical operation of the circuit breaker (trip using pushbutton).
- PC mode, connected to a PC via USB or Bluetooth link. This mode provides access to protection settings, alarm settings and readings of all indicators. Using the associated RSU software utility, it is possible to store, in a dedicated file for each device, all the data that can transferred to another device.

This mode also offers operating-test functions:

- □ check on trip time delay (trip curve)
- □ check on non-tripping time (discrimination)
- □ check on ZSI (Zone Selective Interlocking) function
- □ alarm simulation
- $\hfill\Box$  display of setting curves
- $\hfill\Box$  display of currents
- printing of test reports.

# Functions and characteristics

# Earth-leakage protection

Add-on protection against insulation faults using a Vigi module or Vigirex relay

There are two ways to add earth-leakage protection to any three or four-pole Compact NSX100 to 630 circuit breaker equipped with a magnetic, thermal-magnetic or Micrologic 2, 5 or 6 trip unit:

- by adding a Vigi module to the circuit breaker to form a Vigicompact NSX
- by using a Vigirex relay and separate toroids.



Vigicompact NSX100 to 630.



Earth-leakage relay.



Separate toroids.

# Circuit breaker with add-on Vigi module (Vigicompact NSX)

- For general characteristics of circuit breakers, see page A-6 and page A-7.
- Add-on Vigi modules. Earth-leakage protection is achieved by installing a Vigi module (characteristics and selection criteria on next page) directly on the circuit breaker terminals It directly actuates the trip unit (magnetic, thermal-magnetic or Micrologic).

### Circuit breaker combined with a Vigirex relay

### Compact NSX circuit breaker + Vigirex relay

Vigirex relays may be used to add external earth-leakage protection to Compact NSX circuit breakers. The circuit breakers must be equipped with an MN or MX voltage release. The Vigirex relays add special tripping thresholds and time delays for earth-leakage protection.

Vigirex relays are very useful when faced with major installation constraints (circuit breaker already installed and connected, limited space available, etc.).

### Vigirex-relay characteristics

- Sensitivity adjustable from 30 mA to 250 mA and 9 time-delay settings (0 to 4.5 seconds).
- Closed toroids up to 630 A (30 to 300 mm in diameter), split toroids up to 250 A (46 to 110 mm in diameter) or rectangular sensors up to 630 A.
- 50/60 Hz, 400 Hz distribution systems.

### Ontions

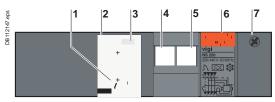
- Trip indication by a fail-safe contact.
- Pre-alarm contact and LED, etc.

### Compliance with standards

- IEC 60947-2, annex M.
- IEC/EN 60755: general requirements for residual-current operated protective devices.
- IEC/EN 61000-4-2 to 4-6: immunity tests.
- CISPR11: radio-frequency radiated and conducted emission tests.
- UL1053 and CSA22.2 No. 144 for RH10, RH21 and RH99 relays at supply voltages up to and including 220/240 V.







- Sensitivity setting
- Time-delay setting (for selective earth-leakage protection).
- Lead-seal fixture for controlled access to settings.
- 4 Test button simulating an earth-fault for regular checks on the tripping function
- 5 Reset button (reset required after earth-fault tripping).
- 6 Rating plate7 Housing for SDV auxiliary contact.

### **Plug-in devices**

The Vigi module can be installed on a plug-in base. Special accessories are required (see catalogue number chapter).

### Vigicompact NSX100 to 630 circuit breakers with earth-leakage protection

Addition of the Vigi module does not alter circuit-breaker characteristics:

- compliance with standards
- degree of protection, class II front-face insulation
- positive contact indication
- electrical characteristics
- trip-unit characteristics
- installation and connection modes
- indication, measurement and control auxiliaries
- installation and connection accessories.

Dimensions a	ind weights	NSX100/160/250	NSX400/630
Dimensions	3 poles	105 x 236 x 86	135 x 355 x 110
WxHxD (mm)	4 poles	140 x 236 x 86	180 x 355 x 110
Weight (kg)	3 poles	2.5	8.8
	4 poles	3.2	10.8

### Vigi earth-leakage protection modules

### Compliance with standards

- IEC 60947-2, annex B.
- Decree dated 14 November 1988 (for France).
- IEC 60755, class A, immunity to DC components up to 6 mA.
- Operation down to -25 °C as per VDE 664.

### Remote indications

Vigi modules may be equipped with an auxiliary contact (SDV) to remotely signal tripping due to an earth fault.

### Use of 4-pole Vigi module with a 3-pole Compact NSX

In a 3-phase installation with an uninterrupted neutral, an accessory makes it possible to use a 4-pole Vigi module with connection of the neutral cable.

Vigi modules are self-supplied internally by the distribution-system voltage and therefore do not require any external source. They continue to function even when supplied by only two phases.

### Vigi module selection

Туре	Vigi ME	Vigi MH	Vigi MB
Number of poles	3, 4 <sup>(1)</sup>	3, 4 (1)	3, 4 (1)
NSX100	•	•	-
NXS160	•	•	-
NSX250	-	•	-
NSX400	-	-	•
NSX630	-	-	•

Protection cha	racteristics		
Sensitivity	fixed	adjustable	adjustable
l∆n (A)	0.3	0.03 - 0.3 - 1 - 3 - 10	0.3 - 1 - 3 - 10 - 30
Time delay	fixed	adjustable	adjustable
Intentional delay (ms)	< 40	0 - 60 (2) - 150 (2) - 310 (2)	0 - 60 - 150 - 310
Max. break time (ms)	< 40	< 40 < 140 < 300 < 800	< 40 < 140 < 300 < 800
Rated voltage V AC 50/60 Hz	200440	200 440 - 440550	200440 - 440550

(1) Vigi 3P modules may also be used on 3P circuit breakers used for two-phase protection. (2) If the sensitivity is set to 30 mA, there is no time delay, whatever the time-delay setting.

### Operating safety

The Vigi module is a user safety device. It must be tested at regular intervals (every 6 months) via test button.

# Functions and characteristics

# **Motor protection**

### General information on motor feeders

The parameters to be considered for motor-feeder protection depend on:

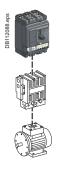
- the application (type of machine driven, operating safety, frequency of operation, etc.)
- the level of continuity of service required by the load or the application
- the applicable standards for the protection of life and property.

The required electrical functions are:

- isolation
- switching, generally at high endurance levels
- protection against overloads and short-circuits, adapted to the motor
- additional special protection.

A motor feeder must comply with the requirements of standard IEC 60947-4-1 concerning contactors and their protection:

- coordination of feeder components
- thermal-relay trip classes
- contactor utilisation categories
- coordination of insulation.



# Power switching Contactor Contactor Contactor Contactor Contactor Additional protection functions

Switchgear functions in a motor feeder.

### **Motor-feeder function**

A motor feeder comprises a set of devices for motor protection and control, as well as for protection of the feeder itself.

### Isolation

The purpose is to isolate the live conductors from the upstream distribution system to enable work by maintenance personnel on the motor feeder at no risk. This function is provided by a motor circuit breaker offering positive contact indication and lockout/tagout possibilities.

### **Switching**

The purpose is to control the motor (ON / OFF), either manually, automatically or remotely, taking into account overloads upon start-up and the long service life required. This function is provided by a contactor. When the coil of the contactor's electromagnet is energised, the contactor closes and establishes, through the poles, the circuit between the upstream supply and the motor, via the circuit breaker.

### **Basic protection**

■ Short-circuit protection

Detection and breaking, as quickly as possible, of high short-circuit currents to avoid damage to the installation. This function is provided by a magnetic or thermal-magnetic circuit breaker.

■ Overload protection

Detection of overload currents and motor shutdown before temperature rise in the motor and conductors damages insulation. This function is provided by a thermal-magnetic circuit breaker or a separate thermal relay.

### Overloads: I < 10 x In

They are caused by:

- an electrical problem, related to an anomaly in the distribution system (e.g. phase failure, voltage outside tolerances, etc.)
- a mechanical problem, related to a process malfunction (e.g. excessive torque) or damage to the motor (e.g. bearing vibrations).

These two causes will also result in excessively long starting times.

Impedant short-circuits: 10 x In < I < 50 x In

This type of short-circuit is generally due to deteriorated insulation of motor windings or damaged supply cables.

Short-circuits: I > 50 x In

This relatively rare type of fault may be caused by a connection error during maintenance.

■ Phase unbalance or phase loss protection

Phase unbalance or phase loss can cause temperature rise and braking torques that can lead to premature ageing of the motor. These effects are even greater during starting, therefore protection must be virtually immediate.

### Additional electronic protection

- Locked rotor.
- Under-load.
- Long starts and stalled rotor.
- Insulation faults.

### **Motor-feeder solutions**

Standard IEC 60947 defines three types of device combinations for the protection of motor feeders.

### Three devices

■ Magnetic circuit breaker + contactor + thermal relay.

### Two devices

■ Thermal-magnetic circuit breaker + contactor.

### One device

■ Thermal-magnetic circuit breaker + contactor in an integrated solution (e.g. Tesys U).

### **Device coordination**

The various components of a motor feeder must be coordinated. Standard IEC 60947-4-1 defines three types of coordination depending on the operating condition of the devices following a standardised short-circuit test.

### Type-1 coordination

- No danger to life or property.
- The contactor and/or the thermal relay may be damaged.
- Repair and replacement of parts may be required prior to further service.

### Type-2 coordination

- No danger to life or property.
- No damage or adjustments are allowed. The risk of contact welding is accepted as long as they can be easily separated.
- Isolation must be maintained after the incident, the motor feeder must be suitable for further use without repair or replacement of parts.
- A rapid inspection is sufficient before return to service.

### **Total coordination**

■ No damage and no risk of contact welding is allowed for the devices making up the motor feeder. The motor feeder must be suitable for further use without repair or replacement of parts.

This level is provided by integrated 1-device solutions such as Tesys U.

### Contactor utilisation categories

For a given motor-feeder solution, the utilisation category determines the contactor withstand capacity in terms of frequency of operation and endurance. Selection, which depends on the operating conditions imposed by the application, may result in oversizing the contactor and circuit-breaker protection. Standard IEC 60947 defines the following contactor utilisation categories.

### Contactor utilisation categories (AC current)

Contactor utilisation categories	Type of load	Control function	Typical applications
AC1	Non-inductive (cos φ ≥ 0.8)	Energising	Heating, distribution
AC2	Slip-ring motor (cos φ ≥ 0.65)	Starting Switching off motor during running Counter-current braking Inching	Wiring-drawing machine
AC3	Squirrel-cage motor ( $\cos \varphi = 0.45$ for $\leq 100$ A) ( $\cos \varphi = 0.35$ for $> 100$ A)	Starting Switching off motor during running	Compressors, elevators, pumps, mixers, escalators, fans, conveyer systems, air-conditioning
AC4		Starting Switching off motor during running Regenerative braking Plugging Inching	Printing machines, wire-drawing machines

# Utilisation category AC3 - common coordination tables for circuit breakers and contactors

This category covers asynchronous squirrel-cage motors that are switched off during running, which is the most common situation (85 % of cases). The contactor makes the starting current and switches off the rated current at a voltage approximately one sixth of the nominal value. The current is interrupted without difficulty.

The circuit breaker-contactor coordination tables for Compact NSX are for use with contactors in the AC3 utilisation category, in which case they ensure type-2 coordination.

### Utilisation category AC4 - possible oversizing

This category covers asynchronous squirrel-cage motors capable of operating under regenerative braking or inching (jogging) conditions

The contactor makes the starting current and can interrupt this current at a voltage that may be equal to that of the distribution system.

These difficult conditions make it necessary to oversize the contactor and, in general, the protective circuit breaker with respect to category AC3.

# **Motor protection**

# Motor-feeder characteristics and solutions

The trip class determines the trip curve of the thermal protection device (inverse-time curve) for a motor feeder.

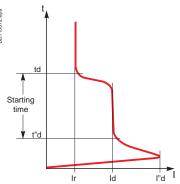
Standard IEC 60947-4-1 defines trip classes 5, 10, 20 and 30.

These classes are the maximum durations, in seconds, for motor starting with a starting current of 7.2 Ir, where Ir is the thermal setting indicated on the motor rating plate.

Example: In class 20, the motor must have finished starting within 20 seconds (6 to 20 s) for a starting current of 7.2 lr.

### Standardised values in kW

Rated operational	Standardi currents l	sed values e (A) for:	in kW	
power	230 V	400 V	500 V	690 V
kW	Α	Α	Α	Α
0.06	0.35	0.32	0.16	0.12
0.09	0.52	0.3	0.24	0.17
0.12	0.7	0.44	0.32	0.23
0.18	1	0.6	0.48	0.35
0.25	1.5	0.85	0.68	0.49
0.37	1.9	1.1	0.88	0.64
0.55	2.6	1.5	1.2	0.87
0.75	3.3	1.9	1.5	1.1
1.1	4.7	2.7	2.2	1.6
1.5	6.3	3.6	2.9	2.1
2.2	8.5	4.9	3.9	2.8
3	11.3	6.5	5.2	3.8
4	15	8.5	6.8	4.9
5.5	20	11.5	9.2	6.7
7.5	27	15.5	12.4	8.9
11	38	22	17.6	12.8
15	51	29	23	17
18.5	61	35	28	21
22	72	41	33	24
30	96	55	44	32
37	115	66	53	39
45	140	80	64	47
55	169	97	78	57
75	230	132	106	77
90	278	160	128	93
110	340	195	156	113
132	400	230	184	134
160	487	280	224	162
200	609	350	280	203
250	748	430	344	250
315	940	540	432	313



Typical motor-starting curve

### Trip class of a thermal-protection device

The motor feeder includes thermal protection that may be built into the circuit breaker. The protection must have a trip class suited to motor starting. Depending on the application, the motor starting time varies from a few seconds (no-load start) to a few dozen seconds (high-inertia load).

Standard IEC 60947-4-1 defines the trip classes below as a function of current setting Ir for thermal protection.

### Trip class of thermal relays as a function of their Ir setting

Class	1.05 l r <sup>(1)</sup>	1.2 lr <sup>(1)</sup>	1.5 lr <sup>(2)</sup>	7.2 l r <sup>(1)</sup>
5	t > 2 h	t < 2h	t < 2 mn	2 s < t ≤ 5 s
10	t > 2 h	t < 2h	t < 4 mn	4 s < t ≤ 10 s
20	t > 2 h	t < 2h	t < 8 mn	6 s < t ≤ 20 s
30	t>2h	t < 2h	t < 12 mn	9 s < t ≤ 30 s

- (1) Time for a cold motor (motor off and cold).
- (2) Time for warm motor (motor running under normal conditions).

### Currents of squirrel-cage motors at full rated load

Standardised values in HP

Rated	Indicative	ndicative values of the rated operational currents le (A) for											
operational power	110 - 120 V	200 V	208 V	220 - 240 V	380 - 415 V	440 - 480 V	550 - 600 V						
hp													
1/2	4.4	2.5	2.4	2.2	1.3	1.1	0.9						
3/4	6.4	3.7	3.5	3.2	1.8	1.6	1.3						
1	8.4	4.8	4.6	4.2	2.3	2.1	1.7						
1 1/2	12	6.9	6.6	6	3.3	3	2.4						
2	13.6	7.8	7.5	6.8	4.3	3.4	2.7						
3	19.2	11	10.6	9.6	6.1	4.8	3.9						
5	30.4	17.5	16.7	15.2	9.7	7.6	6.1						
7 1/2	44	25.3	24.2	22	14	11	9						
10	56	32.2	30.8	28	18	14	11						
15	84	48.3	46.2	42	27	21	17						
20	108	62.1	59.4	54	34	27	22						
25	136	78.2	74.8	68	44	34	27						
30	160	92	88	80	51	40	32						
40	208	120	114	104	66	52	41						
50	260	150	143	130	83	65	52						
60	-	177	169	154	103	77	62						
75	-	221	211	192	128	96	77						
100	-	285	273	248	165	124	99						
125	-	359	343	312	208	156	125						
150	-	414	396	360	240	180	144						
200	-	552	528	480	320	240	192						
250	-	-	-	604	403	302	242						
300	-	-	-	722	482	361	289						

**Note**: 1 hp = 0.7457 kW.

### **Asynchronous-motor starting parameters**

The main parameters of direct on-line starting of three-phase asynchronous motors (90 % of all applications) are listed below.

■ Ir: rated current

This is the current drawn by the motor at full rated load (e.g. approximately 100 A rms for 55 kW at 400 V).

■ Id: starting current

This is the current drawn by the motor during starting, on average 7.2 In for a duration td of 5 to 30 seconds depending on the application (e.g. 720 A rms for 10 seconds). These values determine the trip class and any additional "long-start" protection devices that may be needed.

■ I"d: peak starting current

This is the subtransient current during the first two half-waves when the system is energised, on the average 14 In for 10 to 15 ms (e.g. 1840 A peak).

The protection settings must effectively protect the motor, notably via a suitable thermal-relay trip class, but let the peak starting current through.

### Compact NSX motor-feeder solutions

Compact NSX motor circuit breakers are designed for motor-feeder solutions using:

- three devices, including an MA or 1.3 M magneticonly trip unit
- two devices including a TM-D or 2 M thermal-magnetic trip unit.

They are designed for use with contactors in the AC3 utilisation category (80 % of all cases) and they ensure type-2 coordination with the contactor.

For the AC4 utilisation category, the difficult conditions generally make it necessary to oversize the protection circuit breaker with respect to the AC3 category.

### Compact NSX motor-protection range

Compact NSX trip units can be used to create motor-feeder solutions comprising two or three devices. The protection devices are designed for continuous duty at 65 °C.

### Three-device solutions

- 1 NSX circuit breaker with an MA or Micrologic 1.3 M trip unit.
- 1 contactor.
- 1 thermal relay.

### **Two-device solutions**

- 1 Compact NSX circuit breaker
- $\hfill \square$  with a Micrologic 2.2 M or 2.3 M electronic trip unit
- □ with a Micrologic 6 E-M electronic trip unit. This version offers additional protection and Power Meter functions.
- 1 contactor.

Type of m	otor protection		3 devices		2 devices	
Compact N	SX circuit breaker		NSX100/160/250	NSX400/630	NSX100 to 630	
	Type-2 coordination	n with	Contactor + thermal relay		Contactor	
Trip unit	Туре		MA	Micrologic 1.3 M	Micrologic 2 M	Micrologic 6 E-M
	Technology		Magnetic	Electronic	Electronic	Electronic
				j S Montale talk	人 jiligarili Weedge 2.2 N	大 1 年 1 日 1 日 1 日 1 日 1 日 1 日 1 日 1 日 1 日
			Its 2000 40 42 200 100 100 100 100 100 100 100 100 10			* 500 ×
Thermal relay	y Separate		•			
	Built-in, class	5				
		10				
		20			•	•
		30				=
Protection	functions of Compa	ct NS)	Ccircuit breaker			
Short-circuits	<b>i</b>		•		•	
Overloads					•	•
Insulation faults	Ground-fault					•
	r Phase unbalance					
functions	Locked rotor					
	Under-load					
	Long start					
Built-in Pov	wer Meter functions					
	I, U, energy					
Operating a	assistance					
	Counters (cycles, tr alarms, hours)	ips,				•
	Contact-wear indica	ator				
	Load profile and the image	ermal				•

# Functions and characteristics

# **Motor protection**

# MA and Micrologic 1.3 M instantaneous trip units

MA magnetic trip units are used in **3-device motor-feeder solutions.** They can be mounted on all Compact NSX100/160/250 circuit breakers with performance levels B/F/H/N/S/L.

They provide short-circuit protection for motors up to 110 kW at  $400 \, \text{V}$ .

Micrologic 1.3 M trip units are used in **3-device** motor-feeder solutions on Compact NSX400/630

250 kW at 400 V.

■ tests ■ "Ready" LED.

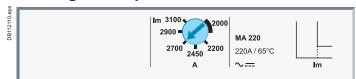
accurate settings

circuit breakers with performance levels B/F/H/N/S/L.

They provide short-circuit protection for motors up to

They also provide the benefits of electronic technology:

### MA magnetic trip units



Circuit breakers with an MA trip unit are combined with a thermal relay and a contactor or a starter.

### Protection.....



### Magnetic protection (Im)

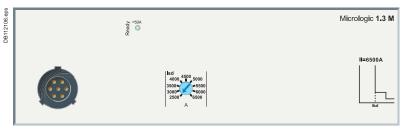
Short-circuit protection with an adjustable pick-up Im that initiates instantaneous tripping if exceeded.

- Im = In x ... is set on an adjustment dial in multiples of the rating:
- ☐ 6 to 14 x In (2.5 to 100 A ratings)
- □ 9 to 14 x In (150 to 200 A ratings)

### **Protection version**

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

### Micrologic 1.3 M trip units



Circuit breakers with a Micrologic 1.3 M trip unit are combined with a thermal relay and a contactor.

### Protection.....



Settings are made using a dial.

### Short-circuits: Short-time protection (Isd)

Protection with an adjustable pick-up Isd. There is a very short delay to let through motor starting currents.

- Isd is set in amperes from 5 to 13 x In, as follows:
- $\Box$  from 1600 to 4160 A for the 320 A rating
- ☐ from 2500 to 6500 A for the 500 A rating.

### Short-circuits: Non-adjustable instantaneous protection (Ii)

Instantaneous protection with non-adjustable pick-up li.

### **Protection version**

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

### Indications .....



### Front indications

■ Green "Ready" LED: flashes slowly when the circuit breaker is ready to trip in the event of a fault.

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

Magnetic trip	units	MA 2	2.5 to 2	20						
Ratings (A)	In at 65 °C (1)	2.5	6.3	12.5	25	50	100 <sup>(1)</sup>	150	220	t.
Circuit breaker	Compact NSX100					-	-	-	-	Ī
	Compact NSX160	-	-	-					-	
	Compact NSX250	-	-	-	-	-				lm 📥
Instantaneous m	agnetic protection									T "
Pick-up (A) accuracy ±20 %	<b>Im</b> = ln x			6 to 14 x In 9, 10, 11, 12				9 to 14	gs 9, 10, 11,	
Time delay (ms)	tm	fixed								

<sup>(1)</sup> MA100 3P adjustable from 6 to 14 x In. MA100 4P adjustable from 9 to 14 x In.

Ratings (A)	In at 65 °C <sup>(1)</sup>	320	500	
Circuit breaker	Compact NSX400	•	-	<b>'</b>
	Compact NSX630	•	•	
S Short-time p	rotection			Isd
Pick-up (A)	Isd	Adjustable directly in amps		Tisu
accuracy ±15 %		9 settings: 1600, 1920, 2440, 2560, 2880, 3200, 3520, 3840, 4160 A	9 settings: 2500, 3000, 3500, 4000, 4500, 5000, 5500, 6000, 6500 A	
Time delay (ms)	tsd	Non-adjustable		
	Non-tripping time Maximum break time	10 60		
Instantaneou	is protection			
Pick-up (A)	li non-adjustable	4800	6500	
accuracy ±15 %	Non-tripping time Maximum break time	0 30 ms		

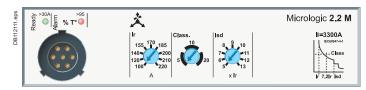
<sup>(1)</sup> Motor standards require operation at 65 °C. Circuit-breaker ratings are derated to take this requirement into account.

# **Motor protection**

### Micrologic 2.2 / 2.3 M electronic trip units

Micrologic 2.2 / 2.3 M trip units provide built-in thermal and magnetic protection. They are used in **2-device motor-feeder solutions** on Compact NSX100 to 630 circuit breakers with performance levels B/F/H/N/S/L. They provide protection for motors up to 315 kW at 400 V against:

- short-circuits
- overloads with selection of a trip class (5, 10 or 20)
- phase unbalance.



Circuit breakers with a Micrologic 2.2/2.3 M trip unit include protection similar to an inverse-time thermal relay. They are combined with a contactor.

### Protection.....



Settings are made using a dial.

Overloads (or thermal protection): Long-time protection and trip class (Ir) Inverse-time thermal protection against overloads with adjustable pick-up Ir. Settings are made in amperes. The tripping curve for the long-time protection, which indicates the time delay tr before tripping, is defined by the selected trip class.

### Trip class (class)

The class is selected as a function of the normal motor starting time.

- Class 5: starting time less than 5 s.
- Class 10: starting time less than 10 s.
- Class 20: starting time less than 20 s.

For a given class, it is necessary to check that all motor-feeder components are sized to carry the 7.2 Ir starting current without excessive temperature rise during the time corresponding to the class.

### Short-circuits: Short-time protection (Isd)

Protection with an adjustable pick-up **Isd**. There is a very short delay to let through motor starting currents.

### Short-circuits: Non-adjustable instantaneous protection (li)

Instantaneous protection with non-adjustable pick-up li.

### Phase unbalance or phase loss (lunbal) (太)

This function opens the circuit breaker if a phase unbalance occurs:

- that is greater than the 30 % fixed pick-up lunbal
- following the non-adjustable time delay **tunbal** equal to:
- □ 0.7 s during starting
- $\hfill \square$  4 s during normal operation.

Phase loss is an extreme case of phase unbalance and leads to tripping under the same conditions.

### Indications .....



### Front indications

- Green "Ready" LED: flashes slowly when the circuit breaker is ready to trip in the event of a fault.
- Red alarm LED for motor operation: goes ON when the thermal image of the rotor and stator is greater than 95 % of the permissible temperature rise.

### Remote indications via SDTAM module

Compact NSX devices with a Micrologic 2 can be equipped with an SDTAM module dedicated to motor applications for:

- a contact to indicate circuit-breaker overload
- a contact to open the contactor. In the event of a phase unbalance or overload, this output is activated 400 ms before circuit-breaker tripping to open the contactor and avoid circuit breaker tripping.

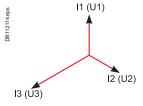
This module takes the place of the MN/MX coils and an OF contact.



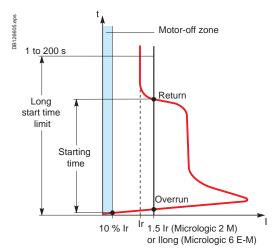
SDTAM remote indication relay module with its terminal block.

Micrologic 2.2											
Ratings (A)	In at 65 °C (1)		25	50	100	150	220	320	500		
Circuit breaker	Compact NSX100			-		-	-	-	-		
	Compact NSX160		-	-	-	•	-	-	-		
	Compact NSX250		-	-	-			-	-		
	Compact NSX400		-	-	-	-	-	-	-		
	Compact NSX630		-	-	-	-	-		-		
	thermal protection):	Long-tin									
Pick-up (A)	Ir			depending	g on trip u	ınit ratinç	g (In) and	•			
ripping between 1.05 and 1.20 Ir	ln = 25 A	Ir =	12	14	16	18	20	22	23	24	25
1.05 and 1.20 ii	ln = 50 A	Ir =	25	30	32	36	40	42	45	47	50
	ln = 100 A	Ir =	50	60	70	75	80	85	90	95	100
	In = 150 A	Ir =	70	80	90	100	110	120	130	140	150
	ln = 220 A	Ir =	100	120	140	155	170	185	200	210	220
	ln = 320 A	Ir =	160	180	200	220	240	260	280	300	320
	In = 500 A	Ir =	250	280	320	350	380	400	440	470	500
Trip class as per IEC 6	0947-4-1		5	10	20						
Time delay (s)	tr	1.5 x lr	120	240	480	for wa	rm motor				
depending on selected	trip class	6 x Ir	6.5	13.5	26	for col	d motor				
		7.2 x lr	5	10	20	for col	d motor				
Thermal memory			20 mir	nutes befo	re and af	ter trippi	ng				
Cooling fan			non-a	djustable	- motor se	elf-coole	d				
Short-circuits:	Short-time protection	on with f	ixed tir	ne delay	/						
Pick-up (A)	<b>Isd</b> = lr x		5	6	7	8	9	10	11	12	13
accuracy ±15 %											
Time delay (ms)	tsd			djustable							
	Non-tripping time		10								
	Maximum break time		60								
	Non-adjustable inst	antaneo		tection							
Pick-up (A) accuracy ±15 %	li non-adjustable		425	750	1500	2250	3300	4800	6500		
Time delay (ms)	Non-tripping time Maximum break time		0 30								
Phase unbalance											
Pick-up (A) accuracy ±20 %	lunbal in % average o	current (2)	> 30 %	)							
				uring star							

- (1) Motor standards require operation at 65 °C. Circuit-breaker ratings are derated to take this requirement into account (see page B-8).
- (2) The unbalance measurement takes into account the most unbalanced phase with respect to the average current.



Unbalance of phase currents and voltages.



Motor starting and long starts.

### Additional technical characteristics

### Phase unbalance

An unbalance in three-phase systems occurs when the three voltages are not equal in amplitude and/or not displaced 120° with respect to each other. It is generally due to single-phase loads that are incorrectly distributed throughout the system and unbalance the voltages between the phases.

These unbalances create negative current components that cause braking torques and temperature rise in asynchronous machines, thus leading to premature ageing.

### Phase loss

Phase loss is a special case of phase unbalance.

- During normal operation, it produces the effects mentioned above and tripping must occur after four seconds.
- During starting, the absence of a phase may cause motor reversing, i.e. it is the load that determines the direction of rotation. This requires virtually immediate tripping (0.7 seconds). Starting time in compliance with the class (Micrologic 2 M)

For normal motor starting, Micrologic 2 M checks the conditions below with respect to the thermal-protection (long-time) pick-up Ir:

- current > 10 % x Ir (motor-off limit)
- overrun of 1.5 x Ir threshold, then return below this threshold before the end of a 10 s time delay.

If either of these conditions is not met, the thermal protection trips the device after a maximum time equal to that of the selected class.

Pick-up Ir must have been set to the current indicated on the motor rating plate.

### Long starts (Micrologic 6 E-M)

When this function is not activated, the starting conditions are those indicated above.

When it is activated, this protection supplements thermal protection (class).

- A long start causes tripping and is characterised by: ■ current > 10 % x Ir (motor-off limit) with:
- either overrun of the long-time pick-up (1 to 8 x lr) without return below the pick-up before the end of the long-time time delay (1 to 200 s)
- or no overrun of the long-time pick-up (1 to 8 x Ir) before the end of the long-time time delay (1 to 200 s).

Pick-up Ir must have been set to the current indicated on the motor rating plate.

This protection should be coordinated with the selected class.

# **Motor protection**

### Micrologic 6 E-M electronic trip units

Micrologic 6.E-M is used in **2-device motor-feeder** solutions.

It provides the same protection as Micrologic 2 M:

- short-circuits
- overloads with selection of the same trip classes (5, 10 or 20), plus trip class 30 for starting of machines with high inertia.

In addition, it offers specific motor-protection functions that can be set via the keypad.



### Protection...



The protection functions are identical to those of Micrologic 2 M and can be fine-adjusted via the keypad ��.

Access to setting modifications via the keypad is protected by a locking function that is 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. It is possible to scroll through settings and measurements with the cover closed.

### Overloads (or thermal), class and short-circuits

The long-time, short-time and instantaneous functions are identical to those of Micrologic 2 M.

In addition, there is trip class 30 for long-time protection and a setting for self-cooled or fan-cooled motors (

### Ground-fault protection (Ig)

Residual type ground-fault protection with an adjustable pick-up **Ig** (with Off position) and adjustable time delay **tg**.

### Phase unbalance or phase loss (lunbal)

This function opens the circuit breaker if a phase unbalance occurs:

- $\blacksquare$  that is greater than the **lunbal** pick-up that can be fine-adjusted from 10 to 40 % (30 % by default)
- following the **tunbal** time delay that is:
- □ 0.7 s during starting

□ adjustable from 1 to 10 seconds (4 seconds by default) during normal operation. Phase loss is an extreme case of phase unbalance and leads to tripping under the same conditions.

### Locked rotor (Ijam)

This function detects locking of the motor shaft caused by the load.

During motor starting (see page A-45), the function is disabled.

During normal operation, it causes tripping:

- above the **ljam** pick-up that can be fine-adjusted from 1 to 8 x Ir
- in conjunction with the **tjam** time delay that can be adjusted from 1 to 30 seconds.

### **Under-load (lund)**

This function detects motor no-load operation due to insufficient load (e.g. a drained pump). It detects phase undercurrent.

During motor starting (see page A-45), the function is always enabled.

During normal operation, it causes tripping:

- below the **lund** pick-up that can be fine-adjusted from 0.3 to 0.9 x Ir
- in conjunction with the **tund** time delay that can be adjusted from 1 to 200 seconds.

### Long starts (llong)

This protection supplements thermal protection (class).

It is used to better adjust protection to the starting parameters.

It detects abnormal motor starting, i.e. when the starting current remains too high or too low with respect to a pick-up value and a time delay. It causes tripping:

- in relation with a **llong** pick-up that can be fine-adjusted from 1 to 8 x lr
- in conjunction with the **tlong** time delay that can be adjusted from 1 to 200 seconds.

(see "long starts" page A-45)

### Display of type of fault .....



On a fault trip, the type of fault (Ir, Isd, Ii, Ig, Iunbal, Ijam), the phase concerned and the interrupted current are displayed.

### Indications .....



### Front indications

- Green "Ready" LED: flashes slowly when the circuit breaker is ready to trip in the event of a fault.
- Red alarm LED for motor operation: goes ON when the thermal image of the rotor or stator is greater than 95% of the permissible temperature rise.

### Remote indications via SDTAM or SDx module

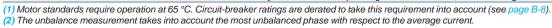
See description on page A-44 for SDTAM and page A-83 for SDx.



SDTAM 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.

Micrologic 6.2	63E-M											
Ratings (A)	In at 65 °C			25	50	80	150	220	320	500		
Circuit breaker	Compact N			<b>2</b> 5	<b>5</b> 0	•	-	-	-	-		
on our pround.	Compact N			-				_	_	_		
	Compact N			•		•	•		-	-		
	Compact N	ISX400		-	-	-	-	-		-		
	Compact N	ISX630		-	-	-	-	-				
Overloads: Lor	ng-time pro	otection										
Pick-up (A)	Ir	Dial setting	J	Value d	epending	on trip-u	nit rating	(In) and	setting or	n dial		
Tripping between		ln = 25 A	lr =	12	14	16	18	20	22	23	24	25
1.05 and 1.20 Ir		ln = 50 A	lr =	25	30	32	36	40	42	45	47	50
		ln = 80 A	lr =	35	42	47	52	57	60	65	72	80
		In = 150 A		70	80	90	100	110	120	130	140	150
		In = 220 A		100	120	140	155	170	185	200	210	220
		In = 320 A		160	180	200	220	240	260	280	300	320
		In = 500 A		250 Fine ad	280	320	350	380	400	440	470	500
Trip class as per IEC 60	0047 4 1	Keypad se	ung	5	ljustments 10	20	30	w maxim	um value	delinea	by dial se	eung
			1.5 x lr	120	240	480	720	forwa	m motor			
Time delay (s)	tr trip class								m motor			
depending on selected	uip ciass		6 x lr	6.5 5	13.5 10	26 20	38 30		d motor			
Thermal memory			7.2 x lr	5 20 minu	utes befor				a motor			
Thermal memory									re			
Cooling fan  Short-circuits:	Short time	nrotooti	on with 4		s for self-		1d11-C001	eu 1110t01	5			
Pick-up (A)	Isd = Ir x		on with i	5	6	7	8	9	10	11	12	13
accuracy ±15 %	15u = 11 X				ljustment					11	12	13
Time delay	tsd				justable	111 U.J X II	steps us	sing the r	сурац			
Time delay	Non-trippin	a time		10 ms	Justable						-	
	Maximum b	Ü		60 ms								
Short-circuits:			tantaneo		tection							
Pick-up (A)	li non-adjus			425	750	1200	2250	3300	4800	6500		
accuracy ±15 %	Non-trippin			0 ms								
	Maximum b			30 ms								
G Ground faults												
Pick-up (A)	<b>Ig</b> = ln x			Dial set	ting							
accuracy ±10 %		ln = 25 A	lg =	0.6	0.6	0.6	0.6	0.7	8.0	0.9	1	Off
		ln = 50 A	lg =	0.3	0.4	0.5	0.6	0.7	8.0	0.9	1	Off
		In > 50 A	lg =	0.2	0.3	0.4	0.5	0.6	0.7	8.0	1	Off
T					ustments			0.4				
Time delay (ms)	tg	a time		0	0.1	0.2	0.3	0.4				
	Non-trippin Maximum b	•		20 80	80 140	140 200	230 320	350 500				
Phase unbalance				80	140	200	320	300				
Pick-up (A)		% average	current (2)	adiuetal	hle from 1	0 to 40 %	default	setting -	- 30 %			
accuracy ±20 %	iulibai – III	76 average	Current	fine adju	ustments d during r	in 1 % ste	ps using					
Time delay (s)	tunbal				ring starti							
					seconds o					sing = 4 se	econds	
Lankad uctor				rine adji	ustments	III I S Ste	ps using	іпе кеур	a0			
Locked rotor	liam = lev			1 v 0 le	with Off po	ocition d	ofault act	ting – Of	f			
Pick-up (A) accuracy ±10 %	ljam = lr x .			fine adju	ustments d during n	in 0.1 x Ir	steps us					
Time delay (s)	tjam =			1 to 30 s	seconds ustments			the keyp	ad, defau	ılt setting	= 5 s	
	-current)			,				- 7 F		3		
Under-load (under	lund = lr x.			Fine ad	9 Ir with O	in lr x 0.0	01 steps			ftware		
Under-load (under Pick-up (A) accuracy ±10 %				activate	d during r	notor sta	rting					
Pick-up (A) accuracy ±10 %	tund =			1 to 200	seconds		ne Lieina	the DCI I	coftware	default	setting -	10 s
Pick-up (A) accuracy ±10 % Time delay (s)	tund =			1 to 200			ps using	the RSU	software	, default	setting =	10 s
Pick-up (A) accuracy ±10 %  Fime delay (s)  Long starts				1 to 200 fine adju	seconds ustments	in 1 s ste				, default s	setting =	10 s
Pick-up (A) accuracy ±10 %	tund =			1 to 200 fine adju	seconds	in 1 s steposition, desir in Ir x 0.7	efault set	ting = Of	f		setting =	10 s





# **Motor protection**

### Micrologic 6 E-M electronic trip units

Micrologic 6 E-M provides Power Meter functions with energy metering. With the FDM121 display unit, all metering data and operating indicators are available on the switchboard front panel. This version also displays the thermal image of the motor.



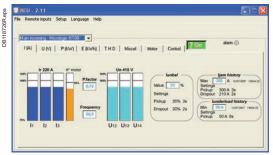
Micrologic 6 E-M.





Current values.

Thermal-image alarm.



PC screen with motor thermal image and value monitoring.

### **Power Meter functions**

The built-in Power Meter functions of the Micrologic 6 E-M are the same as those for the Micrologic 6 E presented in the section on distribution (see page A-22). When used exclusively in the three-phase version, neutral measurements are excluded.

### **Operating-assistance functions**

The operating-assistance functions of the Micrologic 6 E-M are the same as those for the Micrologic 6 E presented in the section on distribution (see page A-24).

### Special functions for motor feeders

Additional operating functions specifically for motor feeders are available.

### Phase sequence

The order in which the phases L1, L2, L3 are connected determines the direction of motor rotation. If two phases are inverted, the direction is reversed. Information on the direction of rotation is provided. It can be linked to an alarm to detect an inversion in the direction following servicing on the supply under denergised conditions and disable restarting.

### Thermal image of the rotor and stator

Micrologic 6 E-M offers a thermal-image function.

Taking into account the Ir setting and the class, an algorithm simulates rotor and stator temperature rise. It includes the slow temperature rise of the stator and its metal mass. Also included is the faster temperature rise of the copper rotor. The thermal protection function trips the circuit breaker when the calculated thermal image reaches 100 % of the permissible temperature rise.

The communication indicates the thermal-image value as a percentage of the permissible temperature rise. One or more alarms may be assigned to selected thresholds. A red LED on the front signals when the value exceeds 95 %. An SDx module with two outputs programmed for thermal-image values can be used to implement other alarm functions.







Micrologic 6 E-M	integrated Power Meter and op	perating-assistance functions	Display	
			Micrologic LCD	FDM121 display
Measurements				u.op.u.y
Instantaneous rms mea	surements			
Currents (A)	Phase currents and average value	I1, I2, I3 and lavg = (I1 + I2 + I3) / 3		-
	Highest current of the 3 phases	Imax of I1, I2, I3		-
	Ground-fault protection	% Ig (pick-up setting)		-
	Current unbalance between phases	% lavg	-	-
Voltages (V)	Phase-to-phase voltages and average value	U12, U23, U31 and Uavg = (U12 + U21 + U23) / 3		•
• ,	Unbalance between phase-to-phase voltages	s % Uavg	_	
	Phase sequence	1-2-3, 1-3-2		-
Frequency (Hz)	Power system	F		•
Power	Active (kW), reactive (kVAR), apparent (kVA)	P, Q, S total and per phase	-	-
· owoi	Power factor and cos φ (fundamental)	PF, cos φ, total and per phase		_
Mayimatara / minimatara			-	
Maximeters / minimeters	Associated with instantaneous rms measurements	Reset via Micrologic and the display unit	-	•
Energy metering				
Energy	Active (kWh), reactive (kVARh),	Total since last reset	-	=
0,	apparent (kVAh)	Absolute or signed mode (1)	-	_
Demand and maximum	demand values			
Demand current (A)	Phases	Present value on the selected window	-	(2)
20and ourion (/ t)		Maximum demand since last reset	-	(2)
Demand power	Active (kWh), reactive (kVARh), apparent	Present value on the selected window	-	(2)
a po./oi	(kVAh)	Maximum demand since last reset	-	(2)
Calculation window	Sliding, fixed or com-synchronised	Adjustable from 5 to 60 minutes in 1 minute steps	-	(2)
	3,,	Absolute or signed mode(1)	-	(2)
Power quality				
Total harmonic distortion	Of voltage with respect to rms value	THDU,THDV of the Ph-Ph and Ph-N voltage	-	-
(%)	Of current with respect to rms value	THDI of the phase current	_	
Operating assistance	•	The first phase surrout		,-
Personalised alarms				
				(2)
Settings	Up to 10 alarms can be assigned to all measu		-	(2)
	as well as to phase lead/lag, four quadrants, p	onase sequence and thermal image	-	(2)
Time-stamped histories				La
Trips	last 17	Ir, Isd, Ii, Ig, Iunbal, Ijam, Iund, Ilong	-	(2)
Alarms	last 10		-	(2)
Operating events	last 10 events and type:	Modification of protection setting by dial	-	(2)
		Opening of keypad lock	-	(2)
		Test via keypad	-	(2)
		Test via external tool	-	(2)
		Time setting (date and time)	-	(2)
		Reset for maximeter/minimeter and energy meter		(2)
Time stamping	Presentation	Date and time, text, status	-	(2)
Time-stamped event tab				•
Protection settings	One of the following settings modified	Ir tr Isd tsd Ii Ig tg	-	(2)
	Time-stamping of modification	Date and time of modification	_	(2)
	Previous value	Value before modification	_	(2)
Min/Max	Value monitored	11	-	(2)
······, ividA	Time-stamping of min/max value	Date and time of record	_	(2)
	Present min/max value	Min/max recorded for the value	_	(2)
Maintenance indicators		minimum recorded for the value		1
Maintenance indicators Counter	Mechanical cycles (3)	Assignable to an alarm	1.	(2)
Counter	•	Assignable to an alarm Assignable to an alarm	-	(2)
	Electrical cycles (3)	•	-	(2)
	Trips	One per type of trip	-	(2)
	Alarms	One for each type of alarm	-	(2)
la di a atau	Hours	Total operating time (hours)	-	
Indicator	Contact wear	%	-	(0)
Load profile	Hours at different load levels	% of hours in four current ranges: 0-49 % In, 50-79 % In, 80-89 % In, $\geqslant$ 90 % In	-	(2)
	Stator and rotor	% of permissible temperature rise		(2)

Thermal image Stator and rotor % of peri (1) Absolute mode: E absolute = E out + E in; Signed mode: E signed = E out - E in. (2) Available via communication system. (3) The BSCM module (page A-29) is required for these functions.

### **Functions** and characteristics

# **Special applications**

### Protection of public distribution systems with Micrologic 2-AB

Micrologic AB trip units are used in public distribution systems to limit the current supplied according to the consumer's contract. They are available in 100, 160, 240 and 400 A ratings and are supplied with a lead-seal device to protect the settings.



Compact INV switch-disconnector with visible break.



Compact NSX with Micrologic 2 AB.



SDx remote indication relay module with its terminal block



Compact NSX circuit breakers equipped with Micrologic AB trip units are installed as incoming devices for consumer installations connected to the public LV distribution

With respect to the utility, they have two functions.

- Consumption is limited to the contractual power level. If the limit is exceeded, a fast thermal-protection function trips the device at the head of the consumer's installation without the utility having to intervene.
- Total discrimination is ensured with the upstream fuses on the public distribution system in the event of a fault, overload or short-circuit in the consumer's installation, protecting the utility line.

In addition, they provide the consumer with:

- protection for the installation as a whole, with the possibility of adding a Vigi earth-leakage protection module
- the possibility of downstream discrimination.

This type of Compact NSX is often used in conjunction with an Compact INV switch-disconnector located outside the consumer's building and providing the visible-break function.

This means the operator can directly see, through a transparent cover, the physical separation of the main contacts. The Compact INV range is also suitable for isolation with positive contact indication.

This means utility operators can work on the service-connection unit after isolating it from the upstream line.



Settings are made using the adjustment dials with fine-adjustment possibilities and a lead-seal fixture.

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

Inverse-time thermal protection against overloads with an adjustable current pick-up Ir and a very short, non-adjustable time delay tr (15 seconds for 1.5 x Ir).

### Short-circuits: Short-time protection (Isd) with fixed time delay

Short-circuit protection with an adjustable pick-up Isd. The short-time pick-up values are high enough to avoid nuisance tripping in the event of transient current spikes.

### Short-circuits: Non-adjustable instantaneous protection

Instantaneous short-circuit protection with a fixed pick-up.

### **Neutral protection**

Available on four-pole circuit breakers only. Neutral protection may be set using a three-position switch:

- 4P 3D: neutral unprotected
- 4P 3D + N/2: neutral protection at half the value of the phase pick-up, i.e. 0.5 x Ir
- 4P 4D: neutral fully protected at Ir.

### Indications.....



### Front indications



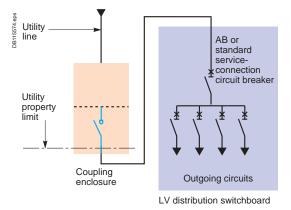
- Green "Ready" LED: flashes slowly when the circuit breaker is ready to trip in the
- Orange overload pre-alarm LED: steady on when I > 90 % Ir.
- Red overload LED: steady on when I > 105 % Ir.

An SDx relay module installed inside the circuit breaker can be used to remote the overload-trip signal. 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.

The module is described in detail in the section dealing with accessories page A-85.

Micrologic 2.2												
Ratings (A)	In at 40 °C <sup>(1)</sup>		100		160		240		400			
Circuit breaker	Compact NSX100		-		-		-		-			t <sub>A</sub>
	Compact NSX160		-		-		-		-			L L
	Compact NSX250		-		-				-			T"
	Compact NSX400		-		-		-					
	Compact NSX630		-		-		-		•			
L Long-time pr	otection											
Pick-up (A)	lr		value	depending	g on trip (	unit rating	(In) and	setting or	n dial			
tripping between 1.05 and 1.20 Ir	In = 100 A	Ir =	40	40	50	60	70	80	90	100		
1.00 and 1.20 ii	In = 160 A	Ir =	90	100	110	120	130	140	150	160		
	ln = 240 A	Ir =	140	150	160	170	180	200	220	240		
	In = 400 A	lr =	260	280	300	320	340	360	380	400		
Time delay (s)	tr		non-a	djustable								
		1.5 lr	15									
		6 Ir	0.5									
		7.2 lr	0.35									
Thermal memory			20 mir	nutes befo	re and a	fter trippir	ng					
Short-time pr	otection with fixed tim	ne delay										
Pick-up (A) accuracy ±10 %	<b>Isd</b> = Ir x		1.5	2	3	4	5	6	7	8	10	
Time delay (ms)	tsd		non-a	djustable:	20							
	Non-tripping time		20									
	Maximum break time		80									
Non-adjustat	ole instantaneous prot	ection										
Pick-up (A) accuracy ±15 %	li non-adjustable		1500		1600		2880		4800			
Time delay (ms)	Non-tripping time Maximum break time		10 50									

(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.



Consumer connection diagram.

### Technical details

### Advantages of the AB trip unit

- Controls the power drawn with respect to contractual power levels. If the contractual level is overrun, the circuit breaker opens and the consumer is not billed excess costs.
- If a short-circuit occurs, the circuit breaker opens and the upstream HRC fuses on utility lines are not affected. No expensive utility servicing is billed to the consumer.

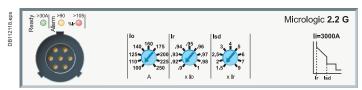
# **Special applications**

### Generator protection with Micrologic 2.2 G

Micrologic G trip units are used for the protection of systems supplied by generators or comprising long cable lengths. They can be mounted on all Compact NSX100/160/250 circuit breakers.

With extensive setting possibilities, Micrologic 5 offers the same functions from 100 to 630 A.

A thermal-magnetic trip unit is also available for the NSX100 to 250 (see page A-16).



Circuit breakers equipped with Micrologic G trip units protect systems supplied by generators (lower short-circuit currents than with transformers) and distribution systems with long cable lengths (fault currents limited by the impedance of the

### Protection.....

Settings are made using the adjustment dials with fine adjustment possibilities.

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

Inverse-time thermal protection against overloads with an adjustable current pick-up Ir and a very short, non-adjustable time delay tr (15 seconds for 1.5 x lr).

### Short-circuits: Short-time protection (Isd) with fixed time delay

Short-circuit protection with an adjustable pick-up Isd, delayed 200 ms, in compliance with the requirements of marine classification companies.

### Short-circuits: Non-adjustable instantaneous protection (li)

Instantaneous short-circuit protection with a fixed pick-up required for generator protection.

### **Neutral protection**

- On 3-pole circuit breakers, neutral protection is not possible.
- On four-pole circuit breakers, neutral protection may be set using a three-position switch:
- □ 4P 3D: neutral unprotected
- □ 4P 3D + N/2: neutral protection at half the value of the phase pick-up, i.e. 0.5 x Ir
- □ 4P 4D: neutral fully protected at Ir.

### **Indications**

### Front indications



- Green "Ready" LED: flashes slowly when the circuit breaker is ready to trip in the
- 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 overload-trip signal.

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.

The module is described in detail in the section dealing with accessories.



SDx remote indication relay module with its terminal block

Dette se (A)	In at 40.00 (1)		40		400		4.0	20		050			
Ratings (A)	In at 40 °C (1)		40		100		16	00		250			
Circuit breaker	Compact NSX100				•		-			-			<sup>t</sup> ≱ .
	Compact NSX160				•		-			-			dir
	Compact NSX250		•		•		_			•			l T
Long-time pro	tection												
Pick-up (A)		lo		•	ng on trip		• ,		•				Isd
ripping between 1.05 and 1.20 Ir	ln = 40 A	lo =	18	18	20	23	25	5	28	32	36	40	Tisu
	In = 100 A	lo=	40	45	50	55	63	3	70	80	90	100	
	In = 160 A	lo=	63	70	80	90	10	00	110	125	150	160	
	In = 250 A (NSX250)	lo=	100	110	125	140	15	50	176	200	225	250	
		<b>Ir</b> = lo x	9 fine	-adjustm	ent settin	gs from	0.9 to	1 for	each lo	/alue			
Time delay (s)	tr		non-a	djustabl	е								
accuracy 0 to -20 %		1.5 x lr	15										
		6 x Ir	0.5										
		7.2 x lr	0.35										
Thermal memory			20 mi	nutes be	fore and	after trip	ping						
Short-time pro	tection with fixed t	ime delay	/										
Pick-up (A) accuracy ±10 %	<b>Isd</b> = Ir x		1.5	2	2.5	3	4	5	6	7	8	9	
Time delay (ms)	tsd		non-a	djustabl	е								
	Non-tripping time		140										
	Maximum break time	e	200										
Non-adjustabl	e instantaneous pr	otection											
Pick-up (A)	li non-adjustable		600		1500		24	400		3000			
accuracy ±15 %	Non-tripping time Maximum break time		15 ms										

<sup>(1)</sup> 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.

# **Special applications**

# Protection of industrial control panels

Compact NSX circuit breakers are also used in industrial control panels.

They serve as an incoming devices or can be combined with contactors to protect motor feeders:

- compliance with worldwide standards including IEC 60947-2 and UL 508 / CSA 22-2 no. 14
- ■overload and short-circuit protection
- isolation with positive contact indication, making it possible to service machines safely by isolating them from all power sources
- installation in universal and functional type enclosures
- NA switch-disconnector version.

# Delifezzados



### Industrial control panels

Compact NSX circuit breakers equipped for public distribution or motor protection functions as described in the previous pages can be used in industrial control panels. The accessories for the Compact NSX range are suitable for the special needs of these switchboards.

### **Auxiliaries**

All auxiliaries can be added to the circuit breaker by the user:

- padlocking devices (in the OFF position)
- rotary handle
- status-indication auxiliary contacts (ON, OFF and tripped)
- shunt (MX) or undervoltage (MN) releases
- early-make or early-break contacts.

### Rotary handle

Direct or extended versions for mounting up to 600 mm behind the front:

- black front with black handle
- yellow front with red handle (for machine tools or emergency off as per IEC 204 / VDE 0013).

All rotary handles can be padlocked in the OFF position. Optional door interlock, recommended for MCC panels (motor control centres).

When the device is equipped with an extended rotary handle, a control accessory mounted on the shaft makes it possible to operate the device with the door open. The device can be padlocked in the OFF position in compliance with UL508.

### Early-make or early-break contacts

These contacts can be used respectively to supply an MN undervoltage release before the circuit breaker closes or to open the contactor control circuit before the circuit breaker opens.

### **Special functions**

- Indication of thermal overloads with the SDx module.
- Early opening of the contactor for overload faults with the SDTAM module.
- Links with PLCs via the communication system.
- Measurement of all electrical parameters with Micrologic A and E.
- Programmable alarms with Micrologic 5 and 6.

### Installation in enclosures

Compact circuit breakers can be installed in a metal enclosure together with other devices (contactors, motor-protection circuit breakers, LEDs, etc.) (see page A-94).

# Compliance with North American industrial control equipment standards

Compact NSX devices have received UL508 / CSA 22-2 no. 14 approval for industrial control equipment of the "Manual Motor Controller", "Across the Line Starter", "General Use" and "Disconnecting Means" types.

Type NA devices are switch-disconnectors that must always be protected upstream.

### **UL508** approval

Circuit breakers	Trip units	Approvals
Compact NSX100 to 630 F/N/H		General Use Motor Disconnecting Means
		Manual Motor Controller Across the Line Starter Motor Disconnecting Means

### Table of 3-phase motor ratings in hp (1 hp = 0.7457 kW)

v AC ratings		115	230	460	5/5
TMD Micrologic 2, 5 and 6	NA, MA Micrologic 1.3 M, 2.2 M, 2.3 M Micrologic 6.2 E-M and 6.3 E-M				
25	25	3	7.5	15	20
50	50	7.5	15	30	40
100	100	15	30	75	100
160	150	25	50	100	150
250	220	40	75	150	200
400	320	-	125	250	300
550	500	-	150	350	500

The deratings indicated on page B-8 and page B-9 apply to TMD, Micrologic 2, 5 and 6 trip units, rated at 40  $^{\circ}$ C.

### 16 Hz 2/3 network protection Micrologic 5 A-Z trip unit

Compact NSX circuit breakers may be used on 16 Hz 2/3 systems with special thermal-magnetic and electronic (Micrologic 5 A-Z) trip units.

### 16 Hz 2/3 networks

Single-phase distribution networks with a frequency of 16 Hz 2/3 are used for railroad applications in certain European countries.

### Breaking capacity for 16 Hz 2/3 at 250/500 V

Compact NSX circuit breakers of the 3P 2D or the 3P 3D type protect 16 Hz 2/3 networks at 250 V or 500 V.

They can be equipped with either:

- a TM-D thermal-magnetic trip unit for Compact NSX100 to 250
- or an electronic Micrologic 5.2 A-Z trip unit for Compact NSX100 to 250 or a 5.3 A-Z for Compact NSX400/630.

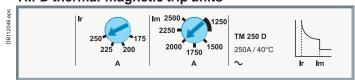
The possible breaking-capacity performance levels are B, F, N and H as indicated below.

### Breaking capacity Icu

Operating volta	TMD a	TMD and Micrologic 5 A-Z trip units				
	Performance	В	F	N	Н	
250 V / 500 V	Icu (kA)	25	36	50	70	

### **Protection**

### TM-D thermal-magnetic trip units



The 16 Hz 2/3 frequency does not modify the thermal settings with respect to those at 50 Hz (see page A-17). The magnetic pick-ups are modified as shown below.

### Magnetic protection for Compact NSX 100/160/250 at 50 Hz and at 16 Hz 2/3

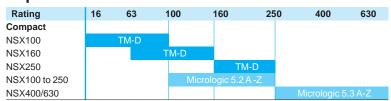
Rating (A) In	16	25	32	40	50	63	80	100	125	160	200 250	
Pick-up (A) Im accur. ±20%		Fixe	d									Adjustable
NSX100	50Hz	190	300	400	500	500	500	640	800			
	16Hz 2/3	170	270	360	450	450	450	580	<b>720</b>			
NSX160/250	50Hz	190	300	400	500	500	500	640	800	1250	1250	5 to 10 ln
	16 Hz 2/3	170	270	360	450	450	450	580	720	1100	1100	4.5 to 9 ln

### Micrologic 5 A-Z trip units

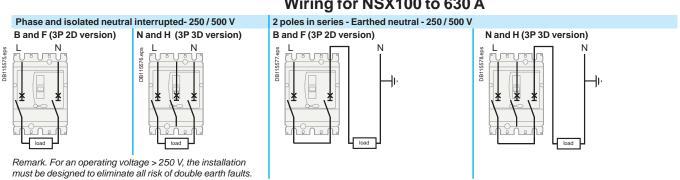


Micrologic 5.2 A-Z and 5.3 A-Z are dedicated to 16 Hz 2/3 networks. They use a suitable sampling frequency. The protection settings are identical to those of Micrologic 5 A (see page A-21). They also offer a current-measurement function for this specific frequency.

### Trip-unit selection



### Wiring for NSX100 to 630 A



# Special applications

### Protection of 400 Hz systems

Compact NSX circuit breakers may be used on 400 Hz systems.

### 400 Hz distribution systems

The main 400 Hz applications are in aeronautics and certain military ships. Modern aircraft have three-phase 115/200 V 400 Hz networks.

### Impact on protective devices

Due to the higher frequency, circuit breakers are subjected to additional temperature rise for identical current levels, resulting from higher losses caused by Foucault currents and an increase in the skin effect (reduction in the useful CSA of conductors). To remain within the rated temperature-rise limits of devices, current derating is required.

The power levels of 400 Hz applications rarely exceed a few hundred kW with relatively low short-circuit currents, generally not exceeding four times the rated current.

The standard Compact NSX and Masterpact NT/NW ranges are suitable for 400 Hz applications if derating coefficients are applied to the protection settings. See the derating table below.

# Breaking capacity of Compact NSX circuit breakers in 400 Hz, 440 V systems

Circuit breaker	Breaking capacity Icu
NSX100	10 kA
NSX160	10 kA
NSX250	10 kA
NSX400	10 kA
NSX630	10 kA



Micrologic TM-D trip unit.

# Trip units equipped with thermal-magnetic protection

The 400 Hz current settings are obtained by multiplying the 50 Hz values by the following adaptation coefficient:

- K1 for thermal trip units
- K2 for magnetic trip units.

These coefficients are independent of the trip-unit setting.

### Thermal trip units

The current settings are lower at 400 Hz than at 50 Hz (K1 < 1).

### Magnetic trip units

The current settings are conversely higher at 400 Hz than at 50 Hz (K2 > 1). Consequently, when the trip units are adjustable, they must be set to the minimum value.

### Adaptation coefficients for thermal-magnetic trip units

Circuit	Trip unit	In (A)	Therm	al at 40°C	Im (A)	Magnetic		
breaker		50Hz	K1	400 Hz	50Hz	K2	400 Hz	
NSX100	TM16G	16	0.95	15	63	1.6	100	
	TM25G	25	0.95	24	80	1.6	130	
	TM40G	40	0.95	38	80	1.6	130	
	TM63G	63	0.95	60	125	1.6	200	
NSX100	TM16D	16	0.95	15	240	1.6	300	
	TM25D	25	0.95	24	300	1.6	480	
	TM40D	40	0.95	38	500	1.6	800	
	TM63D	63	0.95	60	500	1.6	800	
	TM80D	80	0.9	72	650	1.6	900	
	TM100D	100	0.9	90	800	1.6	900	
NSX250	TM100D	100	0.9	90	800	1.6	900	
	TM160D	160	0.9	144	1250	1.6	2000	
	TM200D	200	0.9	180	1000 to 2000	1.6	1600 to 3200	
	TM250D	250	0.9	225	1250 to 2500	1.6	2000 to 4000	

### Example

NSX100 equipped with a TM16G with 50 Hz settings  $Ir=16\,A$  and  $Im=63\,A$ . 400 Hz settings  $Ir=16\,x$  0.95 = 15 A and  $Im=63\,A$  x 1.6 = 100 A.



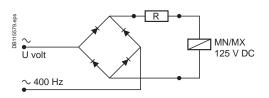
Micrologic 5 E trip unit.



OF auxiliary contact



MX or MN voltage release.



Wiring diagram.



SDx remote indication relay module with its terminal block.

### Protection (cont.)

### Micrologic electronic trip units

Micrologic 2.2, 2.3 or 5.2, 5.3 with A or E measurement functions are suitable for 400 Hz. The use of electronics offers the advantage of greater operating stability when the frequency varies. However the units are still subject to temperature rise caused by the frequency.

The practical consequences are:

- limit settings: see the Ir derating table below
- the long-time, short-time and instantaneous pick-ups are not modified (see page A-19 or page A-21)
- the accuracy of the displayed measurements is 2 % (class II).

### Thermal derating: maximum Ir setting

Circuit breaker	Maximum setting coefficient	Max. Ir setting at 400 Hz
NSX100	1	100
NSX250	0.9	225
NSX400	0.8	320
NSX630	0.8	500

### Example

An NSX250N, equipped with a Micrologic 2.2, Ir = 250 A at 50 Hz, must be limited to use at  $Ir = 250 \times 0.9 = 225 \text{ A}$ .

Its short-time pick-up with fixed time delay is adjustable from 1.5 to 10 Ir (60 to 400 A). The instantaneous pick-up remains at 3000 A.

### OF auxiliary contacts in 400 Hz networks

Electrical characteristics of auxiliary contacts

Contacts		Standard	t	Low leve	ıl
Utilisation cat. (IEC 60947-5-1)		AC12	AC15	CA12	CA15
Operational current	24 V	6	6	5	3
(A)	48 V	6	6	5	3
	110 V	6	5	5	2.5
	220/240 V	6	4	5	2
	380/415 V	6	2	5	1.5

# MN and MX voltage releases for Compact NSX100/630 at 400 Hz and 440 V

For circuit breakers on 400 Hz systems, only 125 V DC MN or MX releases may be used. The release must be supplied by the 400 Hz system via a rectifier bridge (to be selected from the table below) and an additional resistor with characteristics depending on the system voltage.

U (V) 400 Hz	Rectifier	Additional resistor
220/240 V	Thomson 110 BHz or	4.2 kΩ-5 W
	General Instrument W06 or	
	Semikron SKB at 1.2/1.3	
380/420 V	Semikron SKB at 1.2/1.3	10.7 kΩ-10 W

Note: other models of rectifier bridges may be used if their characteristics are at least equivalent to those stated above.

### SDx indication contacts

The SDx module may be used in 400 Hz systems for voltages from 24 to 440 V. An SDx relay module installed inside the circuit breaker can be used to remote the overload-trip signal.

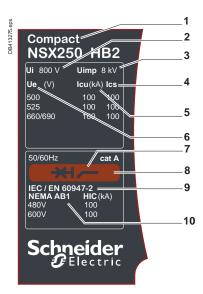
This module receives the signal from the Micrologic electronic trip unit via an optical link and makes it available on the terminal block. The signal is cleared when the circuit breaker is closed.

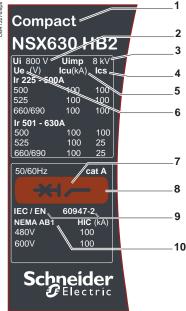
These outputs can be reprogrammed to be assigned to other types of tripping or alarm (see page A-85).

# **Special applications**

# Protection of 440 - 690 V applications

Compact NSX HB circuit breaker is designed specifically for the needs of systems operating at 440 to 690 V.





Standardised characteristics indicated on the rating plate:

- 1 Type of device: frame size and breaking capacity class.
- Ui: rated insulation voltage.
- 3 Uimp: rated impulse withstand voltage.
- 4 Ics: service breaking capacity.
- 5 Icu: ultimate breaking capacity for various values of the rated operational voltage Ue.
- 6 Ue: operational voltage.
- 7 Circuit breaker-disconnector symbol.
- 8 Colour label indicating the breaking capacity class.
- 9 Reference standard.
- 10 Main standards with which the device complies.

### 440-690 V applications

There are three new breaking capacities: R, HB1, and HB2.

### **Markets**

- Marine.
- Oil and gas.
- Data centers.
- Other markets pursuing energy efficiency (water, industrial, etc.).

### Ability to service high power densities

- Upgrade voltage from ~415-440 to 690 V system allows:
- □ smaller cables can be used
- reduced cost and space
- reduced energy loss in transmission
- □ motors are more efficient at 690 V.
- Consider 690 V as an alternative MV system:
- □ lower cost, smaller footprint, and improved maintenance.

### Safety

- IACS (International Association of Classification Societies) change, requires Ics rating for emergency systems:
- □ key influence on Marine systems of high Ics ratings
- □ continuity of service after 3 faults.

### **Technology**

- Best in class technology and performance:
- □ high breaking capacity
- □ NSX family consistency of energy metering, alarming and diagnosis.
- Provides alternative to fuse protection at 440 690 V applications.

### **Enhancing solutions**

- Using smaller frames for 440-690 V high performance circuits:
- □ space and cost benefit
- □ NSX family consistency with same NSX accessories.
- 200 kA breaking capacity on R rating will be mainly used for:
- □ high power factor applications : around 2.8 instead of 2.2
- □ selectivity with Masterpact UR.

### Type I & II coordination for motor applications

- Type I & II coordination with Tesys contactors is available up to 690 V.
- Coordination tables are prepared with external overload relays and protection integrated into the Micrologic trip units.
- See complementary bulletin for ratings.

### Compliance with standards

Compact NSX circuit breakers and auxiliaries comply with the following:

- international recommendations:
- □ IEC 60947-1: general rules
- □ IEC 60947-2: circuit breakers
- □ IEC 60947-3: switch-disconnectors
- □ IEC 60947-4: contactors and motor starters
- □ IEC 60947-5.1 and following: control circuit devices and switching elements; automatic control components
- European (EN 60947-1 and EN 60947-2) and corresponding national standards:
- □ France NF
- □ Germany VDE
- □ United Kingdom BS
- □ Australia AS
- □ Italy CEI
- the specifications of the marine classification companies (Veritas, Lloyd's Register of Shipping, Det Norske Veritas, etc.), standard NF C 79-130 and recommendations issued by the CNOMO organisation for the protection of machine tools.

For U.S. UL, Canadian CSA, Mexican NOM and Japanese JIS standards, please consult us.

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

Ci	rcuit breal	cers	NSX1	00-250	1)	NSX	100		NSX	630				
	eaking capac		R	HB1	HB2	R	HB1	HB2	R	HB1	HB2	R	HB1	HB2
	ectrical chara	•				-								
Bre	aking capacity	/ (kA rms)							Ir < 500	A		Ir > 501	A	
lcu	AC 50/60 Hz	220/240 V	200	-	-	200	-	-	200	-	-	200	-	-
		380/415 V	200	-	-	200	-	-	200	-	-	200	-	-
		440 V	200	-	-	200	-	-	200	-	-	200	-	-
		500 V	80	85	100	80	85	100	80	85	100	80	85	100
		525 V	65	80	100	65	80	100	65	80	100	65	80	100
		690 V	45	75	100	45	75	100	45	75	100	45	75	100
Ser	vice breaking	capacity (kA	rms)						Ir < 500	Α		Ir > 501	Α	
lcs	AC 50/60 Hz	220/240 V	200	-	-	200	-	-	200	-	-	200	-	-
		380/415 V	200	-	-	200	-	-	200	-	-	200	-	-
		440 V	200	-	-	200	-	-	200	-	-	200	-	-
		500 V	80	85	100	80	85	100	80	85	100	80	85	100
		525 V	65	80	100	65	80	100	65	80	100	-	-	-
		690 V	45	75	100	45	75	100	45	75	100	-	-	-

<sup>(1)</sup> There is no 160 A frame, use the 250 A frame with lower amperage trip units.

### Offer structure

The Compact NSX HB offer has some differences compared to the standard NSX offer.

- $\blacksquare$  100 A frame and 250 A frame, there is no 160 A frame. The 125 160 A trip units are used in a 250 A frame.
- All R, HB1, and HB2 circuit breakers are restricted for use as line-load connection. They can not have power fed into the bottom of the circuit breaker. They will be marked with Line and Load markings.
- All trip units will be installed at the factory.

Type of protection		Distribution protect	tion	Motor protection		
		TMD	Micrologic	MA	Micrologic	
PB110106_40.eps	Compact NSX100	40-100	2.2: 40-100 5.2 E: 40-100 6.2 E: 40-100	12.5-100	2.2 M: 25, 50, 100 6.2 E-M: 25, 50, 100	
	Compact NSX250	125-250	2.2: 100, 160, 250 5.2 E: 100, 160, 250 6.2 E: 100, 160, 250	150, 220	2.2 M: 150, 220 6.2 E-M: 150, 220	
PB111001_444 eps	Compact NSX400	-	2.3: 250, 400 5.3 E: 250, 400 6.3 E: 250, 400	-	1.3 M: 320 2.3 M: 320 6.3 M: 320	
	Compact NSX630		2.3: 630 5.3 E: 630 6.3 E: 630		1.3 M: 500 2.3 M: 500 6.3 M: 500	

# **Switch-disconnectors**

# Overview of applications

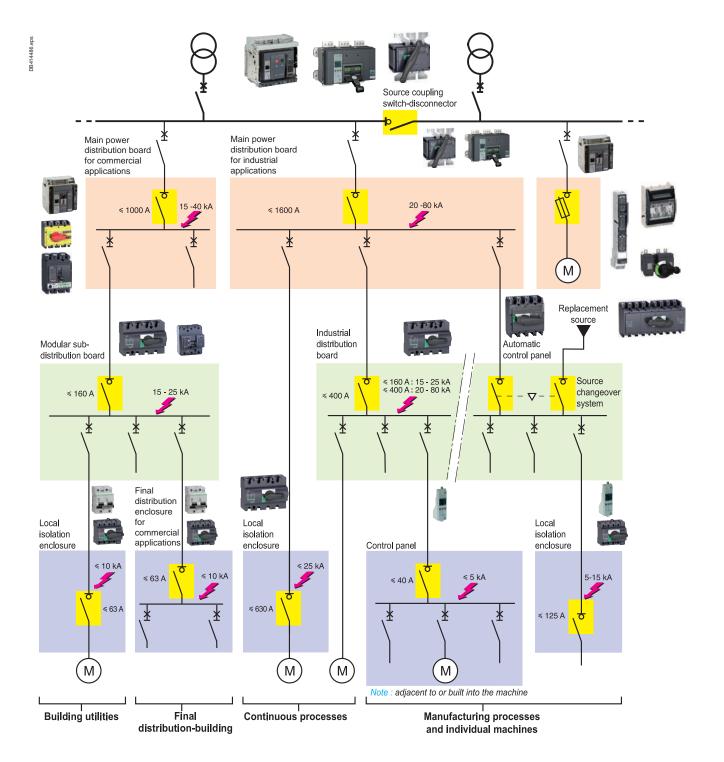
A switch-disconnector is a control device that can be used to open and close a circuit under normal operating conditions.

It is suitable for isolation as indicated on the front by the symbol

### Position of switch-disconnectors

Compact NSX switch-disconnectors are used primarily for the following applications:

- busbar coupling and isolation
- isolation of industrial distribution boards and industrial control panels
- isolation of subdistribution boards for modular devices
- isolation of local enclosures
- isolation of final distribution enclosures for commercial applications
- industrial control panel switch-disconnectors.



### Switch-disconnector functions

Compact NSX100 to 630 NA switch-disconnectors are available in fixed, plug-in and withdrawable versions. They use the same accessories and offer the same connection possibilities as the circuit-breaker versions. They may be interlocked with another Compact switch-disconnector or circuit breaker to form a source-changeover system.



Compact NSX switch-disconnector.



Compact NSX switch-disconnector equipped with a motor mechanism module.



Compact NSX switch-disconnector equipped with a Vigi module.

# Suitability for isolation with positive contact indication

Compact NSX switch-disconnectors are suitable for isolation as defined by standard IEC 60947-3. The corresponding conformity tests guarantee:

- the mechanical reliability of the position indication, i.e. the O (OFF) position indicated by the control device always reflects the open position of the contacts:
- ☐ the required distance between contacts is provided
- □ padlocks may not be installed unless the contacts are open
- the absence of leakage currents
- overvoltage withstand capacity between upstream and downstream connections. Installation of a rotary handle or a motor mechanism does not alter the reliability of the position-indication system.

### **Emergency-off function**

A Compact NSX NA is combined with an MN or MX release connected to an emergency-off button. In an emergency, an operator at a remote location can interrupt the circuit at rated load to isolate the entire switchboard and the downstream loads.

### **Motor mechanism**

Compact NSX NA devices equipped with a motor mechanism module enable remote closing and opening. This function may be combined with the emergency-off function. In this case, the emergency off function is combined with a closing lock-out that must be intentionally reset (electrical diagram with closing lock-out).

### Earth-leakage protection

A Vigi module may be added to a switch-disconnector to monitor all leakage currents in the outgoing circuits of the switchboard on which the switch-disconnector is installed. When the Vigi module detects an earth-leakage current, the switch-disconnector interrupts the load current. This function may be combined with the motor mechanism and the emergency-off function using an MN or MX release.

### **Switch-disconnector protection**

The switch-disconnector can make and break its rated current. For an overload or a short-circuit, it must be protected by an upstream device, in compliance with installation standards.

The circuit-breaker/switch-disconnector coordination tables determine the required upstream circuit breaker. However, due to their high-set magnetic release, Compact NSX100 to 630 A switch-disconnectors are self-protected.

### Switch-disconnector utilisation category

Depending on the rated operational current and the mechanical durability (A for frequent operation or B for infrequent operation), standard IEC 60947-3 defines the utilisation categories as shown in the table below. Compact NSX NA switch-disconnectors comply with utilisation categories AC22A or AC23A.

Utilisation categories		Characteristics
Frequent operation	Infrequent operation	
AC-21B	AC-21A	Switching of resistive loads including moderate overloads (cos $\phi$ = 0.95)
AC-22B	AC-22A	Switching of mixed resistive and inductive loads, including moderate overloads (cos $\phi$ = 0.65)
AC-23B	AC-23A	Switching of motor loads or other highly inductive loads (cos $\phi$ = 0,45 or 0,35)

# Functions and characteristics

# **Switch-disconnectors**

## Characteristics and performance of Compact NSX switch-disconnectors from 100 to 630 NA

Installation standards require upstream protection. However Compact NSX100 to 630 NA switch-disconnectors are self-protected by their high-set magnetic release.

# Scheduler Schedu

Compact NSX100 to 250 NA.



Compact NSX400 to 630 NA.

**Common characteristics** Rated voltages Insulation voltage (V) Ui 800 Impulse withstand voltage (kV) Uimp 8 Operational voltage (V) AC 50/60 Hz 690 Suitability for isolation IEC/EN 60947-3 yes Utilisation category AC 22 A/AC 23 A - DC 22 A/DC 23 A Pollution degree IEC 60664-1

Switch-disconnectors					
Electrical characteristics as p	er IEC 6094	7-3 and EN	60947-3		
Conventional thermal current (A)	Ith 60 °C				
Number of poles					
Operational current (A) depending on	le	AC 50/60 Hz	Z		
the utilisation category			220/240 V		
			380/415 V		
			440/480 V (2)		
			500/525 V		
			660/690 V		
		DC			
			250 V (1 pole)		
			500 poles (2 poles in	series)	
			750 V (3 poles in serie	es)	
Short-circuit making capacity	lcm	min. (switch-	-disconnector alone)		
(kA peak)		max. (protection by upstream circuit breaker)			
Rated short-time withstand current	lcw	for	1 s		
(Arms)			3 s		
			20 s		
Durability (C-O cycles)	mechanical				
	electrical	AC			
			440 V	In/2	
				In	
			690 V	In/2	
				In	
		DC	250 V (1 pole) and	In/2	
			500 V (2 poles in serie	es)In	
Positive contact indication					
Pollution degree					
Protection					
Add-on earth-leakage protection	By Vigi mod	ule			
	By Vigirex re	elay			
Additional indication and con	trol auxiliar	ies			
Indication contacts					
Voltages releases	MX shunt re	lease			
	MN undervo	ltage release			
Voltage-presence indicator					
0 (					

risdiation monitoring module	
Remote communication	by bus

Device-status indication

Device remote operation

Current-transformer module Ammeter module

Operation counter

Installation / connections		
Dimensions (mm)	fixed, front connections	2/3P
WxHxD		4P
Weight (kg)	fixed, front connections	3P
		4P

### Source-changeover systems (see chapter on Source-changeover systems)

Manual source-changeover systems

Remote-operated or automatic source-changeover systems

(1) 2P in 3P case. (2) Suitable for 480 V NEMA.

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

NSX100NA	NSX160NA	NSX250NA	NSX400NA	NSX630NA
100	160	250	400	630
2(1), 3, 4	2(1), 3, 4	2 (1), 3, 4	3, 4	3, 4
AC22A/AC23A	AC22A / AC23A	AC22A/AC23A	AC22A/AC23A	AC22A / AC23A
100	160	250	400	630
100	160	250	400	630
100	160	250	400	630
100	160	250	400	630
100	160	250	400	630
DC22A/DC23A	DC22A / DC23A	DC22A / DC23A	-	-
100	160	250	-	-
100	160	250	-	-
100	160	250	-	-
2.6	3.6	4.9	7.1	8.5
330	330	330	330	330
1000	2500	2500	5000	6000
1800	2500	3500	5000	6000
1800	2500	3500	5000	6000
690	960	1350	1930	2320
50000	40000	20000	15000	15000
AC22A/AC23A	AC22A / AC23A	AC22A/AC23A	AC22A/AC23A	AC22A / AC23A
35000	30000	15000	10000	6000
20000	15000	7500	5000	3000
15000	10000	6000	5000	3000
8000	5000	3000	2500	1500
10000	10000	10000	-	-
5000	5000	5000	-	-
	•	•	•	•
3	3	3	3	3
•			•	
•			•	
			•	
			•	
•			•	
			•	
•			•	
			•	
			•	
			-	
•			•	
•			-	
105 x 161 x 86			140 x 255 x 110	
140 x 161 x 86			185 x 255 x 110	
1.5 to 1.8			5.2	
2.0 to 2.2			6.8	
•			•	

# Functions and characteristics

# Source-changeover systems Presentation

Some installations use two supply sources to counter the temporary loss of the main supply.

A source-changeover system is required to safely switch between the two sources.

The replacement source can be a generator set or another network.





### Service sector

- hospital operating rooms
- safety systems for tall buildings
- computer rooms (banks, insurance companies, etc.)
- lighting systems in shopping centres, etc.



### Industry:

- assembly lines
- engine rooms on ships
- critical auxiliaries in thermal power stations, etc.



### Infrastructures:

- runway lighting systems
- port and railway installations
- control systems for military installations, etc.

### Manual source changeover

This is the most simple system. It is controlled manually by a maintenance technician and consequently the time required to switch from the normal source to the replacement source can vary.

A manual source-changeover system is made up of:

- two devices (circuit breakers or switch-disconnectors) controlled manually
- mechanical interlocking.

The interlock prevents connection to both sources at the same time, even momentarily.

### Remote-operated source-changeover systems

This is the most commonly employed system. No human invention is required. The transfer from the normal to the replacement source is controlled electrically. A remote-operated source-changeover system is made up of two circuit breakers or switch-disconnectors equipped with motor mechanisms and:

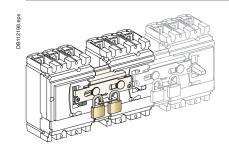
- an electrical interlocking system implemented in a number of manners
- a mechanical interlocking system that protects against the consequences of an electrical malfunction and prevents incorrect manual operation.

### **Automatic source-changeover systems**

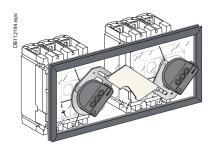
An automatic controller may be added to the remote-operated source-changeover system for automatic source control according to programmable operating modes. This solution ensures optimum energy management:

- switching to a replacement source depending on external requirements
- source management
- load shedding
- emergency source replacement, etc.

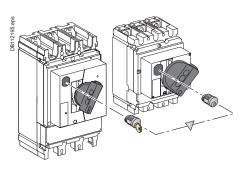
### Manual source-changeover systems



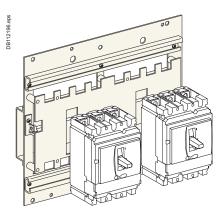
Interlocking of two or three toggle-controlled devices.



Interlocking of two devices with rotary handles.



Interlocking with keylocks



Interlocking on a base plate.

# Interlocking of two or three toggle-controlled devices

### Interlocking system

Two devices can be interlocked using this system. Two identical interlocking systems can be used to interlock three devices installed side by side.

Authorised positions:

- one device closed (ON), the others open (OFF)
- all devices open (OFF).

The system is locked using one or two padlocks (shackle diameter 5 to 8 mm).

This system can be expanded to more than three devices.

There are two interlocking-system models:

- one for Compact NSX100 to 250
- one for Compact NSX400/630.

### **Combinations of Normal and Replacement devices**

All toggle-controlled fixed or plug-in Compact NSX100 to 630 circuit breakers and switch-disconnectors of the same frame size can be interlocked. The devices must be either all fixed or all plug-in versions.

### Interlocking of two devices with rotary handles

### Interlocking system

Interlocking involves padlocking the rotary handles on two devices which may be either circuit breakers or switch-disconnectors.

Authorised positions:

- one device closed (ON), the other open (OFF)
- both devices open (OFF).

The system is locked using up to three padlocks (shackle diameter 5 to 8 mm). There are two interlocking-system models:

- one for Compact NSX100 to 250
- one for Compact NS400/630.

### **Combinations of Normal and Replacement devices**

All rotary-handle fixed or plug-in Compact NSX100 to 630 circuit breakers and switch-disconnectors of the same frame size can be interlocked. The devices must be either all fixed or all plug-in versions.

# Interlocking of a number of devices using keylocks (captive keys)

Interlocking using keylocks is very simple and makes it possible to interlock two or more devices that are physically distant or that have very different characteristics, for example medium-voltage and low-voltage devices or a Compact NSX100 to 630 circuit breaker and switch-disconnector.

### Interlocking system

Each device is equipped with an identical keylock and the key is captive on the closed (ON) device. A single key is available for all devices. It is necessary to first open (OFF position) the device with the key before the key can be withdrawn and used to close another device.

A system of wall-mounted captive key boxes makes a large number of combinations possible between many devices.

### **Combinations of Normal and Replacement devices**

All rotary-handle Compact NSX100 to 630 circuit breakers and switch-disconnectors can be interlocked between each other or with any other device equipped with the same type of keylock.

### Interlocking of two devices on a base plate

### Interlocking system

A base plate designed for two Compact NSX devices can be installed horizontally or vertically on a mounting rail. Interlocking is carried out on the base plate by a mechanism located behind the devices. In this way, access to the device controls and trip units is not blocked.

### **Combinations of Normal and Replacement devices**

All rotary-handle and toggle-controlled Compact NSX100 to 630 circuit breakers and switch-disconnectors can be interlocked. Devices must be either all fixed or all plug-in versions, with or without earth-leakage protection or measurement modules. An adaptation kit is required to interlock:

- two plug-in devices
- a Compact NSX100-250 with an NSX400-630.

Connection to the downstream installation can be made easier using a coupling accessory (see next page).

# Functions and characteristics

# Source-changeover systems

Remote-operated and automatic sourcechangeover systems Coupling accessory on base plate

Remote-operated source-changeover system.

# 3 1 2 5 5

- 1 Circuit breaker QN equipped with a motor mechanism and auxiliary contacts, connected to the Normal source
- 2 Circuit breaker QR equipped with a motor mechanism and auxiliary contacts, connected to the Replacement source
- 3 Base plate with mechanical interlocking
- 4 Electrical interlocking unit IVE
- 5 Coupling accessory (downstream connection)

### Remote-operated systems

It is made up of two devices with motor mechanisms, mounted on a base plate and combined with:

- an electrical interlocking unit
- optional mechanical interlocking system.

### Electrical interlocking unit (IVE)

Interlocks two devices equipped with motor mechanisms and auxiliary contacts. The IVE unit is mandatory to ensure the necessary time-delays required for safe switching.

### Mechanical interlocking system

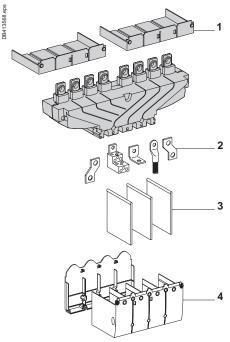
The mechanical interlocking system is strongly recommended to limit the effects of design or wiring errors and to avoid manual switching errors.

### **Automatic systems**

An automatic controller can manage switching from one source to the other. The controller can be:

- a device provided by the customer
- an integrated BA controller
- an integrated UA controller.

An integrated BA or UA automatic controller manages source transfer according to user-selected sequences that can include source priorities, start-up of a generator, return to the Normal source, etc. An ACP auxiliaries control plate facilitates installation of the BA and UA controllers. The plate includes two circuit breakers to protect the control circuits and two contactors to control the motor mechanisms of the devices.



Standard device accessories may be used for the coupling accessory on the base plate.

### Coupling accessory on base plat

This accessory may be used with a manual or remote-operated source-changeover system (with or without an automatic controller). It respects the mounting distance between the devices secured to the ACP plate and provides downstream coupling of the two sets of busbars. It is compatible with standard device accessories. The short terminal shields of the device can be installed on the upstream connectors of the coupling accessory. Downstream, it is possible to use the connection accessories and the long or short terminal shields of the device.

- 1 Short terminal shields
- 2 Terminals
- 3 Interphase barriers
- 4 Long terminal shields

By combining a remote-operated source-changeover system with an integrated BA or UA automatic controller, it is possible to automatically control source transfer according to user-selected sequences.



BA controller.



UA controller.



Auxiliary control plate for a BA or UA controller.

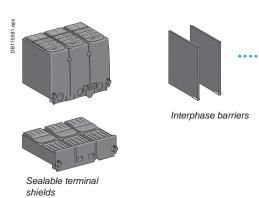
### Functions of the BA and UA controllers

Controller	o BA a			0110	BA		JA
Compatible circuit break	(OFO						
·	kers					Compact NSX100 to 630 ircuit breakers	
4-position switch							
Automatic operation							
Forced operation on No							
Forced operation on Re							
Stop (both Normal and F	Replacement so	urces OF	·F)		_		
Automatic operation							
Monitoring of the Norma source to the other	al source and au	tomatic ti	ransfer fro	om one	•		
Engine generator set sta	art-up control						
Delayed shutdown (adju	ustable) of engir	ne genera	tor set				
Load shedding and reco	nnection of non	-priority l	oads				
Transfer to Replacement is absent	nt source if one o	of the Nor	mal sour	ce phases	3	ı	
Test							
By opening the P25M ci	rcuit breaker up	stream of	f the cont	roller			
By pressing the test butt	ton on the front	of the con	troller				
Indications							
Circuit-breaker status in OFF, fault trip	dication on the	front of th	e control	er: ON,	•	•	
Automatic-mode indicat	ion contact						
Other functions							
Selection of type of Norr (single-phase or three-p						ı	
Voluntary transfer to Re	placement sour	се				ı	
Forced operation on No operational	rmal source if R	eplaceme	ent sourc	e is not		ı	
Additional test contact (I Transfer to Replacemen (e.g. for a UR frequency	nt source only if		losed		•	•	
Setting of maximum star	rt-up time for the	Replace	ement-so	urce			
Power supply							
Control voltages (1)		220 to 2	240 V 50/	60 Hz		-	
		380 to 4	60 Hz		- 1		
		440 V 6	0 Hz			-	•
Operating thresholds	S						
Undervoltage		0.35 Un	≤voltag	e ≤ 0.7 Ur	n <b>=</b>	-	
Phase failure		0.5 Un \$	≤ voltage	≤ 0.7 Un			
Voltage presence			≥ 0.85 U				•
Characteristics of ou	tput contacts (						
Rated thermal current (A	•	8		-			
Minimum load		10 mA a	at 12 V				
		AC				DC	
Utilisation category (IEC	60947-5-1)	AC12	AC13	AC14	AC15	DC12	DC13
Operational current (A)		8	7	5	6	8	2
	48 V	8	7	5	5	2	-
	110 V	8	6	4	4	0.6	-
	220/240 V	8	6	4	3	-	-
	250 V	-	-	-	-	0.4	-
	380/415 V	5	-	-	-	-	-
	440 V	4	-	-	-	-	-
	660/690 V	-	-	-	-	-	-

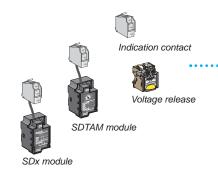
<sup>(1)</sup> The controller is powered by the ACP control plate. The same voltage must be used for the ACP plate, the IVE unit and the circuit-breaker operating mechanisms. If this voltage is the same as the source voltage, then the "Normal" and "Replacement" sources can be used directly for the power supply. If not, an isolation transformer must be used.

Overview of Compact NSX100 to 630 fixed version

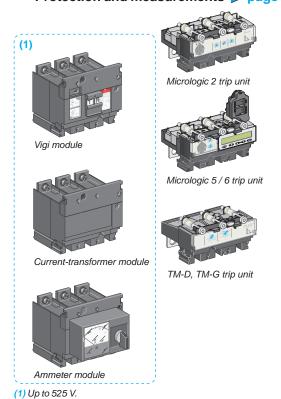
### Insulation accessories **▶** page A-77



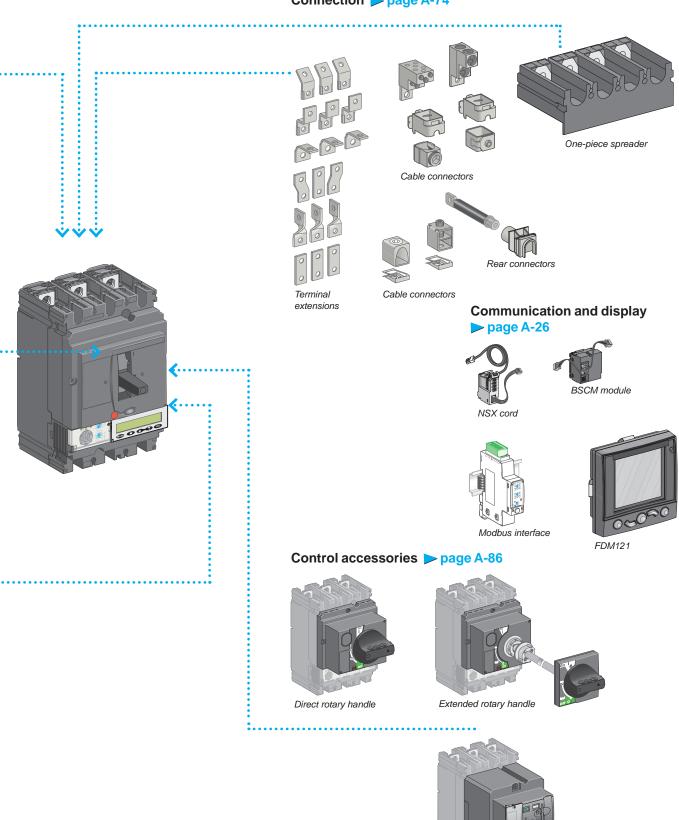
### Electrical auxiliaries **▶** page A-84



### Protection and measurements **▶** page A-90



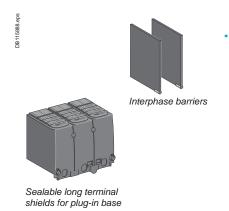
### Connection **▶** page A-74



Motor mechanism

Overview of Compact NSX100 to 630 plug-in and withdrawable versions

### Insulation accessories **▶** page A-77

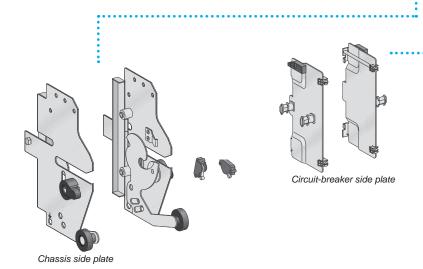


### Electrical accessories **▶** page A-82

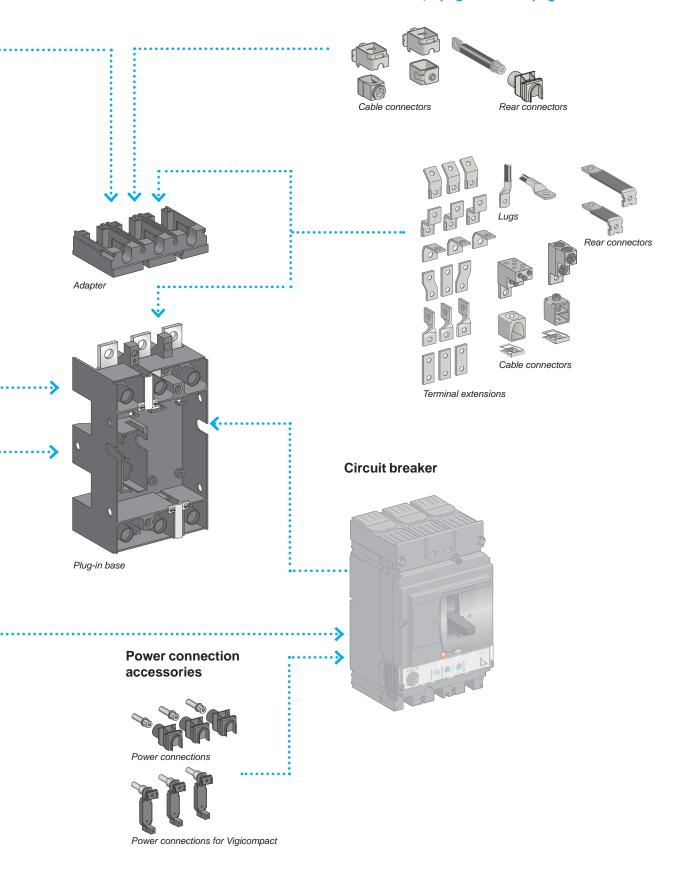




### Mechanical accessories **▶** page A-73



### Connection **▶** page A-74 and page A-76



### Device installation

Compact NSX circuit breakers may be installed horizontally, vertically or flat on their back, without derating performance levels.

There are three installation versions:

- fixed
- plug-in (on a base)
- withdrawable (on a chassis).

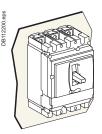
For the last two, components must be added (base, chassis) to the fixed version.

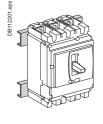
Many connection components are shared by the three versions.

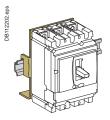
# Fixed circuit breakers Fixed circuit breakers are designed

Fixed circuit breakers are designed for standard connection using bars or cables with lugs. Bare-cable connectors are available for connection to bare copper or aluminium cables.

For connection of large cables, a number of solutions with spreaders may be used for both cables with lugs or bare cables.



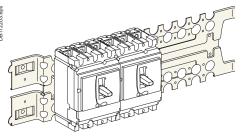


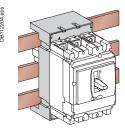


Mounting on a backplate.

Mounting on rails.

Mounting on DIN rail (with adapter).





Mounting on a Prisma mounting plate.

Mounting on busbars with an adapter.



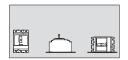
Fixed Compact NSX250.



Installation positions.

# Seguenter Seguenter

Plug-in Compact NSX250.



Installation positions.

### Plug-in circuit breakers

The plug-in version makes it possible to:

- extract and/or rapidly replace the circuit breaker without having to touch the connections on the base
- allow for the addition of future circuits by installing bases that will be equipped with a circuit breaker at a later date
- isolate the power circuits when the device is mounted on or through a panel. It acts as a barrier for the connections of the plug-in base. Insulation is made complete by the mandatory short terminal shields on the device. The degrees of protection are:
- □ circuit breaker plugged in = IP4
- □ circuit breaker removed = IP2
- $\Box$  circuit breaker removed, base equipped with shutters = IP4.

### Parts of a plug-in configuration

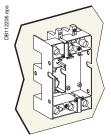
A plug-in configuration is made by adding a "plug-in kit" to a fixed device. To avoid connecting or disconnecting the power circuits under load conditions, a safety trip causes automatic tripping if the device is ON, before engaging or withdrawing it. The safety trip, supplied with the kit, must be installed on the device. If the device is disconnected, the safety trip does not operate. The device can be operated outside the switchboard.

### **Accessories**

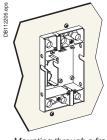
Optional insulation accessories are available.

- Terminal shields to protect against direct contact.
- Interphase barriers to reinforce insulation between phases and protect against direct contact.

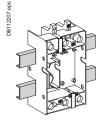
### Mounting



Mounting on a backplate



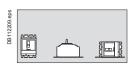
Mounting through a front panel.



Mounting on rails.



Withdrawable Compact NSX250.



Installation positions.







Disconnected.



Removed.

### Withdrawable circuit breakers

In addition to the advantages provided by the base, installation on a chassis facilitates handling. It offers three positions, with transfer from one to the other after mechanical unlocking:

- connected: the power circuits are connected
- disconnected: the power circuits are disconnected, the device can be operated to check auxiliary operation
- removed: the device is free and can be removed from the chassis.

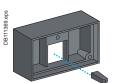
### Parts of a withdrawable configuration

A withdrawable configuration requires two side plates installed on the base and two sides plates mounted on the circuit breaker. Similar to the plug-in version, a safety trip causes automatic tripping if the device is ON, before engaging or withdrawing it, and enables device operation in the disconnected position.

### Accessories

Accessories are the same as for the base, with in addition:

- auxiliary contacts for installation on the fixed part, indicating the "connected" and "disconnected" positions
- locking by 1 to 3 padlocks (shackle diameter 5 to 8 mm), to:
- □ prevent insertion for connection
- □ lock the circuit breaker in connected or disconnected position
- toggle collar for circuit breakers with a toggle mounted through a front panel, intended to maintain the degree of protection whatever the position of the circuit breaker (supplied with a toggle extension)
- telescopic shaft for extended rotary handles. The door can then be closed with the device in the connected and disconnected positions.

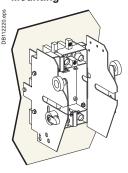


Protection collar for toggle and toggle extension to provide IP4 in the connected and disconnected positions.

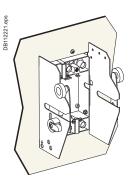


Telescopic shaft.

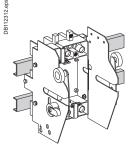
### Mounting



Mounting on a backplate.



Mounting through a front

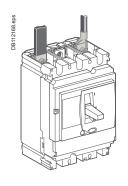


Mounting on rails.

### Connection of fixed devices

Fixed circuit breakers are designed for standard front connection using bars or cables with lugs.

Cable connectors are available for bare cables. Rear connection is also possible.





Insulated bar.



Small lug for copper cables.



Small lug for Al cables.



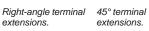




Straight terminal

extensions.









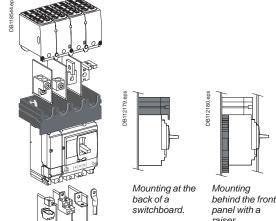




Edgewise terminal extensions.

Double-L terminal extensions

Spreaders.



### Front connection

### Bars or cables with lugs

### Standard terminals

Compact NSX100 to 630 come with terminals comprising snap-in nuts with screws:

- Compact NSX100: M6 nuts and screws. Compact NSX160/250: M8 nuts and screws
- Compact NSX400/630: M10 nuts and screws.

These terminals may be used for:

- direct connection of insulated bars or cables with lugs
- terminal extensions offering a wide range of connection possibilities.

Interphase barriers or terminal shields are recommended. They are mandatory for certain connection accessories (in which case the interphase barriers are provided).

When the switchboard configuration has not been tested, insulated bars are mandatory.

### Maximum size of bars

Compact NSX circui	t breaker	100/160/250	400/630
Without spreaders	pitch (mm)	35	45
	maximum bar size (mm)	20 x 2	32 x 6
With spreaders	pitch (mm)	45	52.5
	maximum bar size (mm)	32 x 2	40 x 6

### Crimp lugs

There are two models, for aluminium and copper cables.

It is necessary to use narrow lugs, compatible with device connections. They must be used with interphase barriers or long terminal shields. The lugs are supplied with interphase barriers and may be used for the types of cables listed below.

### Cable sizes for connection using lugs

Compact NSX circu	it breaker	100/160/250 400/630
Copper cables	size (mm²)	120, 150, 185 240, 300
	crimping	hexagonal barrels or punching
Aluminium cables	size (mm²)	120, 150, 185 240, 300
	crimping	hexagonal barrels

### **Terminal extensions**

Extensions with anti-rotation ribs can be attached to the standard terminals to provide numerous connection possibilities in little space:

- straight terminal extensions
- right-angle terminal extensions
- edgewise terminal extensions
- double-L extensions
- 45° extensions.

### **Spreaders**

Spreaders may be used to increase the pitch:

- NSX100 to 250: the 35 mm pitch can be increased to 45 mm
- NSX400/630: the 45 mm pitch can be increased to 52 or 70 mm.

Bars, cable lugs or cable connectors can be attached to the ends.

### One-piece spreader for NSX100 to 250

Connection of large cables may require an increase in the distance between the device terminals.

The one-piece spreader is the means to:

- increase the 35 mm pitch of the NSX100 to 250 circuit-breaker terminals to the 45 mm pitch of a NSX400/630 device
- use all the connection and insulation accessories available for the next largest frame size (lugs, connectors, spreaders, right-angle and edgewise terminal extensions, terminal shields and interphase barriers)

It may also be used for Compact INS switch-disconnectors.

Equipped with a single-piece spreader, Compact NSX devices can be mounted:

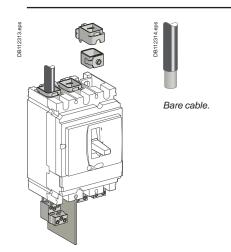
- at the back of a switchboard
- behind the front panel with a raiser.

The one-piece spreader is also the means to:

- align devices with different frame sizes in the switchboard
- use the same mounting plate, whatever the device.

### Pitch (mm) depending on the type of spreader

Compact NSX circuit breaker	NSX100 to 250	NSX100 to 630
Without spreaders	35	45
With spreaders	45	52.5 or 70
With one-piece spreader	45	-











1-cable connector for

NSX100 to 250.

2-cable connector for NSX100 to 250 NSX400/630. NSX100 to 250







NSX400/630

Polybloc 100/160 A and 250 A distribution blocks.

### **Bare cables**

For bare cables (without lugs), the prefabricated bare-cable connectors may be used for both copper and aluminium cables.

### 1-cable connectors for Compact NSX100 to 250

The connectors snap directly on to the device terminals or are secured by clips to right-angle and straight terminal extensions as well as spreaders.

### 1-cable connectors for Compact NSX400 to 630

The connectors are screwed directly to the device terminals.

### 2-cable connectors for Compact NSX100 to 250 and 400/630

The connectors are screwed to device terminals or right-angle terminal extensions.

### Distribution connectors for Compact NSX100 to 250

These connectors are screwed directly to device terminals. Interphase barriers are supplied with distribution connectors, but may be replaced by long terminal shields. Each connector can receive six cables with cross-sectional areas ranging from 1.5 to

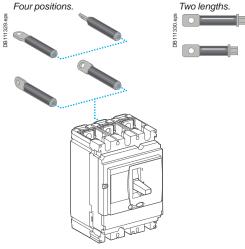
### Polybloc distribution block for Compact NSX100 to 630

Polybloc connects directly to device terminals.

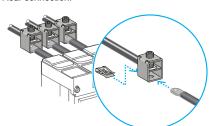
It is used to connect up to six or nine flexible or rigid cables with cross-sectional areas not exceeding 10 mm<sup>2</sup> or 16 mm<sup>2</sup>, to each pole. Connection is made to spring terminals without screws.

### Maximum size of cables depending on the type of connector

Compact NSX circuit breaker		100/160	250	400	630
Steel connectors	1.5 to 95 mm <sup>2</sup>				
Aluminium connectors	25 to 95 mm <sup>2</sup>				
	120 to 185 mm <sup>2</sup>				
	2 cables 50 to 120 mm <sup>2</sup>				
	2 cables 35 to 240 mm <sup>2</sup>				
	35 to 300 mm <sup>2</sup>				
Distribution connectors	6 cables 35 mm <sup>2</sup>				
Polybloc distribution blocks	6 or 9 cables 10/16 mm <sup>2</sup>				







Connection of bare cables to NSX100 to 250.

### Rear connection

Device mounting on a backplate with suitable holes enables rear connection.

### Bars or cables with lugs

Rear connections for bars or cables with lugs are available in two lengths. Bars may be positioned flat, on edge or at 45° angles depending on how the rear connections are positioned.

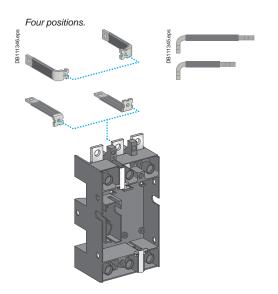
The rear connections are simply fitted to the device connection terminals. All combinations of rear connection lengths and positions are possible on a given device.

### **Bare cables**

For the connection of bare cables, the 1-cable connectors for Compact NSX100 to 250 may be secured to the rear connections using clips.

# Connection of withdrawable and plug-in devices

Connection is identical for both withdrawable and plug-in versions. The same accessories as for fixed devices may be used.

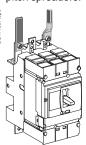


### Bars or cables with lugs

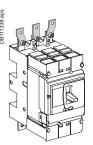
The plug-in base is equipped with terminals which, depending on their orientation, serve for front and rear connection.

For rear connection of a base mounted on a backplate, the terminals must be replaced by insulated, long right-angle terminal extensions.

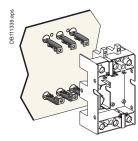
For Compact NSX630 devices, connection most often requires the 52.5 or 70 mm pitch spreaders.



Front connection.



Front connection with spreaders.



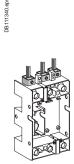
Rear connection of a base mounted on a backplate.

### **Connection accessories**

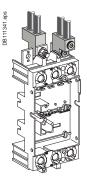
All accessories for fixed devices (bars, lugs, terminal extensions and spreaders) may be used with the plug-in base (see page A-74 and page A-75).

### **Bare cables**

All terminals may be equipped with bare-cable connectors. See the "Connection of fixed devices" section.



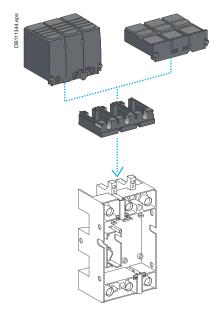
With a 100 to 250 A base.

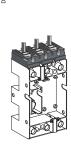


With a 400/630 A base.

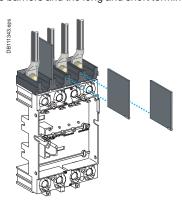
### Adapter for plug-in base

The adapter is a plastic component for the 100 to 250 base and the 400/630 base that enables use of all the connection accessories of the fixed device. It is required for interphase barriers and the long and short terminal shields.





Adapter for 100 to 250 A - 3P base.
Connection with bars or cables with lugs.



Adapter for 400/630 A - 4P base. Connection with spreaders and interphase barriers.

### Insulation of live parts

Terminal shields are identical for fixed and plug-in/withdrawable versions and cover all applications up to 1000 V.

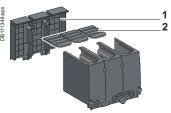
They exist for the 100 to 250 A and 400/630 A ratings, in long and short versions.





Long terminal shields.

Short terminal shields.



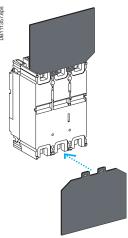
- 1 Partially cut removable squares.
- 2 Grids with break marks.



Assembled with captive screws.



Interphase barriers.



Rear insulating screens.

### Terminal shields

Insulating accessories used for protection against direct contact with power circuits. They provide IP40 degree of protection and IK07 mechanical impact protection.

### Terminal-shield types

Compact NSX100 to 250 and NSX400/630 3P or 4P can be equipped with:

- short terminal shields
- long terminal shields.

All terminal shields have holes or knock-outs in front for voltage-presence indicators.

### Short terminal shields

They are used with:

- plug-in and withdrawable versions in all connection configurations
- fixed versions with rear connection.

### Long terminal shields

They are used for front connection with cables or insulated bars.

They comprise two parts assembled with captive screws, forming an IP40 cover.

- The top part is equipped with sliding grids with break marks for precise adaptation to cables or insulated bars.
- The rear part completely blocks off the connection zone. Partially cut squares can be removed to adapt to all types of connection for cables with lugs or copper bars. Long terminal shields may be mounted upstream and downstream of:
- fixed devices
- the base of plug-in and withdrawable versions, thus completing the insulation provided by the mandatory short terminal shields on the device
- the one-piece spreader for NSX100 to 250
- the 52.5 mm spreaders for NSX400/630.

### Terminal shields and pitch

Combination possibilities are shown below.

Circuit breaker	NSX100/160/250 NSX400/630				
Short terminal shields					
Pitch (mm)	35	45			
Long terminal shields					
Pitch (mm)	35	45	52.5		

### Interphase barriers

Safety accessories for maximum insulation at the power-connection points:

- they clip easily onto the circuit breaker
- single version for fixed devices and adapters on plug-in bases
- not compatible with terminal shields
- the adapter for the plug-in base is required for mounting on plug-in and withdrawable versions.

### Rear insulating screens

Safety accessories providing insulation at the rear of the device.

Their use is mandatory for devices with spreaders, installed on backplates, when terminal shields are not used.

The available screen dimensions are shown below.

Circu	uit breaker	NSX100/160/250	NSX400/630
3P	W x H x thickness (mm)	140 x 105 x 1	203 x 175 x 1.5
4P	W x H x thickness (mm)	175 x 105 x 1	275 x 175 x 1.5

# Selection of auxiliaries for Compact NSX100/160/250

### **Standard**

All Compact NSX100/160/250 circuit breakers and switch-disconnectors have slots for the electrical auxiliaries listed below.

5 indication contacts (see page A-84)

- 2 ON/OFF (OF1 and OF2)
- 1 trip indication (SD)
- 1 fault-trip indication (SDE)
- 1 earth-fault indication (SDV), when the device is equipped with a Vigi module.

1 remote-tripping release (see page A-87)

- either 1 MN undervoltage release
- or 1 MX shunt release.

### Remote indications

Circuit breakers equipped with Micrologic trip units may be equipped with a fault-trip indication to identify the type of fault by installing:

1 indication module with two outputs (see page A-85)

- either an SDx module with Micrologic 2.2 / 5.2 A or E / 6.2 A or E
- or an SDTAM module with Micrologic 2.2 M or 6-2 E-M (motor protection).

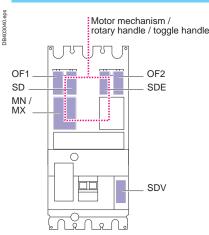
This module occupies the slots of one OF contact and an MN/MX release.

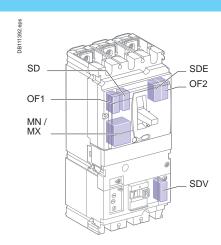
All these auxiliaries may be installed with a motor mechanism or a rotary handle or a toggle handle.

The following table indicates auxiliary possibilities depending on the type of trip unit.

### NA, TMD, TMG, MA

### Standard





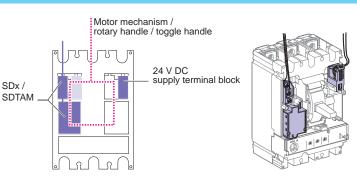
### Micrologic 2/5/6

### Standard

# Motor mechanism / rotary handle / toggle handle OF1 SD MN / MX

### Remote indications via SDx or SDTAM

DB 403042



The SDx or SDTAM uses the OF1 and MN/MX slots. External connection is made via a terminal block in the OF1 slot. The 24 V DC supply provides for the Micrologic 5 / 6 display when the device is OFF or under low-load conditions.

### Communication

Communication requires specific auxiliaries (see page A-28).

### Communication of status indications

- 1 BSCM module.
- 1 NSX cord (internal terminal block) for both communication and 24 V DC supply to the BSCM.

Communication of status conditions is compatible with a toggle handle and a rotary handle.

### Communication of status indications and controls

This requires, in addition to the previous auxiliaries:

■ 1 communicating motor mechanism connected to the BSCM.

### **Communication of measurements**

Available on Micrologic 5 / 6, the system consists of:

■ 1 NSX cord (internal terminal block) for both communication and 24 V DC supply to the Micrologic.

Communication of measurements is compatible with a standard or communicating motor mechanism and a rotary handle.

### Communication of status indications, controls and measurements

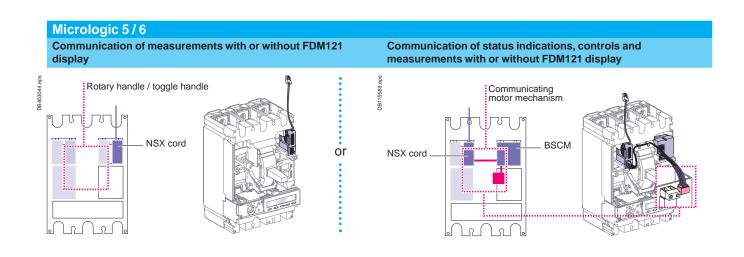
Available on Micrologic 5 / 6, the system consists of:

- 1 BSCM module
- 1 NSX cord (internal terminal block) for both communication and 24 V DC supply to the BSCM and the Micrologic
- 1 communicating motor mechanism connected to the BSCM.

### Installation of SDx or SDTAM is compatible with communication.

The following table indicates auxiliary possibilities depending on the type of trip unit.

# NA, TMD, TMG, MA, Micrologic 2 Communication of status indications Communication of status indications and controls Rotary handle / toggle handle NSX cord NSX cord NSX cord



# Selection of auxiliaries for Compact NSX400/630

### **Standard**

All Compact NSX400/630 circuit breakers and switch-disconnectors have slots for the electrical auxiliaries listed below.

### 7 indication contacts (see page A-84)

- 4 ON/OFF (OF1, OF2, OF3, OF4)
- 1 trip indication (SD)
- 1 fault-trip indication (SDE)
- 1 earth-fault indication (SDV), when the device is equipped with a Vigi module.

### 1 remote-tripping release (see page A-87)

- either 1 MN undervoltage release
- or 1 MX shunt release.

### Remote indications

Circuit breakers equipped with Micrologic trip units may be equipped with a fault-trip indication to identify the type of fault by installing:

### 1 indication module with two outputs (see page A-85)

- either an SDx module with Micrologic 2.2 / 5.2 A or E / 6.2 A or E
- or an SDTAM module with Micrologic 2.2 M or 6-2 E-M (motor protection).

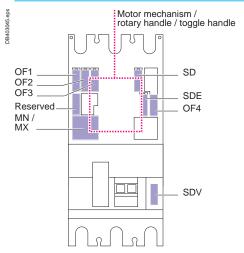
This module occupies the slots of an MN/MX release.

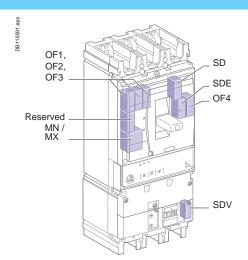
# All these auxiliaries may be installed with a motor mechanism or a rotary handle or a toggle handle.

The following table indicates auxiliary possibilities depending on the type of trip unit.

### NA, Micrologic 1.3 M

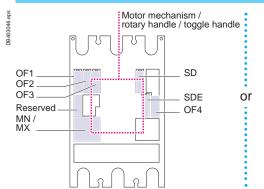
### **Standard**

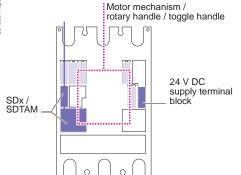


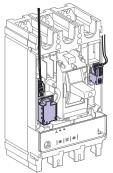


### Micrologic 2/5/6

### Standard







The SDx or SDTAM uses the reserved slot and the MN/MX slots.

External connection is made via a terminal block in the reserved slot.

The 24 V DC supply provides for the Micrologic 5 / 6 display when the device is OFF or under low-load conditions.

### Communication

Communication requires specific auxiliaries (see page A-28).

### Communication of status indications

- 1 BSCM module
- 1 NSX cord (internal terminal block) for both communication and 24 V DC supply to the BSCM.

Communication of status conditions is compatible with a toggle handle and a rotary handle.

### Communication of status indications and controls

This requires, in addition to the previous auxiliaries:

■ 1 communicating motor mechanism connected to the BSCM.

### **Communication of measurements**

Available on Micrologic 5 / 6, the system consists of:

■ 1 NSX cord (internal terminal block) for both communication and 24 V DC supply to the Micrologic.

Communication of measurements is compatible with a standard or communicating motor mechanism and a rotary handle.

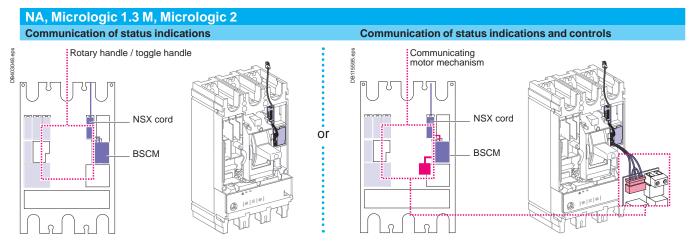
### Communication of status indications, controls and measurements

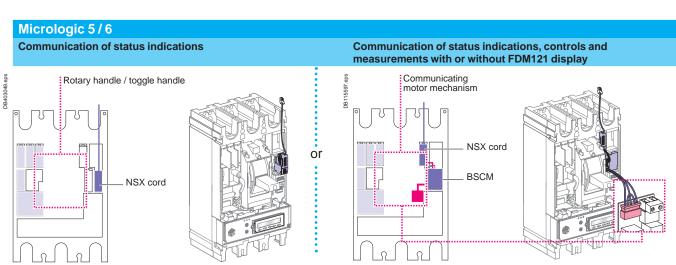
Available on Micrologic 5 / 6, the system consists of:

- 1 BSCM module
- 1 NSX cord (internal terminal block) for both communication and 24 V DC supply to the BSCM and the Micrologic
- 1 communicating motor mechanism connected to the BSCM.

### Installation of SDx or SDTAM is compatible with communication.

The following table indicates auxiliary possibilities depending on the type of trip unit.

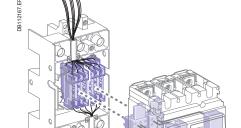




### Connection of electrical auxiliaries

# DBITZIRE, EPPS

Fixed Compact NSX.



Plug-in/withdrawable Compact NSX.

### **Fixed Compact NSX**

Auxiliary circuits exit the device through a knock-out in the front cover.

### Withdrawable or plug-in Compact NSX

### **Automatic auxiliary connectors**

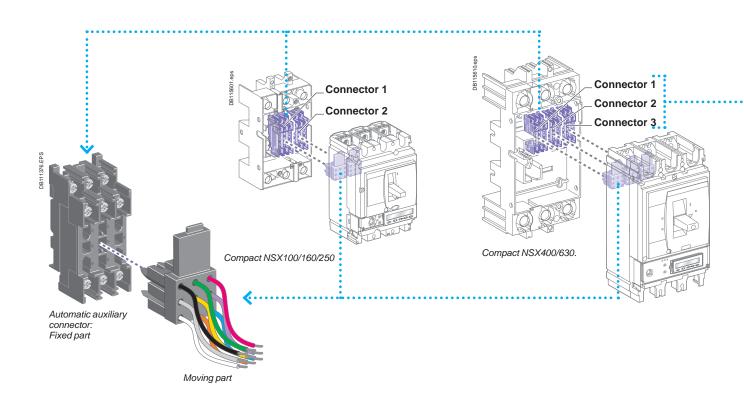
Auxiliary circuits exit the circuit breaker via one to three automatic auxiliary connectors (nine wires each). These are made up of:

- a moving part, connected to the circuit breaker via a support (one support per circuit breaker)
- $\blacksquare$  a fixed part, mounted on the plug-in base, equipped with connectors for bare cables up to 2.5 mm².

 $\dot{\text{Micrologic}}$  trip unit options are also wired via the automatic auxiliary connectors.

### Selection of automatic auxiliary connectors

Depending on the functions installed, one to three automatic auxiliary connectors are required.

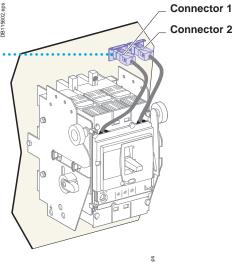


### Withdrawable Compact NSX

### Manual auxiliary connectors

As an option to the automatic auxiliary connectors, withdrawable circuit breakers may be equipped with one to three plugs with nine wires each. In "disconnected" position, the auxiliaries remain connected. They can then be tested by operating the device.

Nine-wire manual auxiliary connector.



Compact NSX100/160/250.

Connector 1 Connector 2

Connector 3

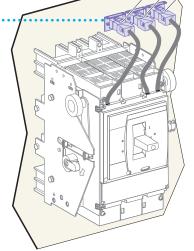
Each auxiliary is equipped with a terminal block with numbered terminals for connection of wires up to:

- 1.5 mm² for auxiliary contacts and voltage releases
- 2.5 mm² for the motor-mechanism module.

	Circuit breaker Connector 1		r 1	Connector 2	Connector 3	
•		OF1 MN/ or MX SD	SDx/ SDTAM	OF2/SDV / ZSI out (1) SDE NSX cord MT MTc 24 V DC	OF3 OF4 ZSI in ZSI out	
	NSX100/160/250	•		•	-	
	NSX400/630	•		•	•	
	(4) 0 1 ( 10)(4004 (	250			-	

(1) Only for NSX100 to 250. MT: motor mechanism.

MTc: communicating motor mechanism.



Compact NSX400/630.

# Functions and characteristics

# Accessories and auxiliaries Indication contacts

One contact model provides circuit-breaker status indications (OF - SD - SDE - SDV).

An early-make or early-break contact, in conjunction with a rotary handle, can be used to anticipate device opening or closing.

A CE / CD contact indicates that the chassis is connected / disconnected.



Indication contacts.



CE/CD carriage switches.

These common-point changeover contacts provide remote circuit-breaker status information.

They can be used for indications, electrical locking, relaying, etc.

They comply with the IEC 60947-5 international recommendation.

### **Functions**

### Breaker-status indications, during normal operation or after a fault

A single type of contact provides all the different indication functions:

- OF (ON/OFF) indicates the position of the circuit breaker contacts
- SD (trip indication) indicates that the circuit breaker has tripped due to:
- □ an overload
- □ a short-circuit
- □ an earth fault (Vigi) or a ground fault (Micrologic 6)
- □ operation of a voltage release
- □ operation of the "push to trip" button
- ☐ disconnection when the device is ON.

The SD contact returns to de-energised state when the circuit breaker is reset.

- SDE (fault-trip indication) indicates that the circuit breaker has tripped due to:
- □ an overload
- □ a short-circuit
- □ an earth fault (Vigi) or a ground fault (Micrologic 6).

The SD contact returns to de-energised state when the circuit breaker is reset.

■ SDV indicates that the circuit breaker has tripped due to an earth fault. It returns to de-energised state when the Vigi module is reset.

All the above auxiliary contacts are also available in "low-level" versions capable of switching very low loads (e.g. for the control of PLCs or electronic circuits).

### Rotary-handle position contact for early-make or early-break functions

■ CAM (early-make or early-break function) contacts indicate the position of the rotary handle.

They are used in particular for advanced opening of safety trip devices (early break) or to energise a control device prior to circuit-breaker closing (early make).

### **Chassis-position contacts**

■ CE/CD (connected/disconnected) contacts are microswitch-type carriage switches for withdrawable circuit breakers.

### Installation

■ OF, SD, SDE and SDV functions: a single type of contact provides all these different indication functions, depending on where it is inserted in the device. The contacts clip into slots behind the front cover of the circuit breaker (or the Vigi module for the SDV function).

The SDE function on a Compact NSX100 - 250 A equipped with a magnetic, thermal-magnetic or Micrologic 2 trip unit requires the SDE actuator.

- CAM function: the contact fits into the rotary-handle unit (direct or extended).
- CE/CD function: the contacts clip into the fixed part of the chassis.

### Electrical characteristics of auxiliary contacts

Contacts	Contacts			Standard			Low level			
Types of contacts			All			OF, SD, SDE, SDV				
Rated thermal current (A)			6				5			
Minimum load			100 m	A at 24 \	/ DC		1 mA a	t 4 V D0	2	
Utilisation ca	t. (IEC 6094	7-5-1)	AC12	AC15	DC12	DC14	AC12	AC15	DC12	DC14
Operational	24 V	AC/DC	6	6	6	1	5	3	5	1
current (A)	48 V	AC/DC	6	6	2.5	0.2	5	3	2.5	0.2
	110 V	AC/DC	6	5	0.6	0.05	5	2.5	0.6	0.05
	220/240 V	AC	6	4	-	-	5	2	-	-
	250 V	DC	-	-	0.3	0.03	5	-	0.3	0.03
	380/440 V	AC	6	2	-	-	5	1.5	-	-
	480 V	AC	6	1.5	-	-	5	1	-	-
	660/690 V	AC	6	0.1	-	-	-	-	-	-

### SDx and SDTAM modules for Micrologic

SDx and SDTAM are relay modules with two static outputs. They send different signals depending on the type of fault. They may not be used together.



SDx relay module with its terminal block.



SDTAM relay module with its terminal block.

### SDx module

The SDx module remotes the trip or alarm conditions of Compact NSX circuit breakers equipped with electronic protection.

The SD2 output, available on all Micrologic trip units, corresponds to the overload-trip indication.

The SD4 output, available on Micrologic 5 / 6, is assigned to:

- overload pre-alarm (Micrologic 5)
- ground-fault trip indication (Micrologic 6).

These two outputs automatically reset when the device is closed (turned ON). For Micrologic 5 / 6, the SD2 and SD4 outputs can be reprogrammed to be assigned to other types of tripping or alarm.

### **Output characteristics**

It is possible to assign a function:

- latching with a time delay. Return to the initial state occurs at the end of the time delay
- permanent latching. In this case, return to the initial state takes place via the communication function.

Static outputs: 24 to 415 V AC / V DC; 80 mA max.

### **SDTAM** module

The SDTAM module is specifically for the motor-protection Micrologic trip units  $2.2\,\mathrm{M}$ ,  $2.3\,\mathrm{M}$  and  $6.2\,\mathrm{E-M}$ ,  $6.3\,\mathrm{E-M}$ .

The SDTAM module, linked to the contactor controller, opens the contactor when an overload or other motor fault occurs, thus avoiding opening of the circuit breaker.

### Micrologic 2 M

The SD4 output opens the contactor 400 ms before normal circuit-breaker opening in the following cases:

- overload (long-time protection for the trip class)
- phase unbalance or phase loss.

The SD2 output serves to memorise contactor opening by SDTAM.

### Micrologic 6 E-M

The SD4 output opens the contactor 400 ms before normal circuit-breaker opening in the following cases:

- overload (long-time protection for the trip class)
- phase unbalance or phase loss
- locked rotor
- underload (undercurrent protection)
- long start.

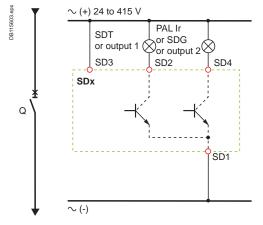
The SD2 output serves to memorise contactor opening by SDTAM.

### **Output characteristics**

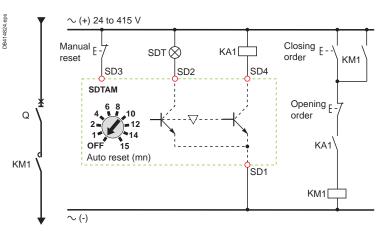
Output reset can be:

- manual by a pushbutton included in the wiring diagram
- automatic after an adjustable time delay (1 to 15 minutes) to take into account the motor-cooling time.

Static outputs: 24 to 415 V AC / V DC; 80 mA max.



SDx wiring diagram.



SDTAM wiring diagram with contactor control.

### Motor mechanism



Compact NSX250 with motor mechanism.

1 2 3

OFF ON OF

- 1 Position indicator
- (positive contact indication)
- 2 Spring status indicator (charged, discharged)
- 3 Manual spring-charging lever
- 4 Keylock device (optional) Locking device (OFF position), using 1 to 3 padlocks, shackle diameter 5 to 8 mm, not supplied
- 5 I (ON) pushbutton
- 6 O (OFF) pushbutton
- 7 Manual/auto mode selection switch. The position of this switch can be indicated remotely.
- switch can be indicated remotely.

  8 Operation counter (Compact NSX400/630)

When equipped with a **motor-mechanism** module, Compact NSX circuit breakers feature very high mechanical endurance as well as easy and sure operation:

- all circuit-breaker indications and information remain visible and accessible, including trip-unit settings and indications
- suitability for isolation is maintained and padlocking remains possible
- double insulation of the front face.

A specific motor mechanism is required for operation via the communication function. This **communicating motor mechanism** must be connected to the BSCM module to receive the opening and closing orders. Operation is identical to that of a standard motor mechanism.

### **Applications**

- Local motor-driven operation, centralised operation, automatic distribution control.
- Normal/standby source changeover or switching to a replacement source to ensure availability or optimise energy costs.
- Load shedding and reconnection.
- Synchrocoupling.

### **Operation**

The type of operation is selected using the manual/auto mode selection switch (7). A transparent, lead-seal cover controls access to the switch.

### Automatic

When the switch is in the "auto" position, the ON/OFF (I/O) buttons and the charging lever on the mechanism are locked.

- Circuit-breaker ON and OFF controlled by two impulse-type or maintained signals.
- Automatic spring charging following voluntary tripping (by MN or MX), with standard wiring.
- Mandatory manual reset following tripping due to an electrical fault.

### Manual

When the switch is in the "manual" position, the ON/OFF (I/O) buttons may be used. A microswitch linked to the manual position can remote the information.

- Circuit-breaker ON and OFF controlled by 2 pushbuttons I/O.
- Recharging of stored-energy system by pumping the lever 8 times.
- Padlocking in OFF position.

### Installation and connections

All installation (fixed, plug-in/withdrawable) and connection possibilities are maintained.

Motor-mechanism module connections are made behind its front cover to integrated terminals, for cables up to 2.5 mm².

### **Optional accessories**

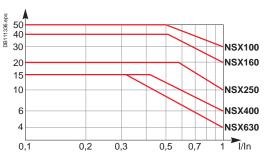
- Keylock for locking in OFF position.
- Operations counter for the Compact NSX400/630, indicating the number of ON/ OFF cycles. Must be installed on the front of the motor-mechanism module.

### Characteristics

Motor mechanism			MT100 to MT630
Response time (ms)	opening		< 600
	closing		< 80
Operating frequency	cycles/minute max.		4
Control voltage (V)	DC		24/30 - 48/60 - 110/130 - 250
	AC 50/60 Hz		48 (50 Hz) - 110/130 -
			220/240 - 380/440
Consumption (1)	DC (W)	opening	≤ 500
		closing	≤ 500
	AC (VA)	opening	≤ 500
		closing	≤ 500

(1) For NSX100 to NSX250, the inrush current is 2 In for 10 ms.

### Electrical endurance



Circuit breaker + motormechanism module, in thousands of operations (IEC 60947 2), at 440 V.

### Remote tripping



MX or MN voltage release.

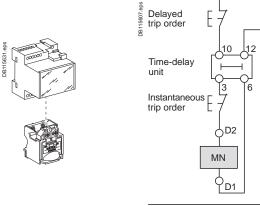




Closing conditions of the MN release

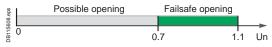


MN voltage release



MN release with a time-delay unit.

Wiring diagram for emergency-off function with MN + time-delay unit.



Opening conditions of the MX release.

**Note:** circuit breaker opening using an MN or MX release must be reserved for safety functions. This type of tripping increases wear on the opening mechanism. Repeated use reduces the mechanical endurance of the circuit breaker by 50 %. MX or MN voltage releases are used to trip the circuit breaker. They serve primarily for remote, emergency-off commands.

It is advised to test the system every six months.

### MN undervoltage release

The MN release opens the circuit breaker when its supply voltage drops to a value below 35 % of its rated voltage Un.

Undervoltage tripping, combined with an emergency-off button, provides fail-safe tripping. The MN release is continuously supplied, i.e. if supply is interrupted:

- either voluntarily, by the emergency-off button,
- or accidentally, through loss of power or faulty wiring,

the release provokes opening of the circuit breaker.

### **Opening conditions**

Circuit-breaker tripping by an MN release meets the requirements of standard IEC 60947-2.

- Automatic opening of the circuit breaker is ensured when the continuous voltage supply to the release  $U \le 0.35 \times Un$ .
- If the supply voltage is between 0.35 and 0.7 Un, opening is possible, but not guaranteed. Above 0.7 Un, opening does not take place.

### Closing conditions

If there is no supply to the MN release, it is impossible to close the circuit breaker, either manually or electrically. Closing is ensured when the voltage supply to the release  $U \ge 0.85 \times Un$ . Below this threshold, closing is not guaranteed.

### Characteristics

Power supply	VAC	50/60 Hz: 24 - 48 - 100/130 - 200/240	
	V 71.0	50 Hz: 380/415 60 Hz: 208/277	
	V DC	12 - 24 - 30 - 48 - 60 - 125 -250	
Operating threshold	Opening	0.35 to 0.7 Un	
	Closing	0.85 Un	
Operating range		0.85 to 1.1 Un	
Consumption (VA or W)		Pick-up: 10 - Hold: 5	
Response time (ms)		50	

### Time-delay unit for an MN release

A time delay unit for the MN release eliminates the risk of nuisance tripping due to a transient voltage dip lasting  $\leq$  200 ms. For shorter micro-outages, a system of capacitors provides temporary supply to the MN at U > 0.7 to ensure non tripping. The correspondence between MN releases and time-delay units is shown below.

Power supply	Corresponding MN release	
Unit with fixed delay 200 ms		
48 V AC	48 V DC	
220 / 240 V AC	250 V DC	
Unit with adjustable delay ≤ 200 ms		
48 - 60 V AC/DC	48 V DC	
100 - 130 V AC/DC	125 V DC	
220 - 250 V AC/DC	250 V DC	

### MX shunt release

The MX release opens the circuit breaker via an impulse-type ( $\geqslant$  20 ms) or maintained order.

### Opening conditions

When the MX release is supplied, it automatically opens the circuit breaker. Opening is ensured for a voltage  $U \ge 0.7 \times Un$ .

### Characteristics

Power supply	V AC	50/60 Hz: 24 - 48 - 100/130 - 200/240
		50 Hz: 380/415 60 Hz: 208/277
	V DC	12 - 24 - 30 - 48 - 60 - 125 -250
Operating range		0.7 to 1.1 Un
Consumption (VA or W)		Pick-up: 10
Response time (ms)		50

### Circuit breaker control by MN or MX

When the circuit breaker has been tripped by an MN or MX release, it must be reset before it can be reclosed.

MN or MX tripping takes priority over manual closing.

In the presence of a standing trip order, closing of the contacts, even temporary, is not possible.

Connection using wires up to 1.5 mm<sup>2</sup> to integrated terminal blocks.

### **Rotary handles**

There are two types of rotary handle:

- direct rotary handle
- extended rotary handle.

There are two models:

- standard with a black handle
- red handle and yellow front for machine-tool control.



Compact NSX with a rotary handle.



Compact NSX with an MCC rotary handle.



Compact NSX with a CNOMO machine-tool rotary handle.



Compact NSX with an extended rotary handle installed at the back of a switchboard, with the keylock option and key.

### **Direct rotary handle**

### Standard handle

Degree of protection IP40, IK07.

The direct rotary handle maintains:

- visibility of and access to trip-unit settings
- suitability for isolation
- indication of the three positions O (OFF), I (ON) and tripped
- access to the "push to trip" button.

### **Device locking**

The rotary handle facilitates circuit-breaker locking.

- Padlocking:
- $\hfill \square$  standard situation, in the OFF position, using 1 to 3 padlocks, shackle diameter 5 to 8 mm, not supplied

□ with a simple modification, in the ON and OFF positions. Locking in the ON position does not prevent free circuit-breaker tripping if a fault occurs. In this case, the handle remains the ON position after the circuit breaker tripping. Unlocking is required to go to the tripped then the OFF position.

■ Keylock (and padlock)

It is possible to install a Ronis or Profalux keylock (optional) on the base of the handle to obtain the same functions as with a padlock.

### Early-make or early-break contacts (optional)

Early-make and/or early-break contacts may be used with the rotary handle. It is thus possible to:

- supply an MN undervoltage release before the circuit breaker closes
- open the contactor control circuit before the circuit breaker opens.

### MCC switchboard control

Control of an MCC switchboard is achieved by adding a kit to the standard handle. In addition to the standard functions, the kit offers the characteristics listed below.

### Higher degree of protection IP

Degree of protection IP43, IK07.

The IP is increased by a built-in gasket.

### Door locking depending on device position

- The door cannot be opened if the circuit breaker is ON or in the tripped position. For exceptional situations, door locking can be temporarily disabled with a tool to open the door when the circuit breaker is closed. This operation is not possible if the handle is locked by a padlock.
- Circuit-breaker closing is disabled if the door is open. This function can be deactivated.

### Machine-tool control in compliance with CNOMO

Control of a machine-tool is achieved by adding a kit to the standard handle. In addition to the standard functions, the kit offers the characteristics listed below.

### Enhanced waterproofness and mechanical protection

- Degree of protection IP54, IK08.
- Compliance with CNOMO E03.81.501N.

### **Extended rotary handle**

Degree of protection IP55, IK08.

The extended rotary handle makes it possible to operate circuit breakers installed at the back of switchboards, from the switchboard front.

It maintains:

- visibility of and access to trip-unit settings
- suitability for isolation
- indication of the three positions O (OFF), I (ON) and tripped.

### Mechanical door locking when device closed

A standard feature of the extended rotary handle is a locking function, built into the shaft, that disables door opening when the circuit breaker is in the ON or tripped positions.

Door locking can be temporarily disabled with a tool to open the door without opening the circuit breaker. This operation is not possible if the handle is locked by a padlock.

### Voluntary disabling of mechanical door locking

A modification to the handle, that can be carried out on site, completely disables door locking, including when a padlock is installed on the handle. The modification is reversible.

When a number of extended rotary handles are installed on a door, this disabling function is the means to ensure door locking by a single device.



### Extended rotary handle (cont.)

### Device and door padlocking

Padlocking locks the circuit-breaker handle and disables door opening:

- standard situation, in the OFF position, using 1 to 3 padlocks, shackle diameter 5 to 8 mm, not supplied
- with a simple modification, in the ON and OFF positions. Locking in the ON position does not prevent free circuit-breaker tripping if a fault occurs. In this case, the handle remains in the ON position after the circuit breaker tripping. Unlocking is required to go to the tripped then the OFF position. If the door controls were modified to voluntarily disable door locking, padlocking does not lock the door, but does disable handle operation of the device.

### Device locking using a keylock inside the switchboard

It is possible to install a Ronis or Profalux keylock (optional) on the base of the rotary handle to lock the device in the OFF position or in either the ON or OFF positions.

### Accessory for device operation with the door open

When the device is equipped with an extended rotary handle, a control accessory mounted on the shaft makes it possible to operate the device with the door open.

- The device can be padlocked in the OFF position.
- The accessory complies with UL508.

### Early-make or early-break contacts (optional)

The extended rotary handle offers the same possibilities with early-make and/or early-break contacts as the standard rotary handle.

### Parts of the extended rotary handles

- A unit that replaces the front cover of the circuit breaker (secured by screws).
- An assembly (handle and front plate) on the door that is always secured in the same position, whether the circuit breaker is installed vertically or horizontally.
- An extension shaft that must be adjusted to the distance. The min/max distance between the back of circuit breaker and door is:
- ☐ 185...600 mm for Compact NSX100 to 250
- □ 209...600 mm for Compact NSX400/630.

For withdrawable devices, the extended rotary handle is also available with a telescopic shaft to compensate for device disconnection. In this case, the min/max distances are:

- □ 248...600 mm for Compact NSX100 to 250
- □ 272...600 mm for Compact NSX400/630.

### Manual source-changeover systems

An additional accessory interlocks two devices with rotary handles to create a source-changeover system. Closing of one device is possible only if the second is open.

This function is compatible with direct or extended rotary handles. Up to three padlocks can be used to lock in the OFF or ON position.



### Additional measurement and indication modules



Voltage-presence indicator.



Compact NSX with current-transformer module.

### Voltage-presence indicator

The indicator detects and indicates that circuit breaker terminals are supplied with power.

### Installation

- Mounted in the long or short terminal shields, via the knockouts.
- May be positioned upstream or downstream of the circuit breaker.
- Degree of protection IP40, IK04.
- Not compatible with the motor-mechanism module.

### **Electrical characteristics**

Operates on all networks with voltages ranging from 220 to 550 V AC.

### **Current-transformer module**

This module enables direct connection of a measurement device such as an ammeter or a power meter.

### Installation

- The module is installed directly on the downstream circuit-breaker terminals.
- Degree of protection IP40, IK04.
- Class II insulation between front and the power circuits.
- Connection to 6 integrated connectors for cables up to 2.5 mm².

### **Electrical characteristics**

- Current transformer with 5 A secondary winding.
- Class 3 for the following output-power consumptions:

### Accuracy:

- ☐ 100 A rating: 1.6 VA
- □ 150 A rating: 3 VA
- □ 250 A rating: 5 VA
- □ 400/600 A rating: 8 VA.

### **Current-transformer module with voltage** measurement outputs

This module enables direct connection of a digital measurement device such as a Power Meter PM700, PM800, etc. (not supplied).

### Installation

- The module is installed directly on the downstream circuit-breaker terminals.
- Degree of protection IP40, IK04.
- Class II insulation between front and the power circuits.
- Built-in connectors for cables from 1.5 to 2.5 mm².

### **Electrical characteristics**

- Rated operational voltage Ue: 530 V
- Frequencies of measured values: 50...60 Hz
- Three CTs with 5 A secondary windings for the rated primary current In:
- □ class 0.5 to 1 for rated power consumption values at the output:
- 125 A, 150 A and 250 A ratings: class 1 for 1.1 VA
- 400/600 A rating: class 0.5 for 2 VA
- □ Connection using a 2.5 mm2 cable up to 2.5 m long.
- Four voltage measurement outputs including protection with automatic reset.
- $\square$  voltage measurement output impedance 3500  $\Omega$  ±25 %, maximum current 1 mA
- $\hfill\Box$  The voltage measurement outputs are intended only for measurements (1 mA max.) and may not be used to supply the display.

### Ammeter and Imax ammeter modules

### Ammeter module

Measures and displays (dial-type ammeter) the current of each phase (selection of phases by 3-position switch in front).

### Imax ammeter module

Measures and displays (dial-type ammeter) the maximum current flowing in the middle phase. The Imax value can be reset on the front.

### Installation

- Identical for both types of ammeter module.
- The module is installed directly on the downstream circuit-breaker terminals.
- The ammeter clips into the module in any of four 90° positions, i.e. it can be installed of devices mounted both vertically and horizontally.
- Degree of protection IP40, IK04.
- Class II insulation between front and the power circuits.

### **Electrical characteristics**

- Ammeter module: accuracy class 4.5.
- Imax ammeter module: accuracy ±6 %.
- Maximum currents are displayed only if they last ≥ 15 minutes.



Compact NSX with ammeter module.



Insulation monitoring module

**Insulation monitoring module**This module detects and indicates an insulation drop on a load circuit (TN-S or TT systems).

Operation is identical to that of a Vigi module, but without circuit-breaker tripping. Indication by a red LED in front.

An auxiliary contact may be installed for remote insulation-drop indications. When insulation drops below a minimum, user-set threshold, the LED goes on and the auxiliary contact switches. The fault indication cannot be cancelled except by pressing the manual reset button.

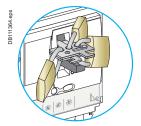
#### Installation

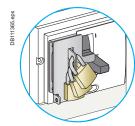
- The module is installed directly on the downstream circuit-breaker terminals.
- Degree of protection IP40, IK04.
- Double insulation of the front face.

#### **Electrical characteristics**

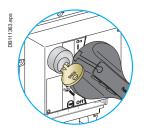
- Settings: 100 200 500 1000 mA.
- Accuracy: -50 +0 %.
- Time delay following insulation drop: 5 to 10 seconds.
- AC-system voltage: 200 to 440 V AC.

## **Accessories and auxiliaries** Locks





Toggle locking using padlocks and an accessory: Removable device Fixed device attached to the

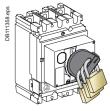


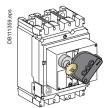
Rotary-handle locking using a keylock.

Locking in the OFF position guarantees isolation as per IEC 60947-2. Padlocking systems can receive up to three padlocks with shackle diameters ranging from 5 to 8 mm (padlocks not supplied). Certain locking systems require an additional

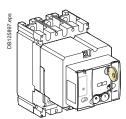
Control devi	ce	Function	Means	Required accessories
Toggle		Lock in OFF position	Padlock	Removable device
		Lock in OFF or ON position	Padlock	Fixed device
Direct rotary Standard			Padlock	-
handle		■ OFF position ■ OFF or ON position (1)	Keylock	Locking device + keylock
	MCC	Lock in ■ OFF position ■ OFF or ON position (1)	Padlock	-
CNOMO		Lock in ■ OFF position ■ OFF or ON position (1)	F position	
Extended rotary handle		Lock in  OFF position  OFF or ON position (1) with door opening prevented (2)	Padlock	-
		Lock in OFF position	Padlock	UL508 control accessory
		■ OFF or ON position (1) inside the switchboard	Keylock	Locking device + keylock
Motor		Lock in OFF position	Padlock	-
mechanism		remote operation disabled	Keylock	Locking device + keylock
Withdrawable circuit breaker		Lock in	Padlock	-
		■ disconnected position	Keylock	Locking device + keylock

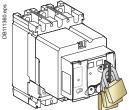
- (1) Following a simple modification of the mechanism.(2) Unless door locking has been voluntarily disabled.
- (3) Only for 3P-4P.



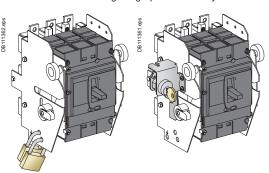


Rotary-handle locking using a padlock or a keylock.



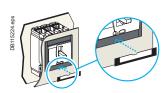


Motor-mechanism locking using a padlock or a keylock.



Chassis locking in the connected position.

## Sealing accessories



Identification accessories.



Sealing accessories.

Outgoing-circuit identification
Compact NSX100 to 630 can be equipped with label holders supplied in sets of ten (cat. no. LV429226).

They are compatible with escutcheons.

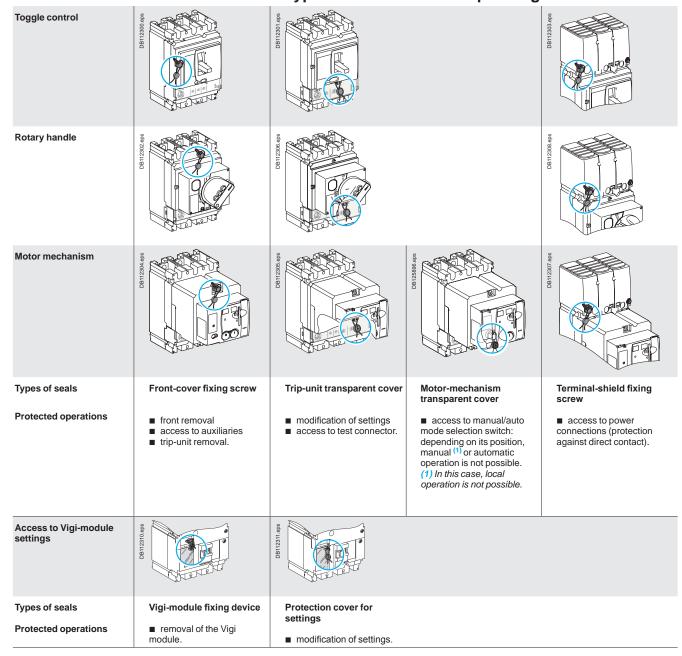
## Sealing accessories

Sealing accessories are available. Each bag of accessories contains all the parts required for the types of sealing indicated below.

A bag contains:

- 6 sealing accessories
- 6 lead seals
- 0.5 m of wire
- 2 screws.

## Types of seals and corresponding functions



## **Accessories and auxiliaries**

## Individual enclosures



IP55 heavy-duty metal enclosure.



IP55 heavy-duty insulating enclosure.

Individual enclosures are available for Compact/Vigicompact NSX devices with two, three or four poles.

All fixed, front connections are possible, except right-angle,  $45^{\circ},$  double-L and edgewise terminal extensions.

All spreaders may be installed in the enclosures intended for Compact/Vigicompact NSX250 to 630 devices, except the 70 mm spreaders for NSX400/630.

#### Two models of enclosures

- IP55 heavy-duty metal individual enclosure, with:
- □ metal enclosure
- □ door with keylock and cut-out for rotary handle
- □ extended rotary handle, IP56, IK08, black or red/yellow
- □ device mounting plate
- □ removable plate (without holes) for cable entry through bottom.
- IP55 heavy-duty insulating individual enclosure, with:
- □ polyester insulating enclosure
- ☐ transparent cover, screwed, lead sealable, with cut-out for extended rotary handle
- □ extended rotary handle, IP56, IK08, black or red/yellow
- □ device mounting plate
- □ 2 removable plates (without holes) for cable entry through bottom and/or top.

#### Dimensions (H x W x D in mm)

■ Metal enclosures:

□ Compact NSX100/160	450 x 350 x 250
☐ Compact NSX250 and Vigicompact NSX100 to 250	650 x 350 x 250
□ Compact NSX400	650 x 350 x 250
□ Compact NSX630 and Vigicompact NSX400/630	850 x 350 x 250
■ Insulating enclosures:	
□ Compact NSX100/160	360 x 270 x 235
□ Compact NSX250 and Vigicompact NSX100/160	540 x 270 x 235
□ Compact NSX400/630	720 x 360 x 235
□ Vigicompact NSX250/630	720 x 360 x 235



## Escutcheons and protection collars

Escutcheons are an optional feature mounted on the switchboard door. They increase the degree of protection to IP40, IK07. Protection collars maintain the degree of protection, whatever the position of the device (connected, disconnected).

# seder (SLI-10) BEI COLLING TO SERVICE STATE OF THE SERVICE STATE OF THE

IP30 escutcheon.



IP30 escutcheon with access to the trip unit.

## IP30 or IP40 escutcheons for fixed devices

#### **IP30**

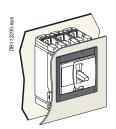
The three types are glued to the cut-out in the front door of the switchboard:

- escutcheon for all control types (toggle, rotary handle or motor mechanism)
- □ without access to the trip unit
- □ with access to the trip unit
- for Vigi modules, can be combined with the above.

## **IP40**

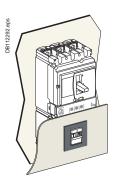
The four types, with a gasket, are screwed to the door cut-out:

- three escutcheons identical to the previous, but IP40
- a wide model for Vigi and ammeter modules that can be combined with the above.

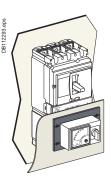




Escutcheon for toggle without and with access to the trip unit.







Wide escutcheon for ammeter.

## **Accessories and auxiliaries**

## Escutcheons and protection collars

## IP40 escutcheons for withdrawable devices

## IP40 for withdrawable devices

The two types, with a gasket, are screwed to the door cut-out:

- for rotary handle or motor mechanism: standard IP40 escutcheon
- for toggle with extension: standard escutcheon + collar for withdrawal.



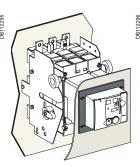
Escutcheon with collar for toggle.



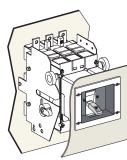
Escutcheon for Vigi module.



Standard escutcheon with rotary handle.



Standard escutcheon for motor mechanism.

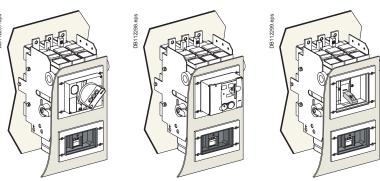


Standard escutcheon with collar for withdrawal, for toggle.

## IP40 for Vigi module on withdrawable device

The two types, with a gasket, are screwed to the door cut-out:

- for rotary handle or motor mechanism: standard IP40 escutcheon
- for toggle: standard escutcheon + collar for withdrawal.



Escutcheon for Vigi module, with escutcheons for the three types of control.

Toggle cover.

NS retrofit front cover.

## IP43 toggle cover

Available only for devices with toggles. Fits over toggle and front cover of the device.

- Mounted on the front of the circuit breaker.
- Degree of protection IP43, IK07.



Toggle cover.

#### Retrofit front covers

These replacement front covers make it possible to install NSX devices in existing switchboards containing NS devices by installing the NS-type retrofit covers on the NSX devices.

- NS100 to 250 cover.
- NS400/630 cover.

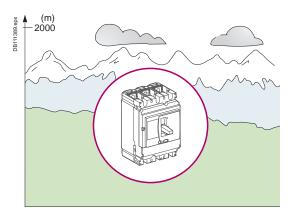


## **Installation recommendations**

## Contents

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## **Operating conditions**



## Altitude derating

Altitude does not significantly affect the characteristics of Compact NSX circuit breakers up to 2000 m. Above this altitude, it is necessary to take into account the decrease in the dielectric strength and cooling capacity of air.

The following table gives the corrections to be applied for altitudes above 2000 metres.

The breaking capacities remain unchanged.

## Compact NSX100 to 630

Altitude (m)		2000	3000	4000	5000
Dielectric withstand voltage (V)		3000	2500	2100	1800
Insulation voltage (V)	Ui	800	700	600	500
Maximum operational voltage (V)	Ue	690	590	520	460
Average thermal current (A) at 40 °C	In x	1	0.96	0.93	0.9



## **Vibrations**

Compact NSX devices resist electromagnetic or mechanical vibrations. Tests are carried out in compliance with standard IEC 60068-2-6 for the levels required by merchant-marine inspection organisations (Veritas, Lloyd's, etc.):

- 2 to 13.2 Hz: amplitude ±1 mm
- 13.2 to 100 Hz: constant acceleration 0.7 g.

Excessive vibration may cause tripping, breaks in connections or damage to mechanical parts.



## **Degree of protection**

Compact NSX circuit breakers have been tested for degree of protection (IP) mechanical impact protection (IK). See page A-3.

## **Electromagnetic disturbances**

Compact NSX devices are protected against:

- overvoltages caused by circuit switching
- overvoltages caused by an atmospheric disturbances or by a distribution-system outage (e.g. failure of a lighting system)
- devices emitting radio waves (radios, walkie-talkies, radar, etc.)
- electrostatic discharges produced directly by users.

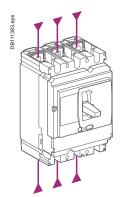
Compact NSX devices have successfully passed the electromagnetic-compatibility tests (EMC) defined by the following international standards. See page A-3.

These tests ensure that:

- no nuisance tripping occurs
- tripping times are respected.

## Installation in switchboards

## Power supply and weights



## Power supply from the top or bottom

Compact NSX circuit breakers can be supplied from either the top or the bottom, even when equipped with a Vigi earth-leakage protection module, without any reduction in performance. This capability facilitates connection when installed in a switchboard.

All connection and insulation accessories can be used on circuit breakers supplied either from the top or bottom.

Weight
The table below presents the weights (in kg) of the circuit breakers and the main accessories, which must be summed to obtain the total weight of complete configurations. The values are valid for all performance categories.

Type of device	е	Circuit breakers	Base	Chassis	Vigi module	Visu module	Motor mech.
NSX100	3P/2D	1.79	0.8	2.2	0.87	2	1.2
	3P/3D	2.05	0.8	2.2	0.87	2	1.2
	4P/4D	2.4	1.05	2.2	1.13	2.2	1.2
NSX160	3P/2D	1.85	0.8	2.2	0.87	2	1.2
	3P/3D	2.2	0.8	2.2	0.87	2	1.2
	4P/4D	2.58	1.05	2.2	1.13	2.2	1.2
NSX250	3P/2D	1.94	0.8	2.2	0.87	2	1.2
	3P/3D	2.4	0.8	2.2	0.87	2	1.2
	4P/4D	2.78	1.05	2.2	1.13	2.2	1.2
NSX400/630	3P/3D	6.19	2.4	2.2	2.8	4.6	2.8
	4P/4D	8.13	2.8	2.2	3	4.9	2.8

## Installation in switchboards

## Safety clearances and minimum distances

#### **General rules**

When installing a circuit breaker, minimum distances (safety clearances) must be maintained between the device and panels, bars and other protection devices installed nearby. These distances, which depend on the ultimate breaking capacity, are defined by tests carried out in accordance with standard IEC 60947-2. If installation conformity is not checked by type tests, it is also necessary to:

- use insulated bars for circuit-breaker connections
- segregate the busbars using insulating screens.

For Compact NSX100 to 630 devices, terminal shields and interphase barriers are recommended and may be mandatory depending on the operating voltage of the device and type of installation (fixed, withdrawable, etc.).

## **Power connections**

The table below indicates the rules to be respected for Compact NSX100 to 630 devices to ensure insulation of live parts for the various types of connection.

- fixed devices with front connection (FC) or rear connection (RC)
- plug-in or withdrawable devices.

Connection accessories such as crimp lugs, bare-cable connectors, terminal extensions (straight, right-angle, double-L and 45°) and spreaders are supplied with interphase barriers.

Long terminal shields provide a degree of protection of IP40 (ingress) and IK07 (mechanical impact).

#### Compact NSX100 to 630: rules to be respected to ensure insulation of live parts

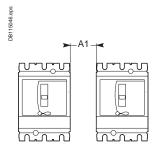
Type of c	onnection	Fixed, front o	onnection		Fixed, rear connection	Plug-in or withd	rawable
		DB119056.eps			DB 1150086 eps	On backplate	Through panel
Possible, r	recommended or mandatory accessories:	No insulating accessory	Interphase barriers	Long terminal shields	Short terminal shields	Short terminal shields	Short terminal shields
4							
operating	2 /						
< 500 V	Insulated bars	Possible	Possible	Possible	Recommended	Recommended	Mandatory
	Extension terminals Cables + crimp lugs	No	Mandatory (supplied)	Possible (instead of ph. barriers)	Recommended	Recommended	Mandatory
	Bare cables + connectors	Possible for cable connectors NSX100 to 250	Possible for cable connectors NSX100 to 250	Possible for cable connectors NSX100 to 250	Recommended	Recommended	Mandatory
		No	Mandatory (1) (supplied)	Possible (1) (instead of ph. barriers)	Treasmine naca	Trosominoridos	Mandatory
≥ 500 V	Insulated bars	No	No	Mandatory (use of short terminal shield possible)	Mandatory	Mandatory	Mandatory
	Extension terminals Cables + crimp lugs	No	No	Mandatory	Mandatory	Mandatory	Mandatory
	Bare cables + connectors	No	No	Mandatory	Mandatory	Mandatory	Mandatory

(1) Long terminal shields, mandatory if the device is fixed through the door, whatever the voltage.

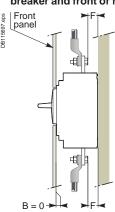
## Installation example

## Safety clearance

Minimum distance between two adjacent circuit breakers



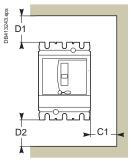
## Minimum distance between circuit breaker and front or rear panels

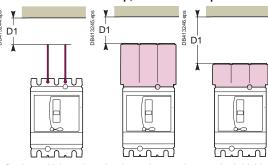


Bare or painted sheetmetal

**Note**: if F < 8 mm: an insulating screen or long terminal shield is mandatory (see page A-77).

#### Minimum distance between circuit breaker and top, bottom or side panels





Devices without accessories.

Devices with interphase barriers or long or short terminal shields.

#### Minimum safety clearances for Compact NSX100 to 630

Operating voltage   Clearance (mm)									
	Between	Between device and sheetmetal							
	devices	Painte	d sheet	metal	Bare sheet metal				
	A1	C1	D1	D2	C1	D1	D2	D3	
U ≤ 440 V									
for devices equipped with:									
■ no accessories	0	0	30	30	5	40	40	-	
■ short terminal shields	0	0	30	30	5	40	40	50	
■ interphase barriers	0	0	0	0	5	0	0	-	
■ long terminal shields	0	0	0	0	0	0	0	-	
440 V < U ≤ 600 V									
for devices equipped with:									
■ short terminal shields	0	0	30	30	10	40	40	50	
■ interphase barriers <sup>(1)</sup>	0	0	0	0	20	10	10	-	
■ long terminal shields <sup>(2)</sup>	0	0	0	0	10	10	10	-	
U > 600 V									
for devices equipped with:									
■ short terminal shields	0	10	50	50	20	100	100	50	
■ long terminal shields	0	10	30	30	20	40	40	-	

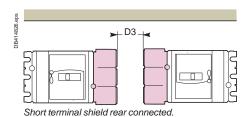
- (1) Only for NSX100 to 250.
- (2) For all cases.

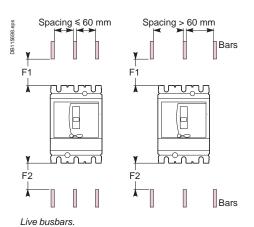
## Clearances with respect to live bare busbars

Minimum clearances for Compact NSX100 to 630

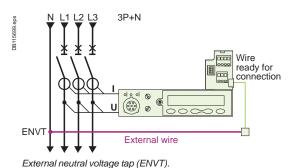
minimum ologi allogo lo	minimum ordar and occupant to the to to to					
Operating voltage	Clearances with respect to live bare busbars					
	spacing	≤ 60 mm	spacing	> 60 mm		
	F1	F2	F1	F2		
U < 440 V	350	350	80	80		
440 V ≤ U ≤ 600 V	350	350	120	120		
U > 600 V	prohibited: insulating screen required between device and busbars					

These clearances can be reduced for special installations as long as the configuration is checked by tests.





## **Control wiring**



## Remote tripping by MN or MX release

Power consumption is approximately:

- 30 VA for pick-up of the MN and MX releases
- 300 VA to 500 VA for the motor mechanism.

The table below indicates the maximum permissible cable length for different supply voltages and cable cross-sectional areas.

#### Recommended maximum cable lengths (in metres)

Power supply voltage (V DC) Cable cross-section (mm²)		12 V		24 V		48 V	
		1.5	2.5	1.5	2.5	1.5	2.5
MN	U source 100 %	15	-	160	-	640	-
	U source 85 %	7	_	40	_	160	_
MX	U source 100 %	60	-	240	-	960	_
	U source 85 %	30	-	120	_	480	_
Motor mech	nanism U source 100 %	-	_	10	16	65	110
	U source 85 %	-	-	2	4	17	28

Note: the indicated length is that of each of the two wires.

## 3P+N: supply from the top T2 (89) Ø

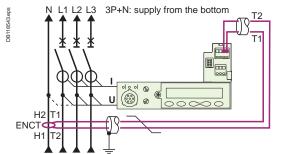
## External neutral voltage tap (ENVT)

This connection is required for accurate power measurements on 3-pole circuit breakers equipped with Micrologic 5 / 6 E trip units in installations with a distributed neutral. It can be used to measure phase-neutral voltages and calculate power using the 3 wattmeter method.

Compact NSX 3-pole circuit breakers come with a wire installed on the device for the connection to the ENVT.

This wire is equipped with a connector for connection to an external wire with the following characteristics:

- cross-sectional area of 1 mm² to 2.5 mm²
- maximum length of 10 metres.



External neutral current transformer (ENCT)

Modbus

24 V DC

## External neutral current transformer (ENCT)

This connection is required to protect the neutral on 3-pole circuit breakers equipped with Micrologic 5 / 6 A or E trip units in installations with a distributed neutral. For Micrologic 6 A or E, it is required for type G ground-fault protection.

The ENCT is connected in the same way for fixed, plug-in or withdrawable devices:

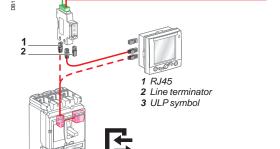
- fixed devices are connected via terminals T1 and T2 of the internal terminal block.
- plug-in and withdrawable devices are not connected via the auxiliary terminals. The wires must be connected/disconnected inside the device via terminals T1 and T2.

The ENCT must be connected to the Micrologic trip unit by a shielded twisted pair. The shielding should be connected to the switchboard earth only at the CT end, no more than 30 cm from the CT.

- the power connections of the CT to the neutral (H2 and H1) must be made in the same way for power supply from the top or the bottom (see figure). Make sure they are not reversed for devices with power supply from the bottom.
- cross-sectional area of 0.4 mm<sup>2</sup> to 1.5 mm<sup>2</sup>
- maximum length of 10 metres.

## **ULP connection system between Micrologic,** FDM 121 switchboard display and Modbus interface

The ULP (Universal Logic Plug) wiring system used by Compact NSX for connections through to the Modbus network requires neither tools nor settings. The prefabricated cords are sued for both data transfer and distribution of 24 V DC power. Connectors on each component are identified by ULP (Universal Logic Plug) symbols, ensuring total compatibility between each component.



ULP connection system.

**ULP** wiring

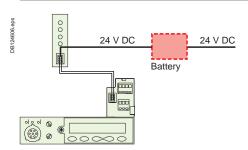
#### Available cords

All connections are made with prefabricated cords:

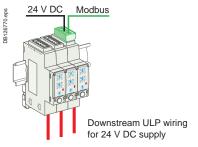
- NSX cord for connection of the internal terminal block to the Modbus interface or the FDM 121 display via an RJ45 connector. The cord is available in three lengths, 0.35 m. 1.3 m and 3 m
- ULP cords with RJ45 connectors at each end for the other connections between components. The cord is available in six lengths, 0.3 m, 0.6 m, 1 m, 2 m, 3 m and 5 m. For greater distances, two cords can be interconnected using the RJ45 female/ female accessory.

Maximum length of 10 m between 2 modules and 30 m in all.

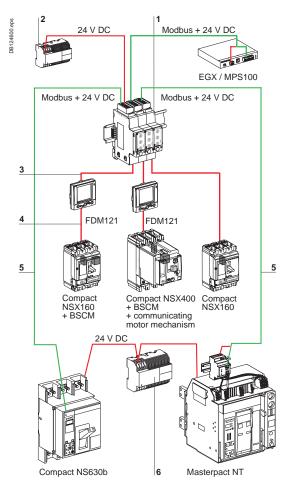
A line terminator must be fitted to all components with an unused RJ45 connector.



Power supply, without the Communication function, via the terminal block with a backup battery.



Supply, with the Communication function, via the Modbus interface



- Modbus interface module with connection accessory.
- 2 24 V DC power supply of Micrologic for Compact NSX and communication modules
- 3 ULP cord.
- 4 NSX cord.
- 5 Modbus cable + 24 V DC: ref. 50965 (Schneider Electric) recommended or ref. 7895A (Belden).
- 6 24 V DC power supply of Micrologic for Compact NS/ Masterpact.

## 24 V DC power-supply module

#### Use

An external 24 V DC power supply is required for installations with communication, whatever the type of trip unit.

On installations without communication, it is available as an option for Micrologic 5/6 to:

- modify settings when the circuit breaker is open (OFF position)
- display measurements when the current flowing through the circuit breaker is low
- maintain the display of the cause of tripping.

## Characteristics

The external 24 V DC supply may be used for the entire switchboard.

The required characteristics are indicated in the table below.

Characteristics

Characteristics	
Output voltage	24 V DC -20 % to +10 %
Ripple	±1 %
Overvoltage category (OVC)	OVC IV - as per IEC 60947-1

#### Sizing

Sizing must take into account all supplied modules.

Module	Consumption (mA)
Micrologic 5 / 6	40
BSCM module	10
FDM 121	40
Modbus communication interface	60
NSX cord U > 480 V AC	30
SDx / SDTAM module	20

## Wiring

## Micrologic 5 or 6 not using the Communication function

The external 24 V DC supply is connected via the circuit breaker terminal block. Use of a 24 V DC battery provides backup power for approximate 3 hours (100 mA) in the event of an interruption in the external supply.

## Micrologic 5 or 6 using the Communication function

The external 24 V DC supply is connected via the Modbus interface using a five-pin connector, including two for the power supply. Stacking accessories (see page A-29) can be used to supply a number of interfaces by fast clip-on connection.

The 24 V DC power is distributed downstream by the ULP (Universal Logic Plug) communication cords with RJ45 connectors. This system ensures both data transfer and power distribution to the connected modules.

#### Recommendations for 24 V DC wiring

- Do not connect the positive terminal to earth.
- Do not connect the negative terminal to earth.
- The maximum length for each conductor (+/-) is ten metres.
- For connection distances greater than ten metres, the plus and minus conductors of the 24 V DC supply must be twisted to improve EMC.
- The 24 V DC conductors must cross the power cables perpendicularly. If this is difficult or impossible, the plus and minus conductors must be twisted.

#### Modbus

Each Compact NSX circuit breaker equipped with Micrologic 5/6 and an FDM 121 display is connected to the Modbus network via the Modbus interface module. Connection of all the circuit breakers and other Modbus devices in the switchboard to a Modbus bus is made much easier by using a Modbus RJ45 junction block installed in the switchboard.

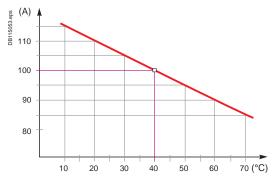
## Recommendations for Modbus wiring

- The shielding may be earthed.
- The conductors must be twisted to improve immunity (EMC).
- The Modbus conductors must cross the power cables perpendicularly.

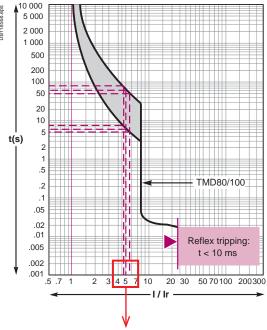
## **Temperature derating**

# Compact NSX100 to 250 equipped with thermal-magnetic trip units

When thermal-magnetic trip units are used at ambient temperatures other than 40 °C, the Ir pick-up is modified.



Temperature derating curve for Compact NSX100.



Example 1. Fault I = 500 A

I/Ir	4.5	5	5.5
T°C	20 °C	40 °C	60 °C
t min.	8 s	6 s	5 s
t max.	80 s	60 s	50 s

Thermal-protection curve with minimum and maximum values.

The overload protection is calibrated at 40  $^{\circ}$ C in the lab. This means that when the ambient temperature is less or greater than 40  $^{\circ}$ C, the Ir protection pick-up is slightly modified.

To obtain the tripping time for a given temperature:

- see the tripping curves for 40 °C (see page E-2 and page E-3)
- determine tripping times corresponding to the Ir value (thermal setting on the device), corrected for the ambient temperature as indicated in the tables below.

## Settings of Compact NSX100 to 250 equipped with TM-D and TM-G trip units, as a function of the temperature

The table indicates the real Ir (A) value for a given rating and temperature.

Rat.	Temp	oeratu	re (°C	)									
(A)	10	15	20	25	30	35	40	45	50	55	60	65	70
16	18.4	18.7	18	18	17	16.6	16	15.6	15.2	14.8	14.5	14	13.8
25	28.8	28	27.5	27	26.3	25.6	25	24.5	24	23.5	23	22	21
32	36.8	36	35.2	34.4	33.6	32.8	32	31.3	30.5	30	29.5	29	28.5
40	46	45	44	43	42	41	40	39	38	37	36	35	34
50	57.5	56	55	54	52.5	51	50	49	48	47	46	45	44
63	72	71	69	68	66	65	63	61.5	60	58	57	55	54
80	92	90	88	86	84	82	80	78	76	74	72	70	68
100	115	113	110	108	105	103	100	97.5	95	92.5	90	87.5	85
125	144	141	138	134	131	128	125	122	119	116	113	109	106
160	184	180	176	172	168	164	160	156	152	148	144	140	136
200	230	225	220	215	210	205	200	195	190	185	180	175	170
250	288	281	277	269	263	256	250	244	238	231	225	219	213

**Example 1.** What is the tripping time of a Compact NSX100 equipped with a TM100D trip unit set to 100 A, for an overload I = 500 A?

The overload I/Ir is calculated as a function of the temperature. Use the above values and the curve on page E-3 (shown on the left) to determine the corresponding time.

- At 40 °C, Ir = 100 A, I/Ir = 5 and the tripping time is between 6 and 60 seconds.
- At 20 °C, Ir = 110 A, I/Ir = 4.54 and the tripping time is between 8 and 80 seconds.
- At 60 °C, Ir = 90 A, I/Ir = 5.55 and the tripping time is between 5 and 50 seconds.

**Example 2.** What is the setting to obtain a real Ir of 210 A, taking into account the temperature, for a Compact NSX250 equipped with a TM250D trip unit? The necessary dial setting, in amperes, is shown below.

- At 40 °C, Ir = (210/250) x 250 A = 210 A
- At 20 °C, Ir = (210/277) x 250 A = 189.5 A
- At 60 °C, Ir = (210/225) x 250 A = 233 A

## Additional derating coefficient for an add-on module

The values indicated in the previous tables are valid for **fixed** circuit breakers equipped with one of the following modules:

- Vigi module
- insulation monitoring module
- ammeter module
- current-transformer module.

They also apply for **plug-in or withdrawable** circuit breakers equipped with:

- ammeter module
- current-transformer module.

However, for **plug-in or withdrawable** circuit breakers equipped with a Vigi module or an insulation monitoring module, the coefficient 0.84 must be applied. The table below sums up the situation for add-on modules.

Type of device	Circuit breaker	TM-D trip-unit rating	Vigi or insulation monitoring module	Ammeter or current transformer module
Fixed	NSX100	16 to 100		
	NSX160 to 250	125 to 160		
	NSX250	200 to 250	1	
Plug-in or	NSX100	16 to 100		1
withdrawable	NSX160	125 to 160		
	NSX250	200 to 250	0.84	

# Compact NSX equipped with electronic trip units

Electronic trip units are not affected by variations in temperature. If the trip units are used in high-temperature environments, the Micrologic setting must nevertheless take into account the temperature limits of the circuit breaker.

Changes in temperature do not affect measurements by electronic trip units.

- The built-in CT sensors with Rogowski toroids measure the current.
- $\blacksquare$  The control electronics compare the value of the current to the settings defined for 40  $^{\circ}\text{C}.$

Because temperature has no effect on the toroid measurements, the tripping thresholds do not need to be modified.

However, the temperature rise caused by the flow of current and the ambient temperature increase the temperature of the device. To avoid reaching the thermal withstand level of the equipment, it is necessary to limit the current flowing through the device, i.e. the maximum Ir setting as a function of the temperature.

## Compact NSX100/160/250

The table below indicates the maximum long-time (LT) protection setting Ir (A) depending on the ambient temperature.

Type of	Rating (A)	Temperature (°C)										
device		40	45	50	55	60	65	70				
NSX100/160												
Fixed, plug-in or withdr.		no der	ating									
NSX250												
Fixed, plug-in or	100	no der	ating									
withdrawable	160	no der	ating									
Fixed	250	250	250	250	245	237	230	225				
Plug-in or withdr.	250	250	245	237	230	225	220	215				

#### Compact NSX400 and 630

The table below indicates the maximum long-time (LT) protection setting Ir (A) depending on the ambient temperature.

Type of	Rating (A)	Temperature (°C)									
device		40	45	50	55	60	65	70			
NSX400											
Fixed	400	400	400	400	390	380	370	360			
Plug-in/withdr.	400	400	390	380	370	360	350	340			
NSX630											
Fixed	630	630	615	600	585	570	550	535			
Plug-in/withdr.	630	570	550	535	520	505	490	475			

Example. A fixed Compact NSX400 equipped with a Micrologic can have a maximum Ir setting of:

- 400 A up to 50 °C
- 380 A up to 60 °C.

## Additional derating coefficient for an add-on module

For fixed or plug-in / withdrawable circuit breakers, the addition of a:

- Vigi module
- insulation-monitoring module
- ammeter module
- current-transformer module

can modify the derating values. Apply the coefficients shown below.

## Derating of a Compact NSX equipped with a Micrologic trip unit

Type of device	Circuit breaker	Micrologic rating	Vigi / Insulation monitoring module	Ammeter module / External sensor (CT)
Fixed	NSX100	40 to 100		
	NSX160	40 to 160		
	NSX250	40 to 250	1	
Plug-in or	NSX100	40 to 100		
withdrawable	NSX160	40 to 160		4
	NSX250	40 to 250	0.86	'
Fixed	NSX400	250 to 400	0.97	
	NSX630	250 to 630	0.90	
Plug-in or	NSX400	250 to 400	0.97	
withdrawable	NSX630	250 to 630	0.90	

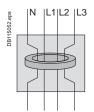
**Note**: to provide the Visu function, Compact NSX circuit breakers, with or without a Vigi module, are combined with INV switch-disconnectors. Tripping values for the selected combination are indicated in the Compact INS/INV catalogue.

# Installation recommendations

## **Power loss/ Resistance**

## Compact NSX equipped with thermalmagnetic trip units

Compact NSX thermal power loss values are used to calculate total temperature rise in the switchboard in which the circuit breakers are installed.



With a Vigi module, the deviation of the N and L3 bars required to pass through the toroid results in higher power losses compared to those of the L1 and L2 bars.

The values indicated in the tables below are typical values for a device at full rated load and  $50/60\,\text{Hz}$ .

#### Power loss per pole (P/pole) in Watts (W)

The value indicated is the power loss at  $I_N$ , 50/60 Hz, for a three-pole or four-pole circuit breaker. Measurement and calculation of power loss are carried out in compliance with the recommendations of Annex G of standard IEC 60947-2.

#### Resistance per pole (R/pole) in milliohms (m $\Omega$ )

The value of the resistance per pole is provided as a general indication for a new device

The value of the contact resistance must be determined on the basis of the measured voltage drop, in accordance with the manufacturer's test procedure (ABT instruction document no. 1 - BEE - 02.2 -A).

**Note**: this measurement is not sufficient to determine the quality of the contacts, i.e. the capacity of the circuit breaker to carry its rated current.

#### Additional power loss

Additional power loss is equal to the sum of the power dissipated by the following:

- Vigi module: note that the deviation of the N and L3 bars required to pass through the toroid results in higher power losses compared to those of the L1 and L2 bars (diagram opposite). When calculating total power loss, use L1, L2, L3 for a 3P device and N, L1, L2, L3 for a 4P device
- disconnecting contacts (plug-in and withdrawable devices)
- ammeter module
- transformer module.

#### Calculation of total power loss

Total power loss at full rated load and 50/60 Hz is equal to the sum of the device and additional power losses per pole multiplied by the number of poles (2, 3 or 4). If a Vigi module is installed, it is necessary to differentiate between N and L3 on one hand and L1 and L2 on the other.

## Compact NSX100 to 250 equipped with TM-D and TM-G trip units

Type of d	evice	Fixed d	evice	Additio	nal powe	r / pole		
3/4 poles	Rat. (A)	R/pole	P/pole	Vigi (N, L3)	Vigi (L1, L2)		Ammeter module	Transfo. module
NSX100	16	11.42	2.92	0	0	0	0	0
	25	6.42	4.01	0	0	0.1	0	0
	32	3.94	4.03	0.06	0.03	0.15	0.1	0.1
	40	3.42	5.47	0.10	0.05	0.2	0.1	0.1
	50	1.64	4.11	0.15	0.08	0.3	0.1	0.1
	63	2.17	8.61	0.3	0.15	0.4	0.1	0.1
	80	1.37	8.77	0.4	0.2	0.6	0.1	0.1
	100	0.88	8.8	0.7	0.35	1	0.2	0.2
NSX160	80	1.26	8.06	0.4	0.2	0.6	0.1	0.1
	100	0.77	7.7	0.7	0.35	1	0.2	0.2
	125	0.69	10.78	1.1	0.55	1.6	0.3	0.3
	160	0.55	13.95	1.8	0.9	2.6	0.5	0.5
NSX250	125	0.61	9.45	1.1	0.55	1.6	0.3	0.3
	160	0.46	11.78	1.8	0.9	2.6	0.5	0.5
	200	0.39	15.4	2.8	1.4	4	0.8	0.8
	250	0.3	18.75	4.4	2.2	6.3	1.3	1.3

## Compact NSX100 to 630 equipped with MA/1.3-M trip units

Type of o	device	Fixed d	evice	Additio	nal powe	r / pole		
3 poles	Rat. (A)	R/pole	P/pole	Vigi (N, L3)	Vigi (L1, L2)	Plug-in / withdr.	Ammeter module	Transfo. module
NOVAGO		4.40.40	0.00	` '				
NSX100	2.5	148.42	0.93	0	0	0	0	0
	6.3	99.02	3.93	0	0	0	0	0
	12.5	4.05	0.63	0	0	0	0	0
	25	1.66	1.04	0	0	0.1	0	0
	50	0.67	1.66	0.2	0.1	0.3	0.1	0.1
	100	0.52	5.2	0.7	0.35	1	0.2	0.2
NSX160	150	0.38	8.55	1.35	0.68	2.6	0.45	0.45
NSX250	220	0.3	14.52	2.9	1.45	4.89	0.97	0.97
NSX400	320	0.12	12.29	3.2	1.6	6.14	1.54	1.54
NSX630	500	0.1	25	13.99	7	15	3.75	3.75

# Compact NSX equipped with electronic trip units

The values indicated in the table below are typical values for a device at full rated load and 50/60 Hz. The definitions and information are the same as that for circuit breakers equipped with thermal-magnetic trip units.

## Compact NSX100 to 630 equipped with Micrologic trip units

Type of de	evice	Fixed d	evice	Additio	nal powe	r / pole		
3/4 poles	Rat. (A)	R/pole	P/pole	Vigi (N, L3)	Vigi (L1, L2)	Plug-in / withdr.	Ammeter module	Transfo. module
NSX100	40	0.84	1.34	0.1	0.05	0.2	0.1	0.1
	100	0.468	4.68	0.7	0.35	1	0.2	0.2
NSX160	40	0.73	1.17	0.4	0.2	0.6	0.1	0.1
	100	0.36	3.58	0.7	0.35	1	0.2	0.2
	160	0.36	9.16	1.8	0.9	2.6	0.5	0.5
NSX250	100	0.27	2.73	1.1	0.55	1.6	0.2	0.2
	250	0.28	17.56	4.4	2.2	6.3	1.3	1.3
NSX400	400	0.12	19.2	3.2	1.6	9.6	2.4	2.4
NSX630	630 <sup>(1)</sup>	0.1	39.69	6.5	3.25	19.49	5.95	5.95

<sup>(1)</sup> The power loss values for the Vigi modules and withdrawable circuit breakers are given for 570 A.



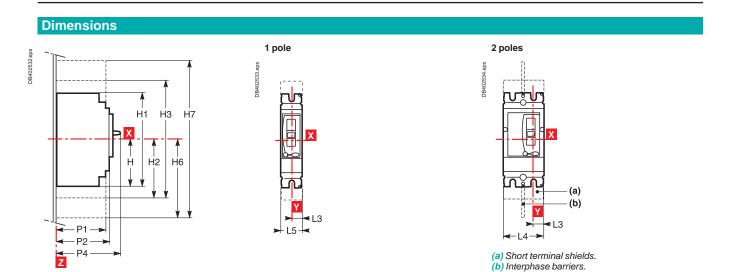
# **Dimensions and connection**

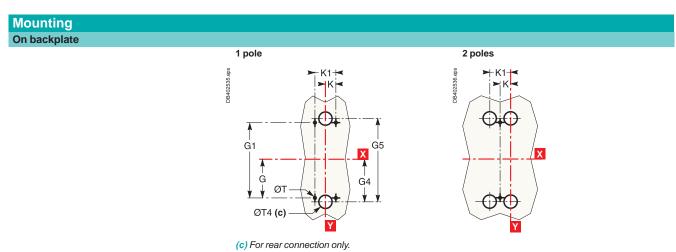
## Contents

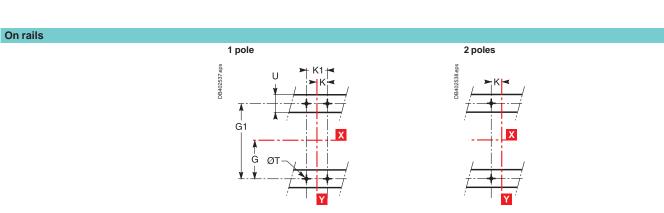
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## Dimensions, mounting, cutout

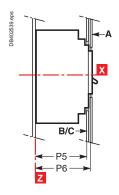
Compact NSX100 to NSX250 fixed version, 1P-2P

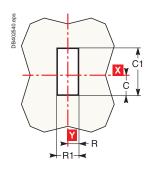


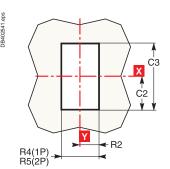


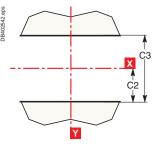


# Front-panel cutout On backplate

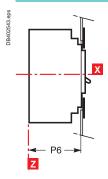


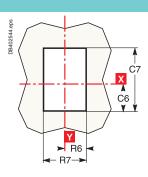






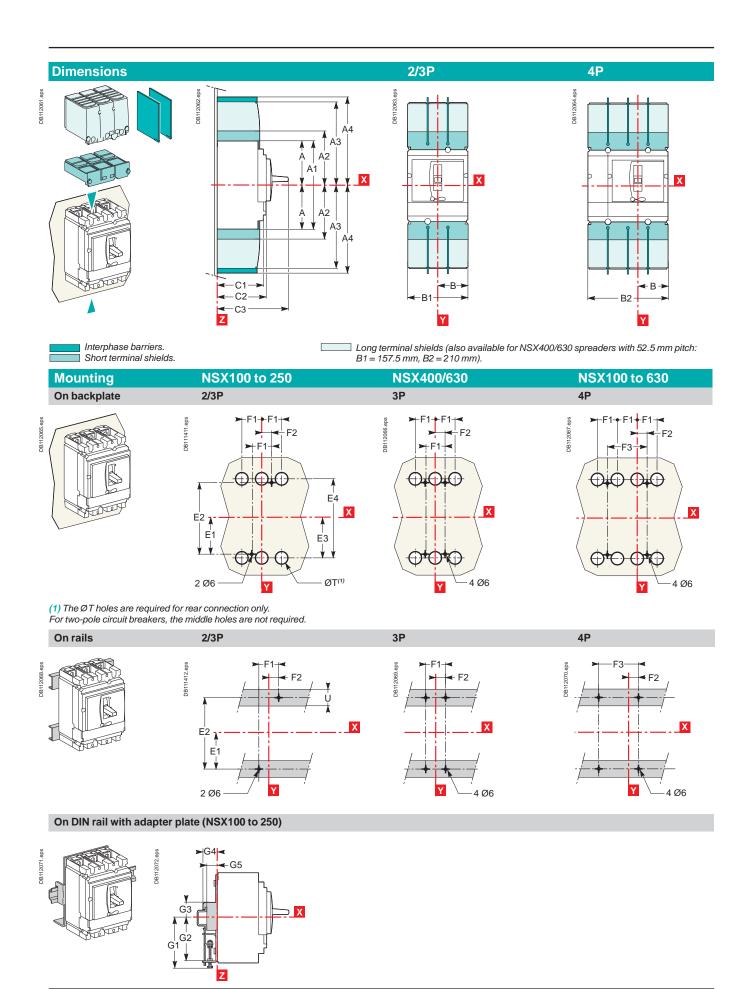
## With escutcheon



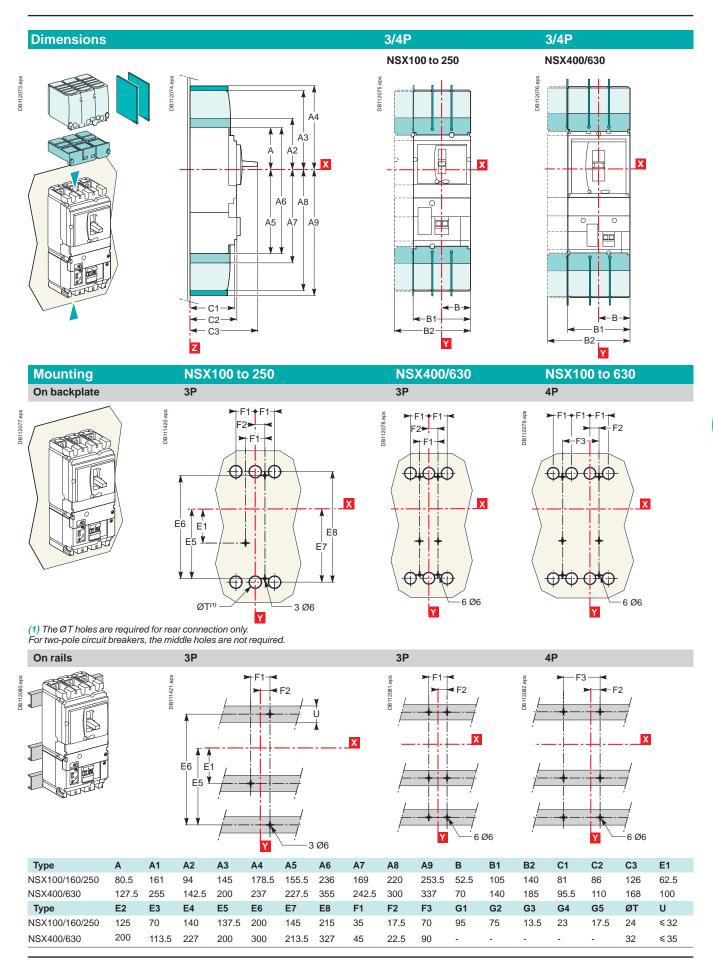


Dimensions (I	mm)										
Туре	С	C1	C2	C3	C6	C7	G	G1	G4	G5	Н
NSX100/250	29	76	54	108	43	104	62.5	125	70	140	80.5
Туре	H1	H2	Н3	H4	H6	H7	K	K1	L3	L4	L5
NSX100/250	161	94	188	160.5	178.5	357	17.5	35	17.5	70	35
Туре	P1	P2	P4	P5	P6	R	R1	R2	R4	R5	R6
NSX100/250	81	86	111	83	88	14.5	29	19	38	73	29
Туре	R7	ØT	ØT4	U							
NSX100/250	58	6	22	≤ 32							

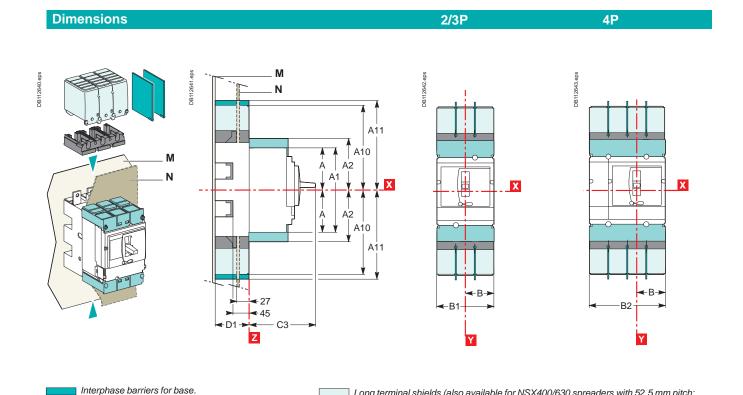
## Compact NSX100 to 630 fixed version

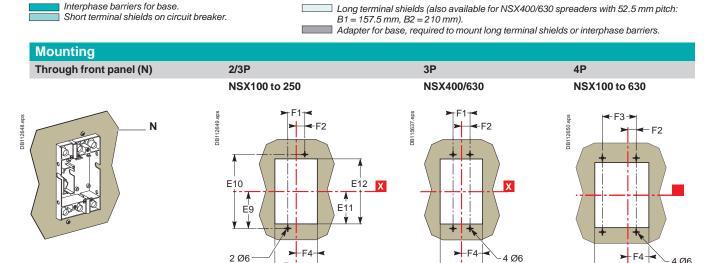


# Vigicompact NSX100 to 630 fixed version



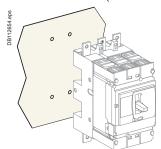
Compact NSX100 to 630 plug-in version

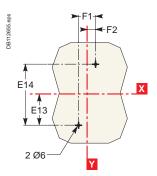


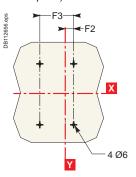


On backplate (M) 2/3P 4P

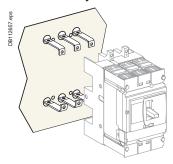
Front connection (an insulating screen is supplied with the base and must be fitted between the base and the backplate)

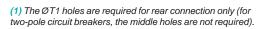


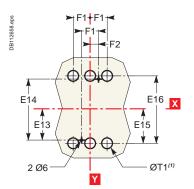


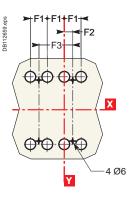


## Connection by exterior-mounted rear connectors

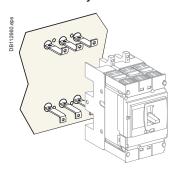




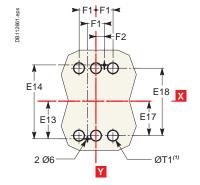


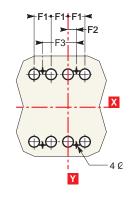


## Connection by interior-mounted rear connectors

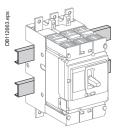


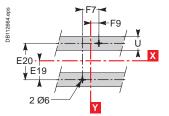
(1) The ØT1 holes are required for rear connection only (for two-pole circuit breakers, the middle holes are not required).

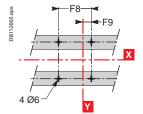




On rails	2/3P	4P

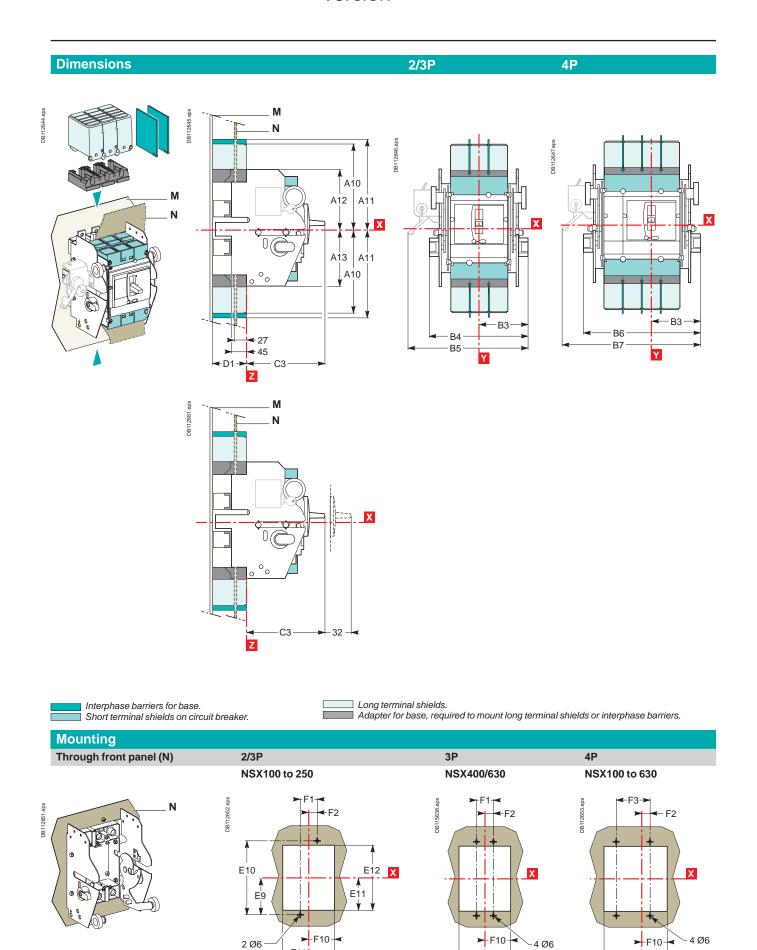






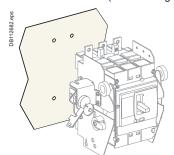
Туре	Α	A1	A2	A10	A11	В	B1	B2	C3	D1	E9	E10	E11	E12	E13	E14	E15
NSX100/160/250	80.5	161	94	175	210	52.5	105	140	126	75	95	190	87	174	77.5	155	79
NSX400/630	127.5	255	142.5	244	281	70	140	185	168	100	150	300	137	274	125	250	126
Туре	E16	E17	E18	E19	E20	F1	F2	F3	F4	F5	F6	F7	F8	F9	ØT1	U	
NSX100/160/250	158	61	122	37.5	75	35	17.5	70	54.5	109	144	70	105	35	24	≤32	
NSX400/630	252	101	202	75	150	45	22.5	90	71.5	143	188	100	145	50	33	≤35	

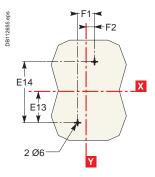
Compact NSX100 to 630 withdrawable version

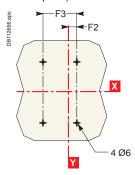


On backplate (M) 2/3P 4P

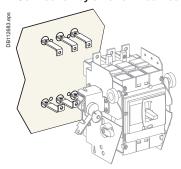
Front connection (an insulating screen is supplied with the base and must be fitted between the base and the backplate)

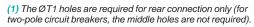




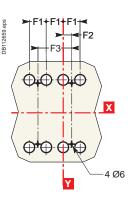


## Connection by exterior-mounted rear connectors

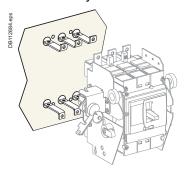




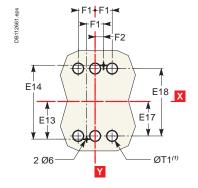
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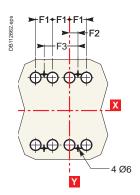


## Connection by interior-mounted rear connectors

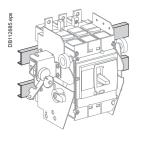


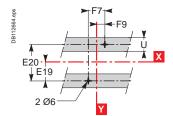
(1) The ØT1 holes are required for rear connection only (for two-pole circuit breakers, the middle holes are not required).

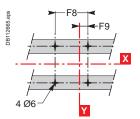




On rails	2/3P	4P
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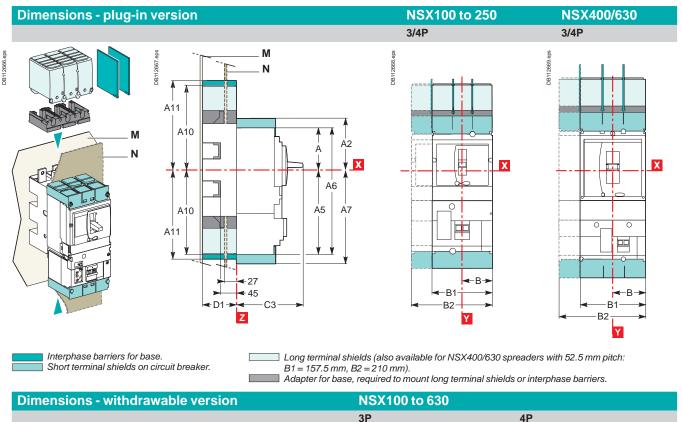




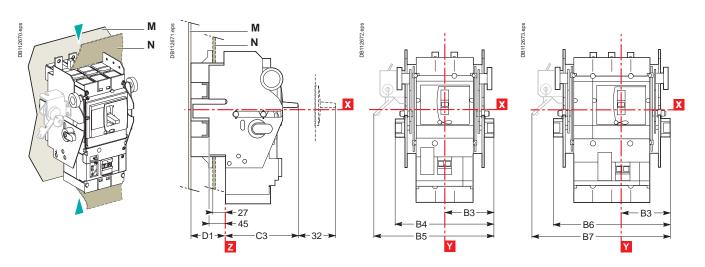


Туре	A10	A11	A12	A13	В3	B4	B5	B6	B7	C3	D1	E9	E10	E11	E12	E13	E14
NSX100/160/250	175	210	106.5	103.5	92.5	185	216	220	251	126	75	95	190	87	174	77.5	155
NSX400/630	244	281	140	140	110	220	250	265	295	168	100	150	300	137	274	125	250
Туре	E15	E16	E17	E18	E19	E20	F1	F2	F3	F7	F8	F9	F10	F11	F12	ØT1	U
NSX100/160/250	79	158	61	122	37.5	75	35	17.5	70	70	105	35	74	148	183	24	≤32
NSX400/630	126	252	101	202	75	150	45	22.5	90	100	145	50	91.5	183	228	33	≤ 35

Vigicompact NSX100 to 630 plug-in and withdrawable versions



3P



## **Mounting**

## Through front panel (N)

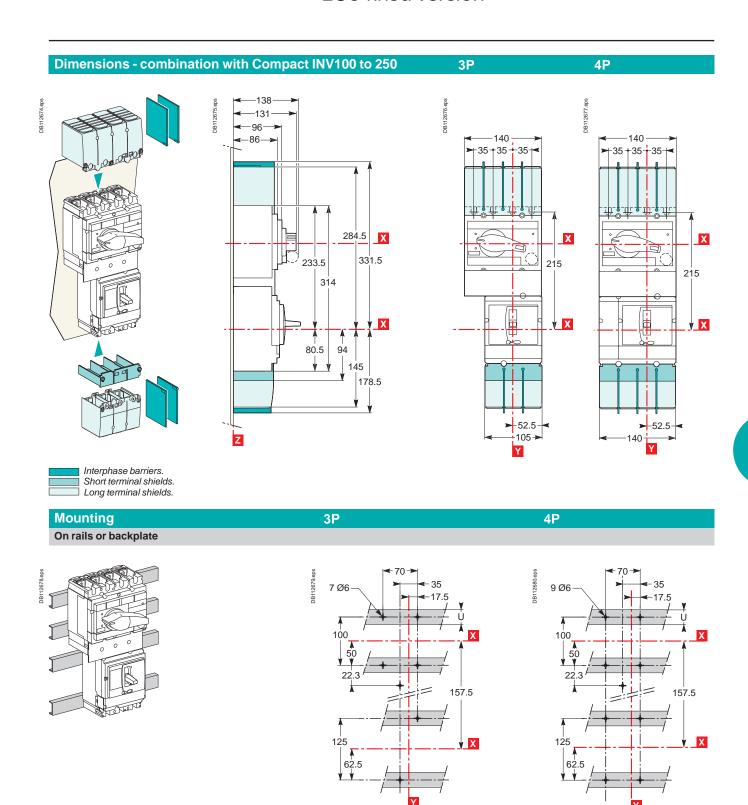
See Compact NSX100 to 630 plug-in version, page C-6, or withdrawable version, page C-8

See Compact NSX100 to 630 plug-in version, page C-7, or withdrawable version, page C-9

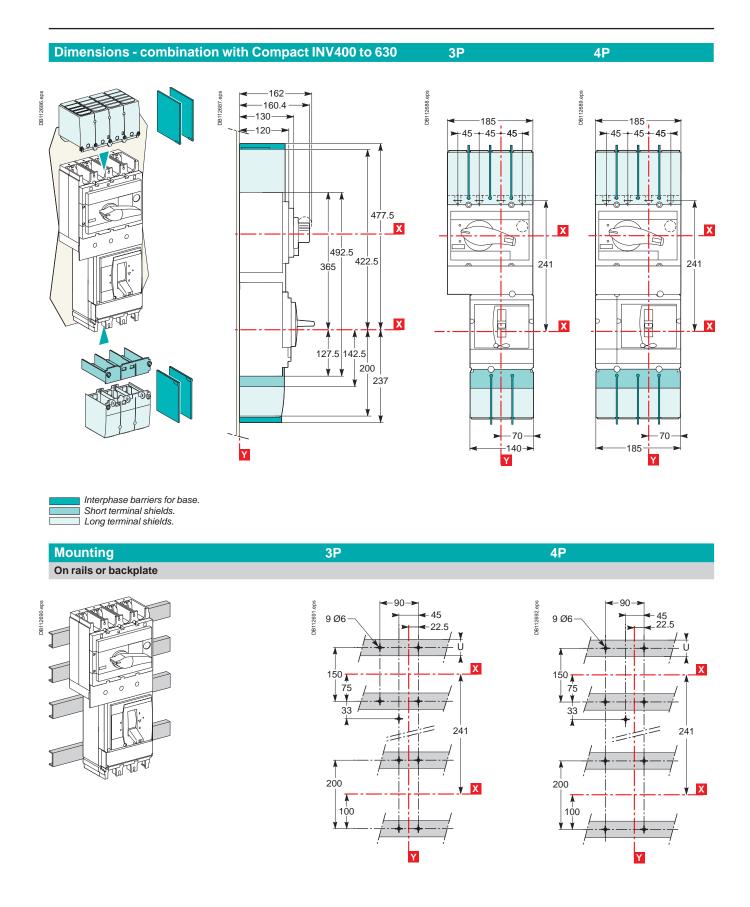
See Compact NSX100 to 630 plug-in version, page C-7, or withdrawable version, page C-9

Туре	Α	A2	A5	A6	A7	A10	A11	В	B1	B2	В3	B4	B5	В6	В7	C3	D1
NSX100/160/250	80.5	94	155.5	236	169	175	210	52.5	105	140	92.5	185	216	220	251	126	75
NSX400/630	127.5	142.5	227.5	355	242.5	244	281	70	140	185	110	220	250	265	295	168	100

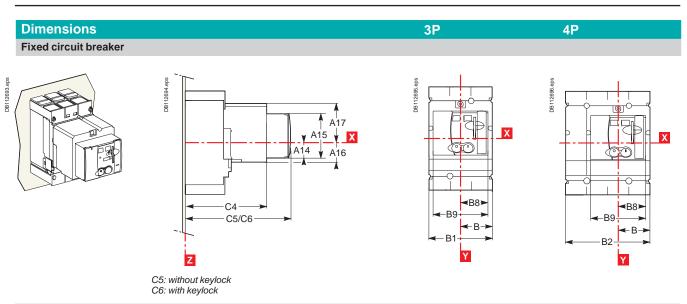
# Visu function for Compact NSX100 to 250 fixed version



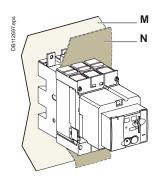
Visu function for Compact NSX400/630 fixed version

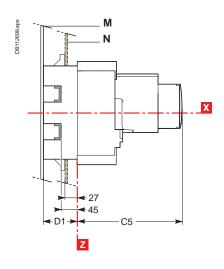


# Motor mechanism module for Compact NSX100 to 630

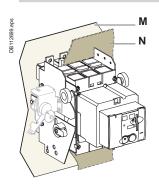


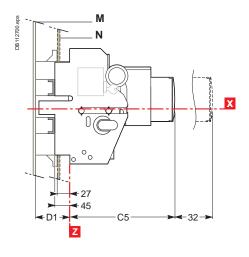
## Plug-in circuit breaker





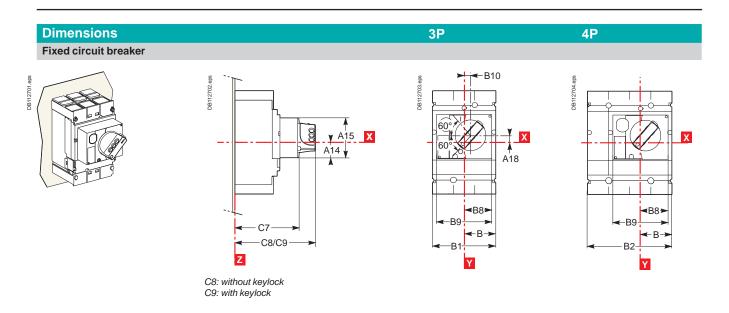
## Withdrawable circuit breaker



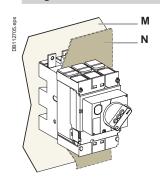


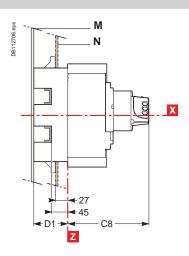
Туре	A14	A15	A16	A17	В	B1	B2	B8	В9	C4	C5	C6	D1
NSX100/160/250	27.5	73	34.5	62.5	52.5	105	140	45.5	91	143	182	209.5	75
NSX400/630	40	123	52	100	70	140	185	61.5	123	215	256	258	100

Direct rotary handle for Compact and Vigicompact NSX100 to 630

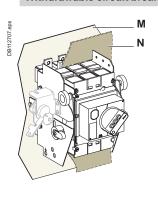


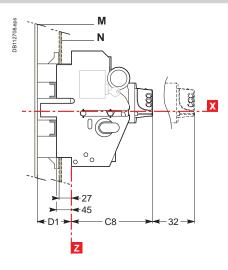
## Plug-in circuit breaker





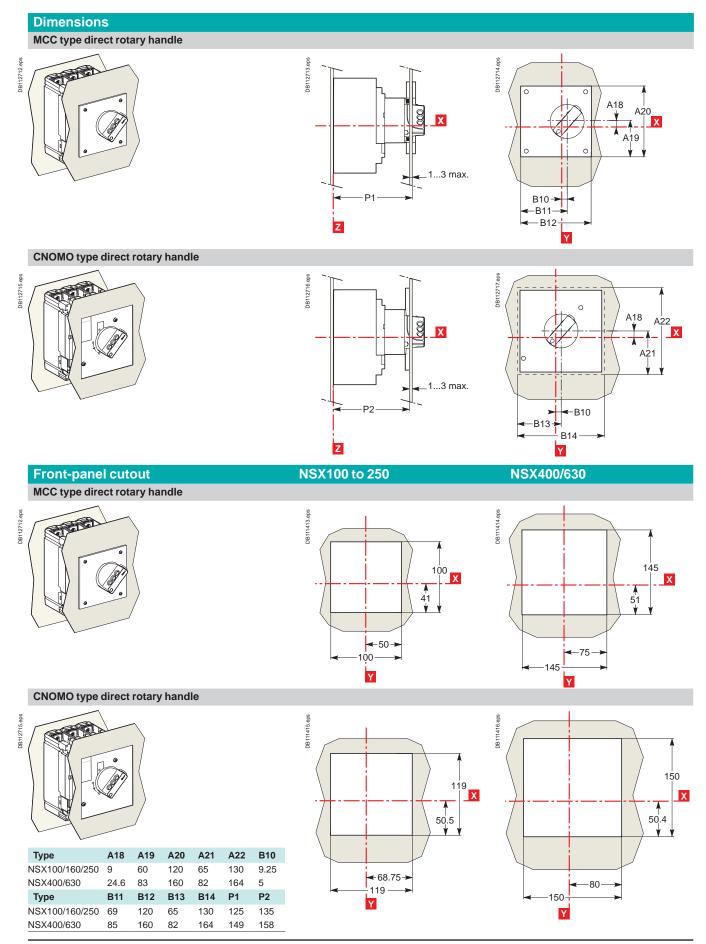
## Withdrawable circuit breaker





Туре	A14	A15	A18	В	B1	B2	B8	В9	B10	<b>C7</b>	C8	C9	D1
NSX100/160/250	27.5	73	9	52.5	105	140	45.5	91	9.25	121	155	164	75
NSX400/630	40	123	24.6	70	140	185	61.5	123	5	145	179	188	100

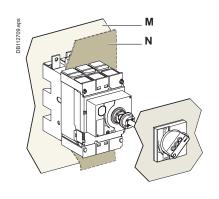
# MCC and CNOMO type direct rotary handles for Compact NSX100 to 630 fixed version

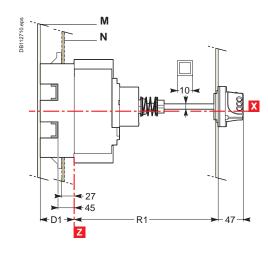


Extended rotary handle for Compact NSX100 to 630

## **Dimensions**

## Fixed and plug-in circuit breakers

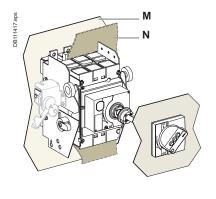


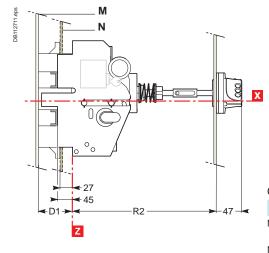


#### Cutout for shaft (mm)

туре	R1
NSX100/160/250	min. 171 max. 600
NSX400/630	min. 195

## Withdrawable circuit breaker

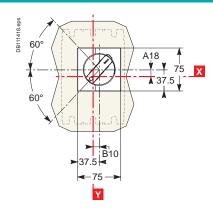


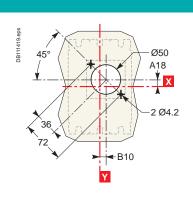


## Cutout for shaft (mm)

Туре	R2
NSX100/160/250	min. 248 max. 600
NSX400/630	min. 272 max. 600

## Dimensions and front-panel cutout

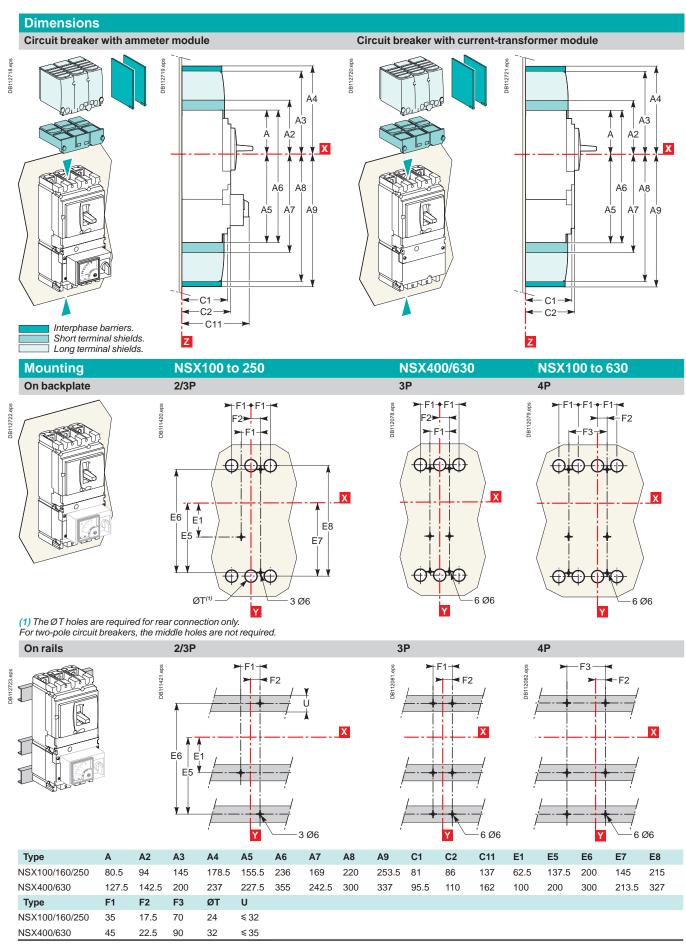




Туре	A18	B10	D1
NSX100/160/250	9	9.25	75
NSX400/630	24.6	5	100

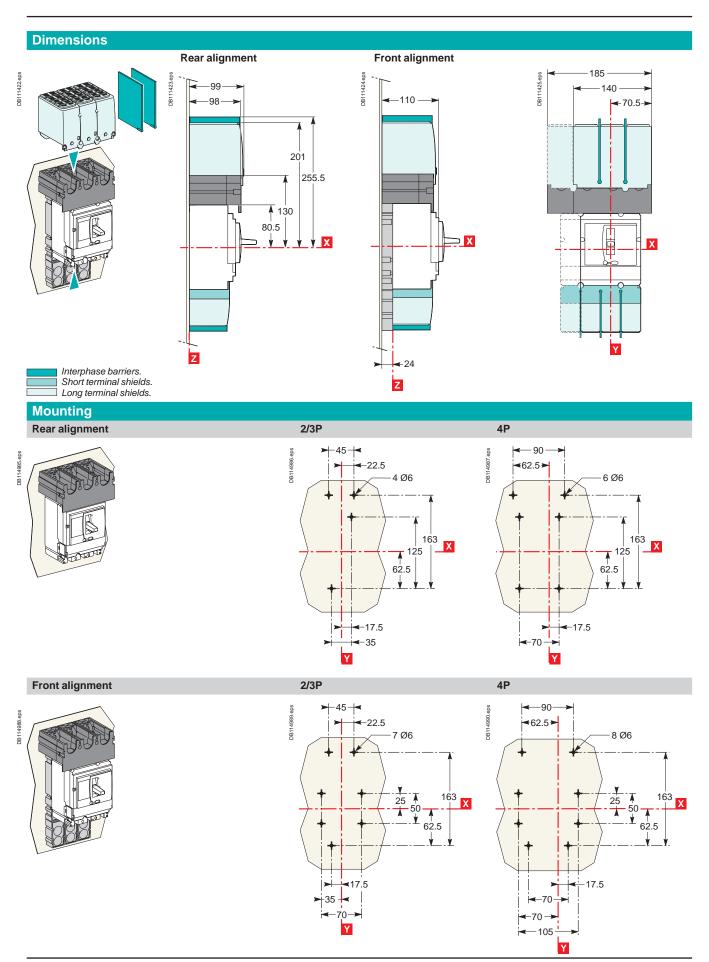
# **Dimensions and mounting**

Indication and measurement modules for Compact NSX100 to 630 fixed version



# **Dimensions and mounting**

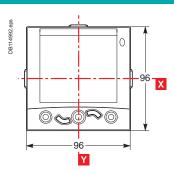
One-piece spreader for Compact NSX100 to 250 fixed version



# FDM121 switchboard display

#### **Dimensions**

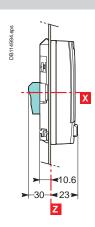


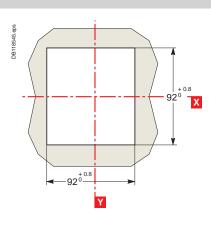


#### Mounting

#### Through panel



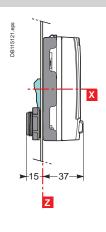


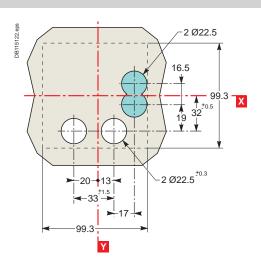


#### On panel







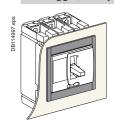


Connector (optional).

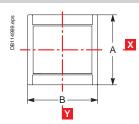
# Front-panel accessories Compact NSX100 to 630

#### IP30 front-panel escutcheons

#### For toggle, rotary handle or motor mechanism module

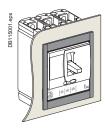




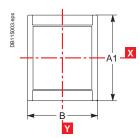


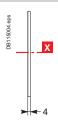


#### For toggle or rotary handle with access to trip unit

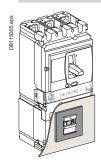




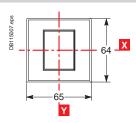




#### **For Vigicompact**



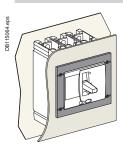




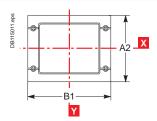


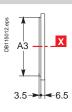
#### **IP40** front-panel escutcheons

#### For toggle, rotary handle or motor mechanism module and protection collar

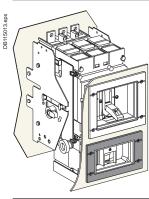




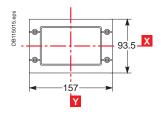




#### For Vigicompact with protection collar or ammeter module



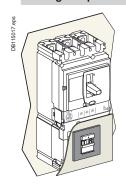




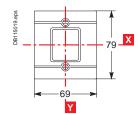


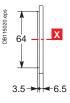
#### IP40 front-panel escutcheons (cont.)

#### For Vigicompact



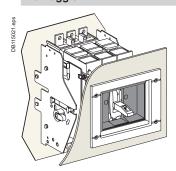




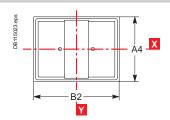


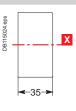
#### Protection collars for IP40 front-panel escutcheons

#### For toggle

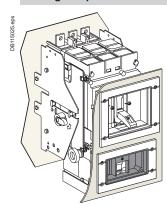


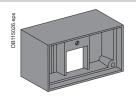


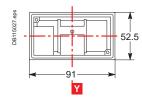




#### For Vigicompact









Circuit breaker with toggle or rotary handle.

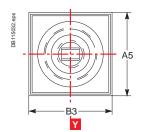


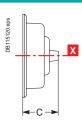
Circuit breaker with motor-mechanism module.

#### IP43 toggle cover



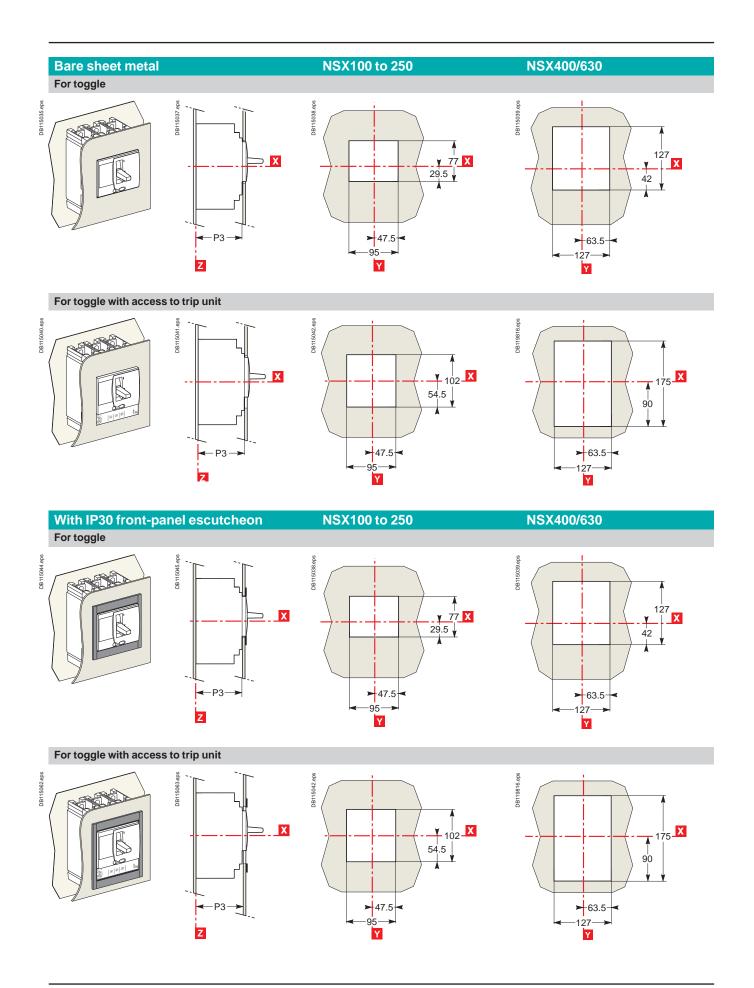






Туре	Α	A1	A2	А3	A4	A5	В	B1	B2	В3	С
NSX100/160/250	113	138	114	101	73	85	113	157	91	103	40
NSX400/630	163	211	164	151	122.5	138	163	189	122.5	138	60

# Front-panel cutouts Compact NSX100 to 630 fixed version



#### 

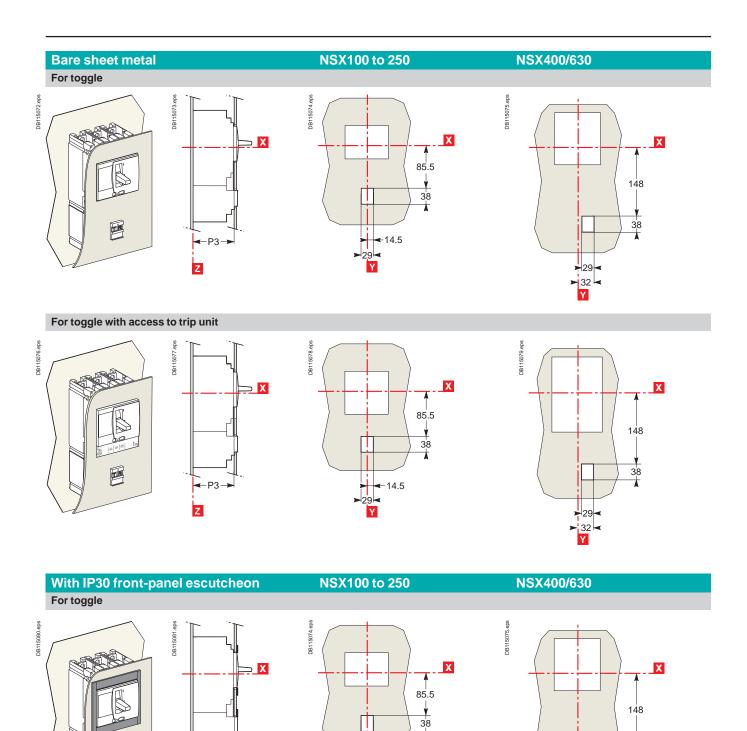
# With IP43 toggle cover For toggle See 98091191 See 98091

Туре	P3	P4
NSX100/160/250	88	89
NSX400/630	112	113

dimensions are given for a device position in ere $\Delta \ge 100 + (h \times 5)$ with respect to the door

Front-panel cutouts
Vigicompact NSX100 to 630 fixed version

38

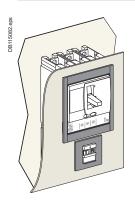


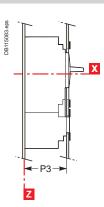
#### With IP30 front-panel escutcheon (cont.)

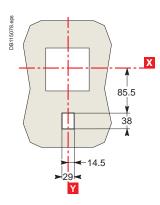
#### NSX100 to 250

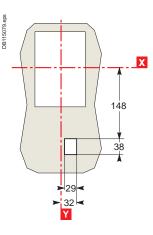
#### NSX400/630

For toggle with access to trip unit







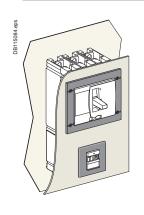


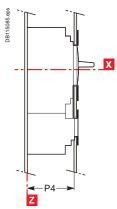
With IP40 front-panel escutcheon

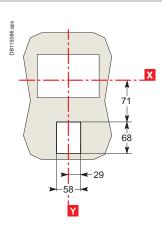
NSX100 to 250

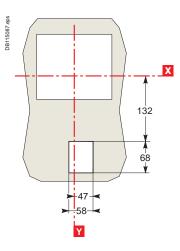
NSX400/630

For toggle









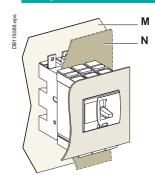
Туре	P3	P4
NSX100/160/250	88	89
NSX400/630	112	113

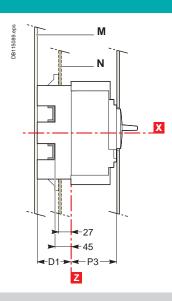
**Note:** door cutout dimensions are given for a device position in the enclosure where  $\Delta \ge 100 + (h \times 5)$  with respect to the door hinge.

# **Front-panel cutouts**

Compact NSX100 to 630 plug-in and withdrawable versions

#### **Plug-in version**





#### Bare sheet metal

See Compact NSX100 to 630 fixed version, page C-22

#### With IP30 front-panel escutcheon

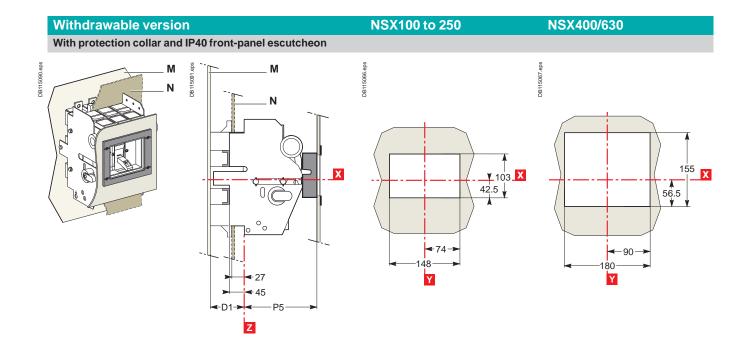
See Compact NSX100 to 630 fixed version, page C-22

#### With IP40 front-panel escutcheon

See Compact NSX100 to 630 fixed version, page C-23

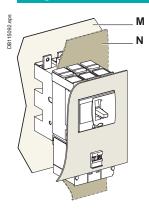
#### With toggle cover

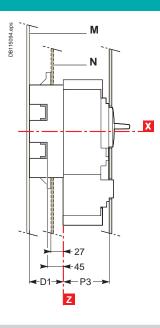
See Compact NSX100 to 630 fixed version, page C-23



# Vigicompact NSX100 to 630 plug-in and withdrawable versions

#### **Plug-in version**





#### Bare sheet metal

See Compact NSX100 to 630 fixed version, page C-24

#### With IP30 front-panel escutcheon

See Compact NSX100 to 630 fixed version, page C-24

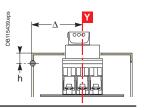
#### With IP40 front-panel escutcheon

See Compact NSX100 to 630 fixed version, page C-25

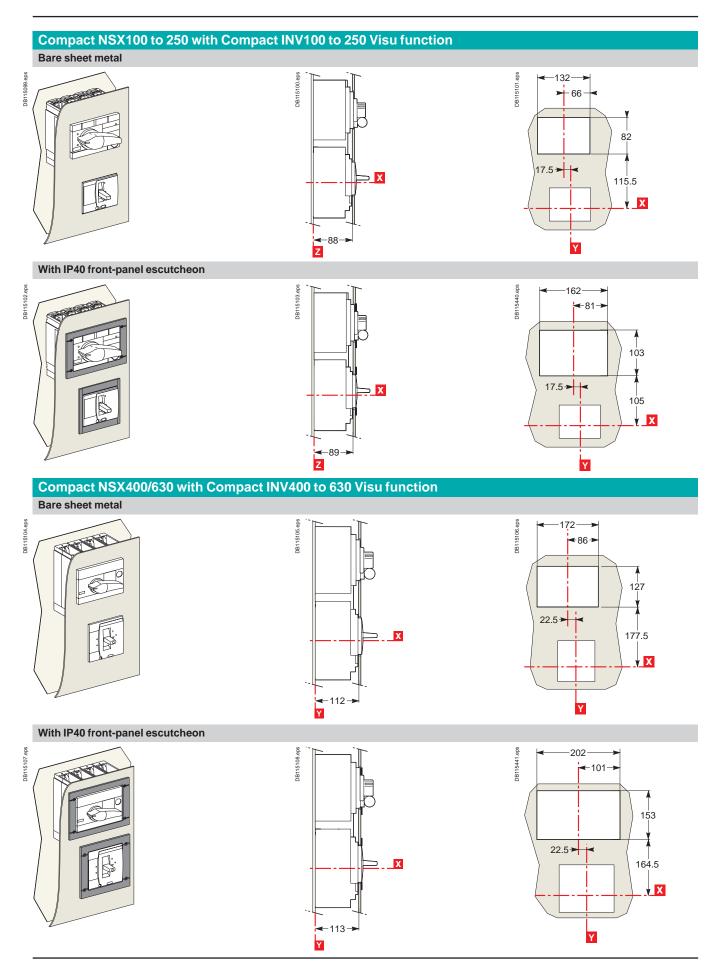
# 

Туре	D1	P3	P5
NSX100/160/250	75	88	123
NSX400/630	100	112	147

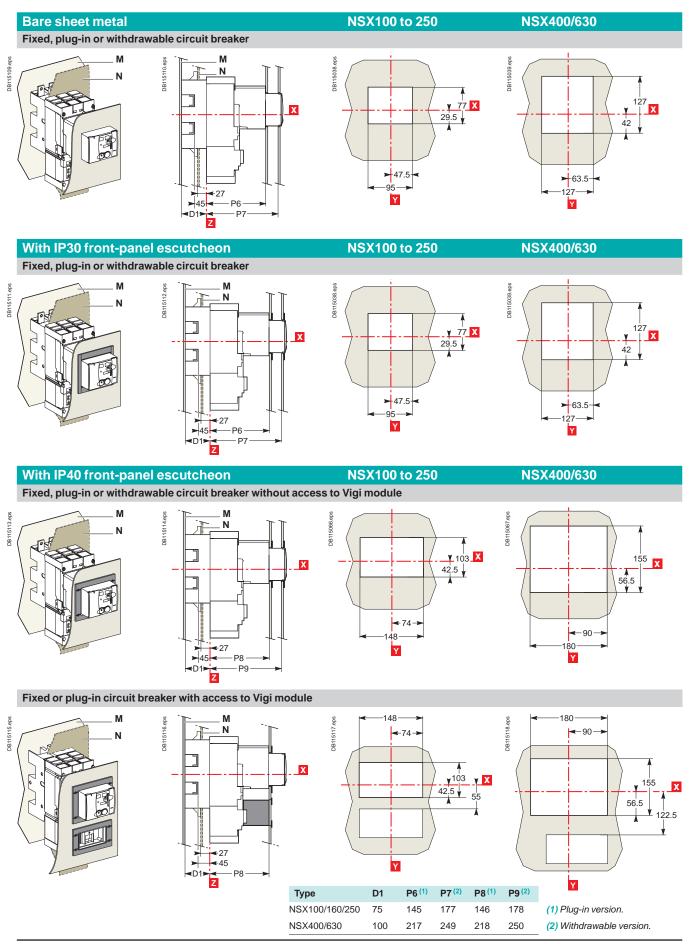
**Note**: door cutout dimensions are given for a device position in the enclosure where  $\Delta \ge 100 + (h \times 5)$  with respect to the door hinge.



**Front-panel cutouts**Visu function for Compact NSX100 to 630 fixed version

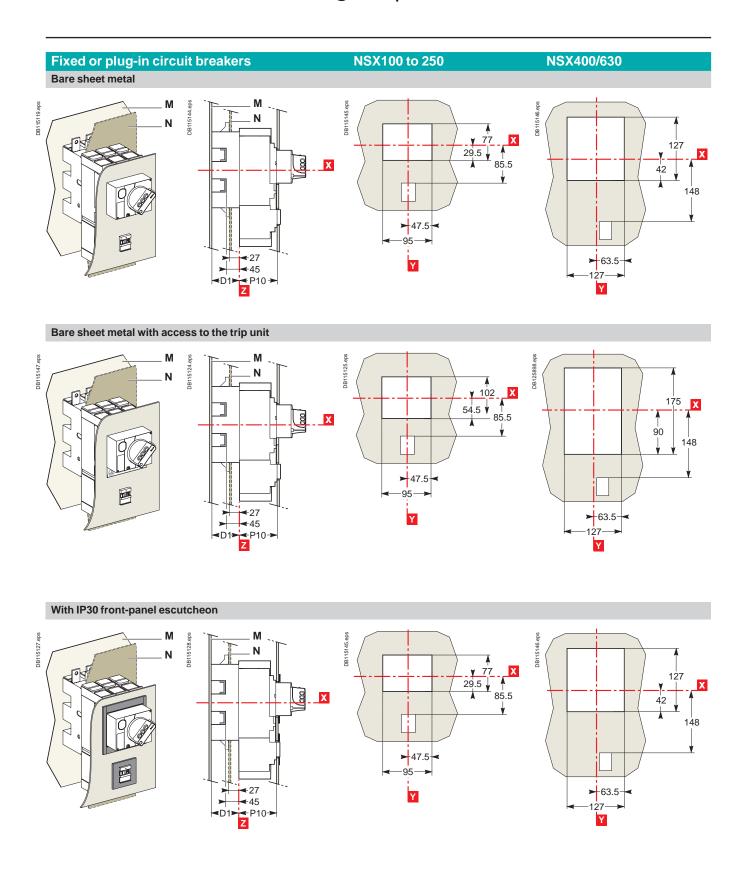


# Motor mechanism module for Compact and Vigicompact NSX100 to 630



# **Front-panel cutouts**

Direct rotary handle for Compact and Vigicompact NSX100 to 630

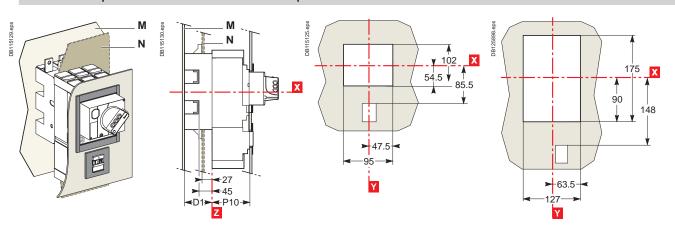


#### Fixed or plug-in circuit breakers (cont.)

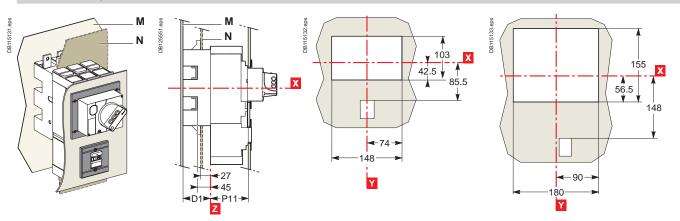
NSX100 to 250

NSX400/630

With IP30 front-panel escutcheon with access to the trip unit



#### With IP40 front-panel escutcheon



Fixed or withdrawal With IP40 front-panel es		NSX100 to 250	NSX400/630	
M N	M N N N 277 45 D1 P12 - Z	148 ————————————————————————————————————	- 55	155 5.5   122.5

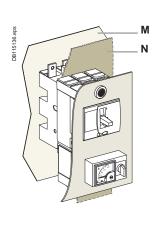
Туре	D1	P10	P11	P12	
NSX100/160/250	75	89	90	123	
NSX400/630	100	112	113	147	

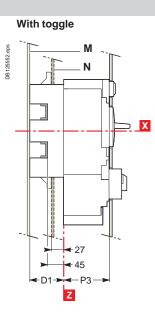
# **Front-panel cutouts**

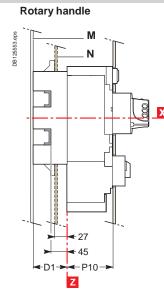
Indication and measurement modules for Compact NSX100 to 630

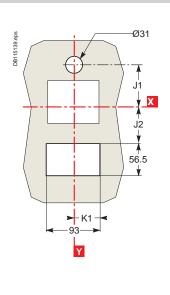
#### Fixed or plug-in circuit breakers with ammeter module and voltage-presence indicator

#### Bare sheet metal

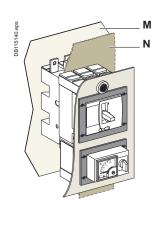


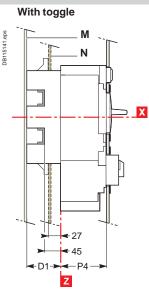


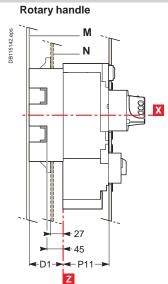


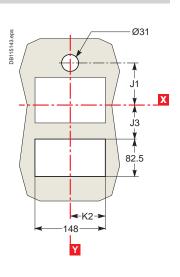


#### With IP40 front-panel escutcheon







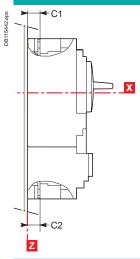


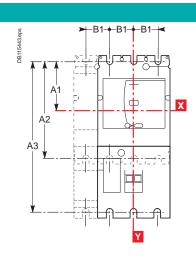
Туре	D1	J1	J2	J3	K1	K2	P3	P4	P10	P11
NSX100/160/250	75	78.5	67.5	55	46.5	74	88	89	89	90
NSX400/630	100	122	129	122.5	64.5	90	112	113	112	113

# **Power connections**

Compact and Vigicompact NSX100 to 630 fixed version

#### Connection locations

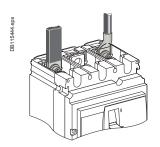


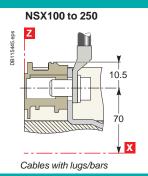


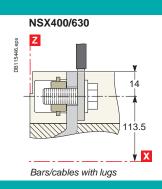
Туре	A1	A2	B1	C1	C2	
NSX100/160	70	140	35	19.5	19.5	
NSX250	70	140	35	21.5	19.5	
NSX400/630	113.5	227	45	26	26	

Туре	A1	A3	B1	C1	C2
NSX100/160 + Vigi	70	215	35	19.5	21.5
NSX250 + Vigi	70	215	35	21.5	21.5
NSX400/630 + Vigi	113.5	327	45	26	26

#### Front connection without accessories

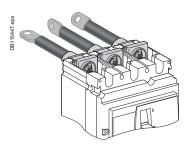




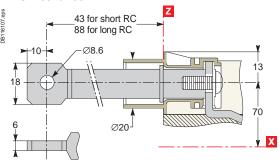


#### **Connection with accessories**

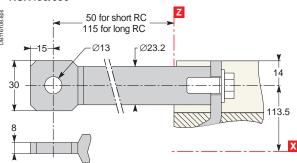
Long and short rear connectors



#### NSX100 to 250

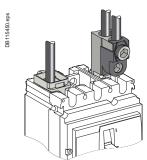


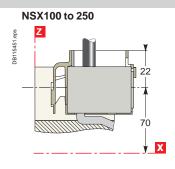
#### NSX400/630

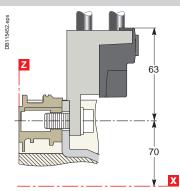


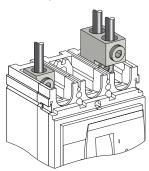
#### Connection with accessories (cont.)

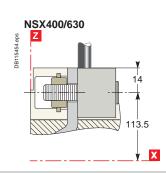
#### Bare-cable connectors

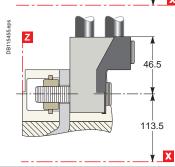




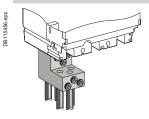


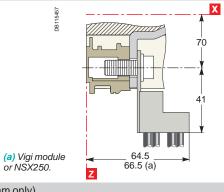




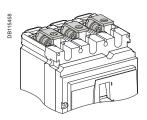


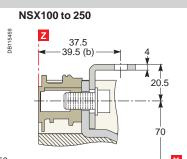
Distribution connectors (for NSX100 to 250 only)

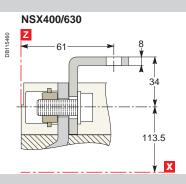




Right-angle terminal extensions (upstream only)



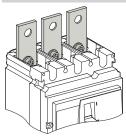


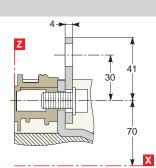


**(b)** NSX250.

DB115462

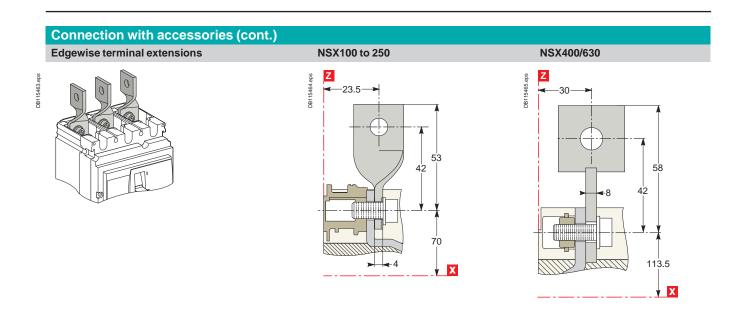
#### Straight terminal extensions (for NSX100 to 250 only)

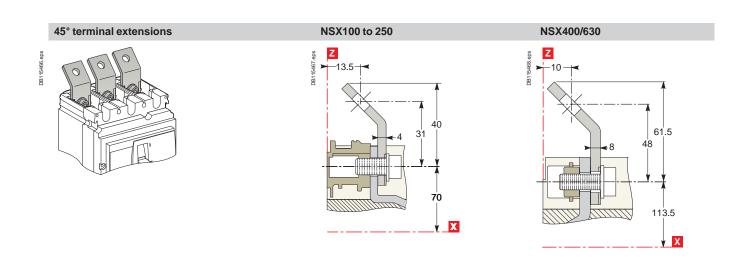


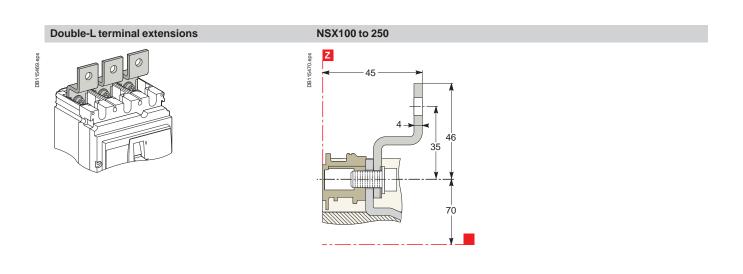


# **Power connections**

Compact and Vigicompact NSX100 to 630 fixed version

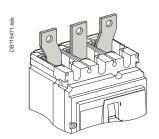


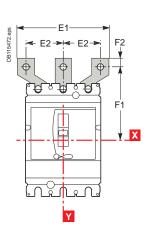


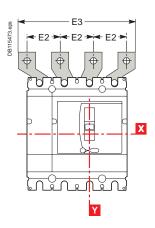


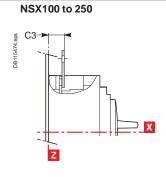
#### Connection with accessories (cont.)

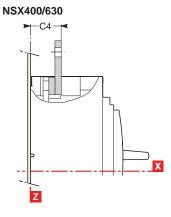
Spreaders 3P 4P





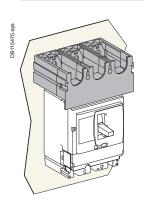


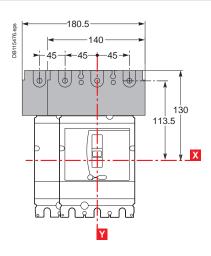


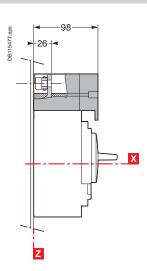


Туре	C3	C4	E1	E2	E3	F1	F2
NSX100/160	23.5	-	114	45	159	100	11
NSX250	25.5	-	114	45	159	100	11
NSX400/630	-	44	135 170	52.5 70	187.5 240	152.5 166	15 15

#### One-piece spreader (for NSX100 to 250 only)







## **Power connections**

■ for withdrawable versions, terminal shields are recommended.

Compact and Vigicompact NSX100 to 630 plug-in and withdrawable versions

## 

#### **Connection without accessories**

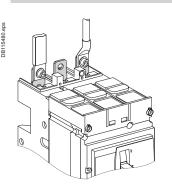
156.5

Front connection: mounting on backplate (M) or rails (V)

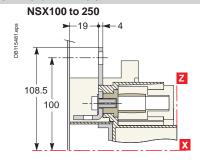
45

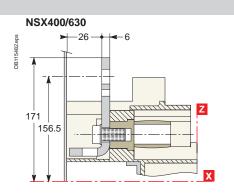
100

313

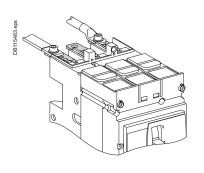


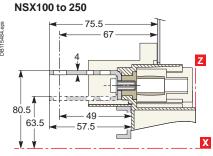
NSX400/630

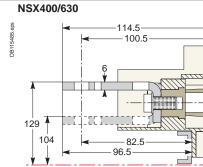


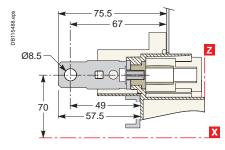


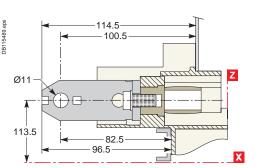
#### Rear connection: mounting through front panel (N) or on rails (V)





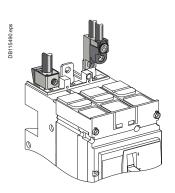


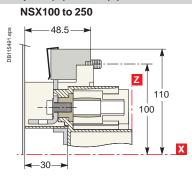


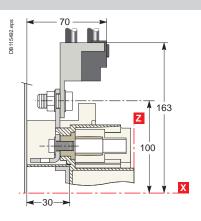


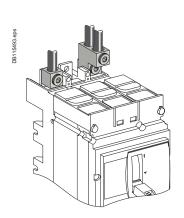
#### **Connection with accessories**

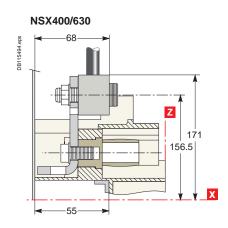
#### Bare-cable connectors: mounting on backplate (M) or rails (V)

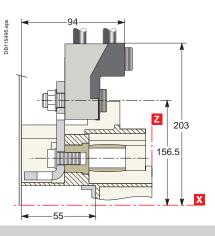




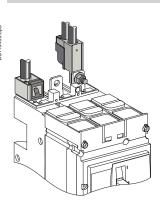


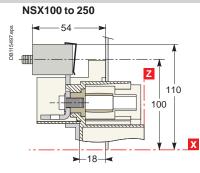


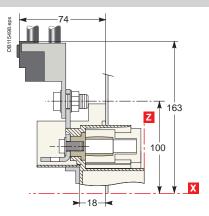


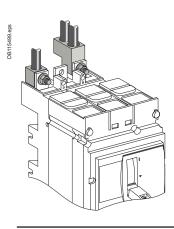


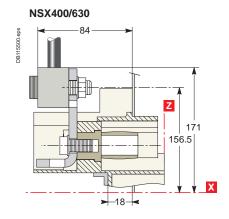
#### Bare-cable connectors: mounting through front panel (N) or on rails (V)

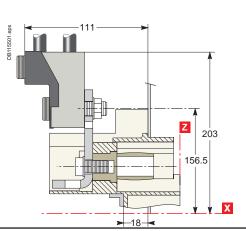










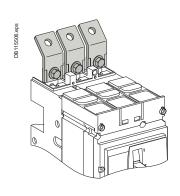


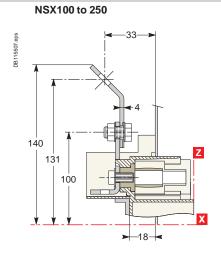
## **Power connections**

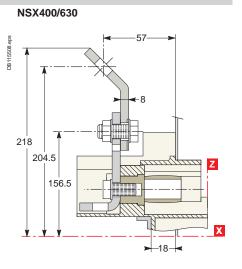
Compact and Vigicompact NSX100 to 630 plug-in and withdrawable versions

#### Connection with accessories (cont.)

45° extensions: mounting through front panel (N) or on rails (V)

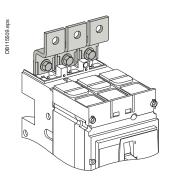


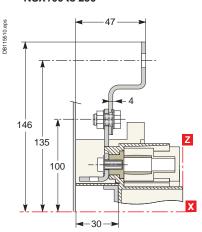




#### Double-L extensions: mounting on backplate (M) or rails (V)

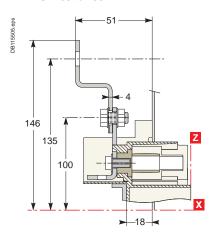
#### NSX100 to 250





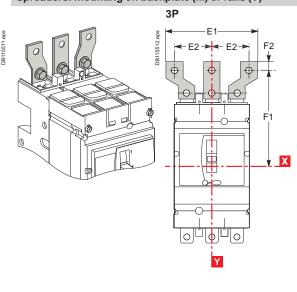
#### Double-L extensions: mounting through front panel (N) or on rails (V)

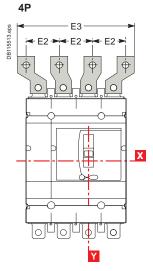
#### NSX100 to 250

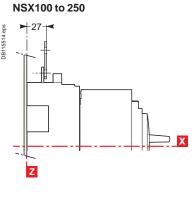


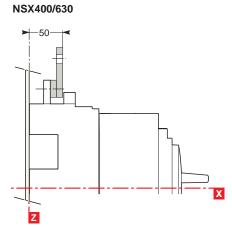
#### Connection with accessories (cont.)

#### Spreaders: mounting on backplate (M) or rails (V)





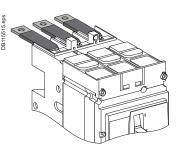




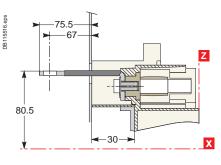
Туре	E1	E2	E3	F1	F2
NSX100 to 250	114	45	159	130	11
NSX400/630	135 170	52.5 70	187.5 240	195.5 209	15 15

#### Long insulated rear connectors: mounting on backplate (M) or rails (V)

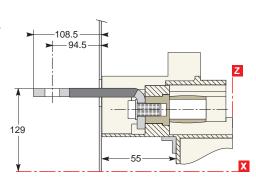
#### **Exterior-mounted rear connectors**



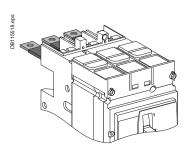




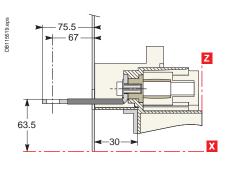
#### NSX400/630



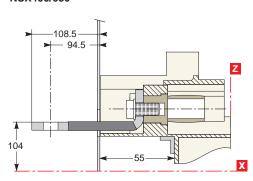
#### Interior-mounted rear connectors



#### NSX100 to 250



#### NSX400/630

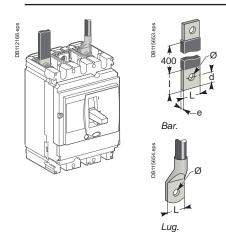


Long, insulated connectors are mandatory.

# Dimensions and connection

#### **Power connections**

Connection of insulated bars or cables with lugs to Compact and Vigicompact NSX100 to 630



Dimensions		NSX100	NSX160/250	NSX400/630
Bars	L (mm)	≤ 25	≤ 25	≤ 32
	l (mm)	d + 10	d + 10	d + 15
	d (mm)	≤ 10	≤ 10	≤ 15
	e (mm)	≤6	≤ 6	3 ≤ e ≤ 10
	Ø (mm)	6.5	8.5	10.5
Lugs	L (mm)	≤ 25	≤ 25	≤32
	Ø (mm)	6.5	8.5	10.5
Torque (Nm) (1)		10	15	50
Torque (Nm) (2)		5/5	5/5	20/11
Torque (Nm) (3)		8	8	20

- (1) Tightening torque on the circuit breaker for lugs or bars.
- (2) Tightening torque on fixed devices for rear connectors//tightening torque on plug-in or withdrawable devices for power connectors.
- (3) Tightening torque on the plug-in base for terminal extensions.

#### Accessories for NSX100 to 250

Straight terminal extensions



Tinned copper

Spreaders: separate parts



Tinned copper

Double-L terminal extensions



one-piece spreader



For U > 600 V, the mandatory insulation kit is not compatible with spreaders made up of separate parts. The one-piece spreader must be used.

#### Accessories for NSX400 and 630

Spreaders made up of separate parts for 52.5 and 70 mm pitch



Tinned copper

For U > 600 V, use of the 52.5 mm pitch spreaders requires a specific insulation kit.

The 70 mm pitch spreaders may not be used.

#### Accessories for NSX100 to 630

Right-angle terminal extensions



Tinned copper
To be mounted on upstream
side

Edgewise terminal extensions



Tinned copper

45° terminal extensions



Tinned copper

# Connection with accessories to NSX100 to 250 (IEC 228)

	Pole pitch				
	Without spreaders		35 mm		
	With spreaders			45 mm	
	Dimensions		With spreaders or terminal extensions		
				NSX100	NSX160/250
sd		Bars	L (mm)	≤25	≤25
JB115656.eps			l (mm)	20 ≤ 1 ≤ 25	20 ≤ 1 ≤ 25
DB11	<b>F C C C C C C C C C C</b>		d (mm)	≤10	≤10
	400		e (mm)	≤6	≤6
	# 4 0		Ø (mm)	6.5	8.5
	A	Lugs	L (mm)	≤25	≤25
			Ø (mm)	6.5	8.5
	•e	Torque (Nm) (1)		10	15
		Torque (Nm) (2)		5	5

- (1) Tightening torque on the circuit breaker for spreaders or terminal extensions.
- (2) Tightening torque on the plug-in base for spreaders or terminal extensions.

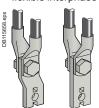
Spreaders and straight, right-angle, 45°, double-L and edgewise terminal extensions are supplied with flexible interphase barriers.

#### Connection with accessories to NSX400 and 630 (IEC 228)

	Pole pitch				
	Without spreaders			45 mm	
	With spreaders			52.5 or 70 mm	
	Dimensions		With spreaders	With terminal extensions	
sde		Bars	L (mm)	≤40	≤ 32
DB115656.eps			l (mm)	d + 15	30 ≤ I ≤ 34
DB11			d (mm)	≤20	≤ 15
	400		e (mm)	3 ≤ e ≤ 10	3 ≤ e ≤ 10
			Ø (mm)	12.5	10.5
		Lugs	L (mm)	≤ 40	≤ 32
			Ø (mm)	12.5	10.5
		Torque	(Nm) (1)	50	50
		Torque	(Nm) (2)	20	20

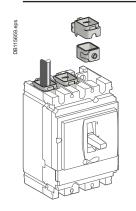
- (1) Tightening torque on the circuit breaker for spreaders or terminal extensions.
- (2) Tightening torque on the plug-in base for spreaders or terminal extensions.

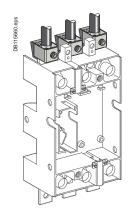
Spreaders and right-angle, 45° and edgewise terminal extensions are supplied with flexible interphase barriers.



Mounting detail: 2 cables with lugs.

# Connection of bare cables to Compact and Vigicompact NSX100 to 630





#### **Connection for NSX100 to 250**











1-cable connector

2-cable connector

Distribution connector

Polybloc distribution block



1-cable connector	Steel ≤ 160 A	Aluminium ≤ 250 A		
L (mm)	25	25		
S (mm²) Cu / Al	1.5 to 95 (1)	25 to 50	70 to 95	120 to 185 150 max. flex.
Torque (Nm)	12	20	26	26
2-cable connector				
L (mm)	25 or 50			
S (mm²) Cu / Al	2 x 50 to 2 x 1	20		
Torque (Nm)	22			
6-cable distribution	n connector (c	opper or alum	inium)	
L (mm)	15 or 30			
S (mm²) Cu / Al	1.5 to 6 (1)	8 to 35		
Torque (Nm)	4	6		
Polybloc distribution	on block (6 or	9 cables)		
L (mm)	12	16		
S (mm²) Cu / Al	6 x 4 to 10	3 x 6 to 16		

<sup>(1)</sup> For flexible cables from 1.5 to 4 mm<sup>2</sup>, connection with crimped or self-crimping ferrules.

#### Connection to NSX400 and 630





1-cable connector

2-cable connector



	1-cable connector	2-cable connector
L (mm)	30	30 or 60
S (mm²) Cu / Al	35 to 300 rigid 240 max. flex.	2 x 35 to 2 x 240 rigid 240 max. flex.
Torque (Nm)	31	31
•		

#### Conductor materials and electrodynamic stresses

Compact NSX circuit breakers can be connected indifferently with bare-copper, tinned-copper and tinned-aluminium conductors (flexible or rigid bars, cables). In the event of a short-circuit, thermal and electrodynamic stresses will be exerted on the conductors. They must therefore be correctly sized and held in place by supports.

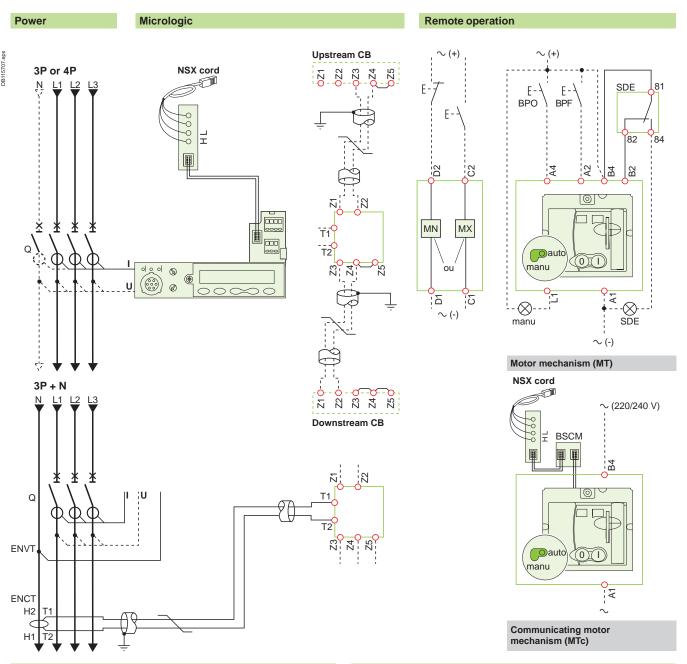
Electrical connection points on switchgear devices (switch-disconnectors, contactors, circuit breakers, etc.) should not be used for mechanical support. Any partition between upstream and downstream connections of the device must be made of non-magnetic material.



# Wiring diagrams Contents

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#### Fixed circuit breakers



#### Micrologic A or E

#### Communication

H(WH), L(BL): data

- (BK), + (RD): 24 V DC power supply

A/E ZSI (Zone Selective Interlocking)

Z1: ZSI OUT SOURCE

Z2: ZSI OUT

Z3: ZSI IN SOURCE

Z4: ZSI IN ST (short time)

Z5: ZSI IN GF (ground fault)

Note: Z3, Z4, Z5 for NSX400/630 only.

#### ENCT: external neutral current transformer:

- shielded cable with 1 twisted pair (T1, T2)
- shielding earthed at one end only (CT end).

Connection L = 30 cm max.

- maximum length of 10 metres
- cable size 0.4 to 1.5 mm<sup>2</sup>
- recommended cable: Belden 8441 or equivalent.

Ε ENVT: external neutral voltage tap for connection to the neutral via a 3P circuit breaker.

#### Remote operation

MN: undervoltage release

or

shunt release

#### Motor mechanism (MT)

A4: opening order A2: closing order

B4, A1: power supply to motor mechanism

11. manual position (manu)

B2: SDE interlocking (mandatory for correct operation)

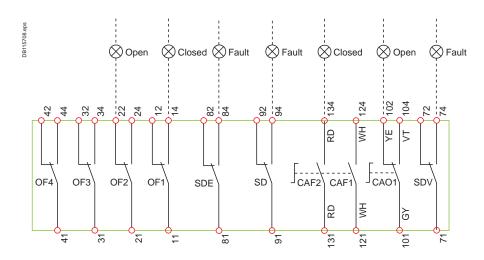
BPO: opening pushbutton BPF: closing pushbutton

#### Communicating motor mechanism (MTc)

B4, A1: motor mechanism power supply BSCM: breaker status and control module

#### Fixed circuit breakers

#### **Indication contacts**



The diagram is shown with circuits deenergised, all devices open, connected and charged and relays in normal position.

Terminals shown in red O must be connected by the customer.

#### Indication contacts

OF2 / OF1: device ON/OFF indication contacts

**OF4 / OF3:** device ON/OFF indication contacts (NSX400/630)

SDE: fault-trip indication contact (short-circuit, overload, ground fault, earth

leakage)

**SD:** trip-indication contact

**CAF2/CAF1:** early-make contact (rotary handle only) **CAO1:** early-break contact (rotary handle only)

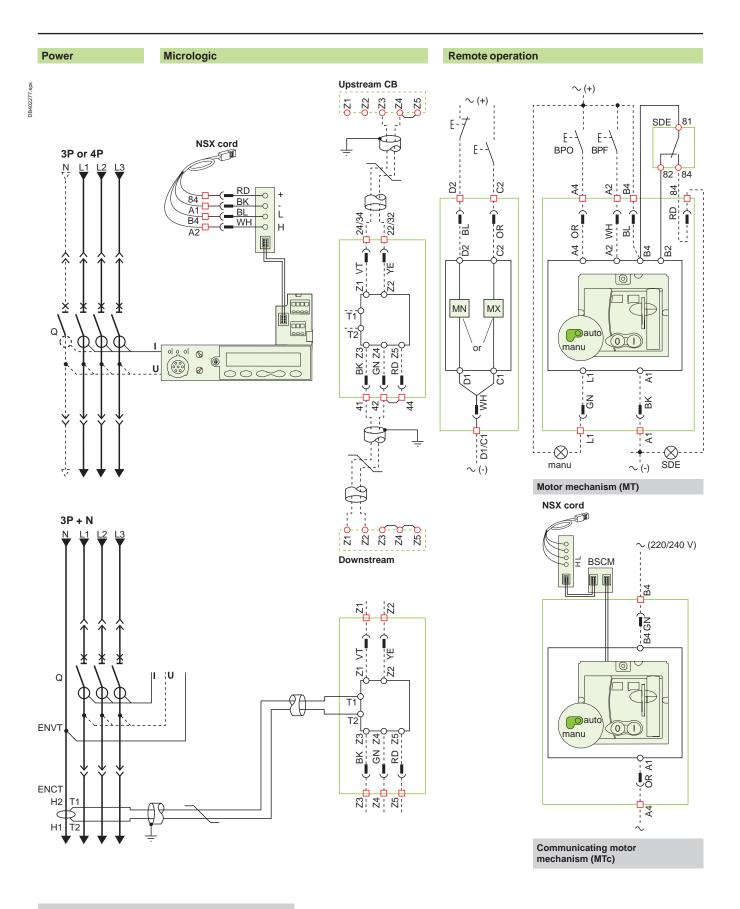
**SDV:** earth leakage fault trip indication contact (add-on Vigi module)

#### Colour code for auxiliary wiring

RD: red VT: violet
WH: white GY: grey
YE: yellow OR: orange
BK: black BL: blue

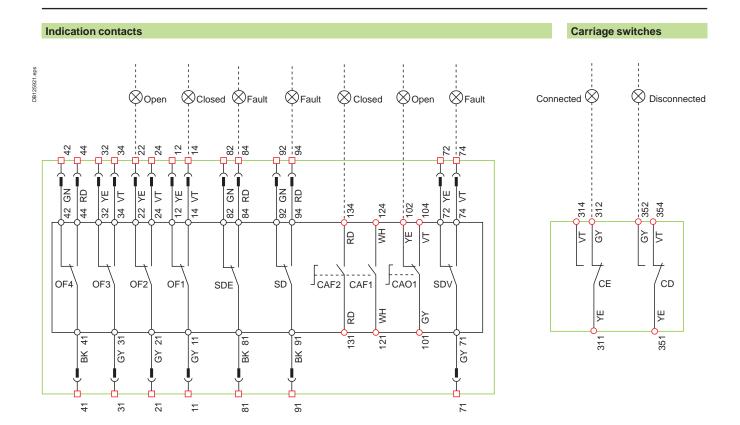
GN: green

## Plug-in / withdrawable circuit breakers



The diagram is shown with circuits deenergised, all devices open, connected and charged and relays in normal position.

### Plug-in / withdrawable circuit breakers



#### Micrologic A or E

A/E Communication

H(WH), L(BL): data

- (BK), + (RD): 24 V DC power supply

A/E ZSI (Zone Selective Interlocking)

Z1: ZSI OUT SOURCE

Z2: ZSI OUT

Z3: ZSI IN SOURCE

Z4: ZSI IN ST (short time)

Z5: ZSI IN GF (ground fault)

Note: Z3, Z4, Z5 for NSX400/630 only.

A/E ENCT: external neutral current transformer:

- shielded cable with 1 twisted pair (T1, T2)

- shielding earthed at one end only (CT end).

Connection L = 30 cm max.

- maximum length of 10 metres

- cable size 0.4 to 1.5 mm<sup>2</sup>

- recommended cable: Belden 8441 or equivalent.

ENVT: external neutral voltage tap for connection to the neutral via a 3P circuit breaker.

#### Colour code for auxiliary wiring

GN: green

RD: red VT: violet
WH: white GY: grey
YE: yellow OR: orange
BK: black BL: blue

Terminals shown in red  $\square$  /  $\bigcirc$  must be connected by the customer.

#### Remote operation

MN: undervoltage release

or

MX: shunt release

#### Motor mechanism (MT)

A4: opening order
A2: closing order

**B4, A1:** motor mechanism power supply

L1: manual position (manu)

B2: SDE interlocking (mandatory for automatic or remote

recharging)

BPO: opening pushbutton closing pushbutton

#### Communicating motor mechanism (MTc)

**B4, A1:** motor mechanism power supply **BSCM:** breaker status and control module

#### **Indication contacts**

**CAO1:** 

OF2 / OF1: device ON/OFF indication contacts

**OF4 / OF3:** device ON/OFF indication contacts (NSX400/630)

SDE: fault-trip indication contact

(short-circuit, overload, ground fault, earth leakage)

SD: trip-indication contact
CAF2/CAF1: early-make contact

(rotary handle only)

early-break contact (rotary handle only)

**SDV:** earth leakage fault trip indication contact (add-on Vigi

module)

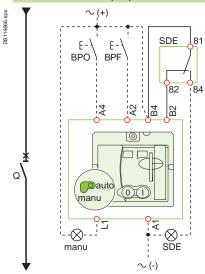
## Motor mechanism

The diagram is shown with circuits deenergised, all devices open, connected and charged and relays in normal position.

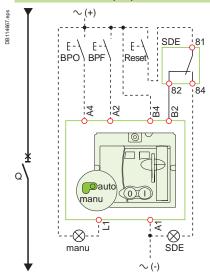
After tripping initiated by the "Push to trip" button or by the undervoltage (MN) release or the shunt (MX) release, device reset can be automatic, remote or manual.

Following tripping due to an electrical fault (with an SDE contact), reset must be carried out manually.

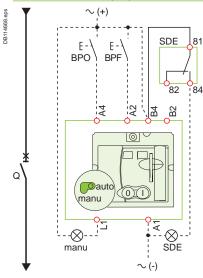
#### Motor mechanism (MT) with automatic reset



#### Motor mechanism (MT) with remote reset



#### Motor mechanism (MT) with manual reset



#### Symbols

Q: circuit breaker A4: opening order A2: closing order

**B4, A1:** motor mechanism power supply

L1: manual position (manu)

B2: SDE interlocking (mandatory for correct

operation)

**BPO:** opening pushbutton **BPF:** closing pushbutton

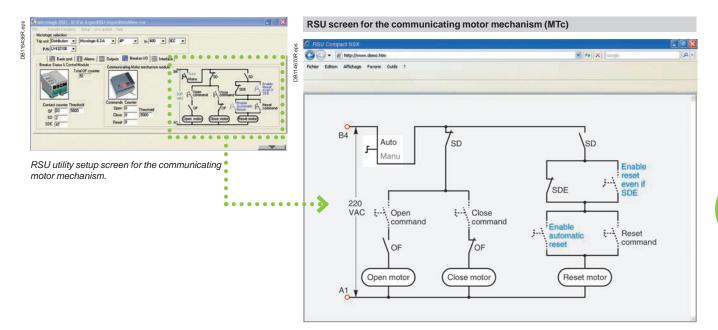
**SDE:** fault-trip indication contact (short-circuit, overload, ground fault, earth leakage)

## Motor mechanism

# Communicating motor mechanism (MTc) NSX cord V (220/240 V) BSCM A (220/240 V)

Schematic representation of the communicating motor mechanism (MT).

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#### Single-line diagram of communicating motor mechanism

Opening, closing and reset orders are transmitted via the communication network. The "Enable automatic reset" and "Enable reset even if SDE" parameters must be set using the RSU software via the screen by clicking the blue text.

"Auto/manu" is a switch on the front of the motor mechanism.

#### Symbols

Q: circuit breaker

**B4, A1:** motor mechanism power supply **BSCM:** breaker status and control module

Terminals shown in red O must be connected by the customer.

# SDx module with Micrologic

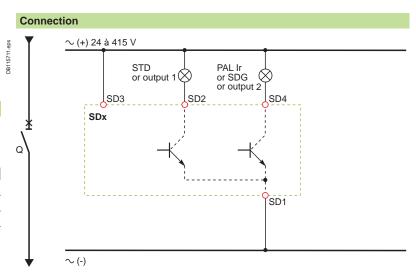
The diagram is shown with circuits deenergised, all devices open, connected and charged and relays in normal position.

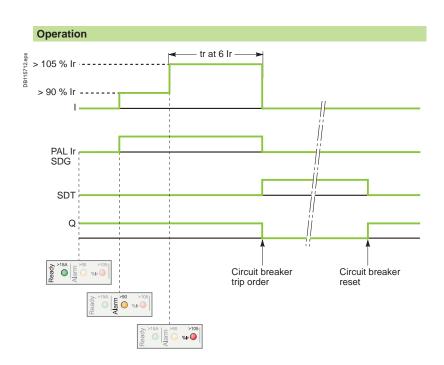
#### **Symbols**

SD1, SD3: SDx-module power supply SD2: output 1 (80 mA max.) SD4: output 2 (80 mA max.)

	SD2	SD4
Micrologic 2	SDT	-
Micrologic 5	SDT or output 1	PAL Ir or output 2
Micrologic 6	SDT or output 1	SDG or output 2

Terminals shown in red O must be connected by the customer.





I: charge current

PAL Ir: thermal overload pre-alarm

SDG: ground-fault signalSDT: thermal-fault signalQ: circuit breaker

## SDTAM module with Micrologic M

The diagram is shown with circuits deenergised, all devices open, connected and charged and relays in normal position.

#### **Symbols**

SD1, SD3: SDTAM-module power supply SD2: thermal-fault signal output

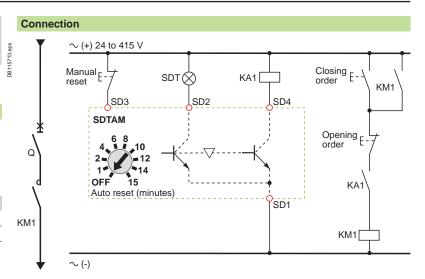
(80 mA max.)

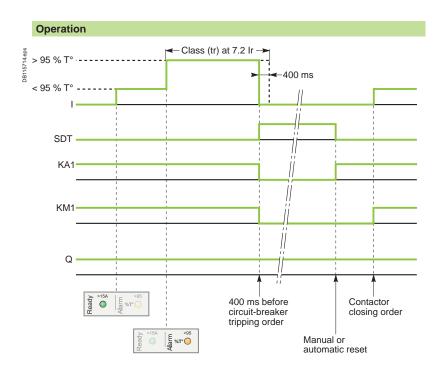
SD4: contactor-control output

(80 mA max.)

	SD2	SD4
Micrologic 2-M	SDT	KA1
Micrologic 6 E-M	SDT	KA1

Terminals shown in red O must be connected by the customer.





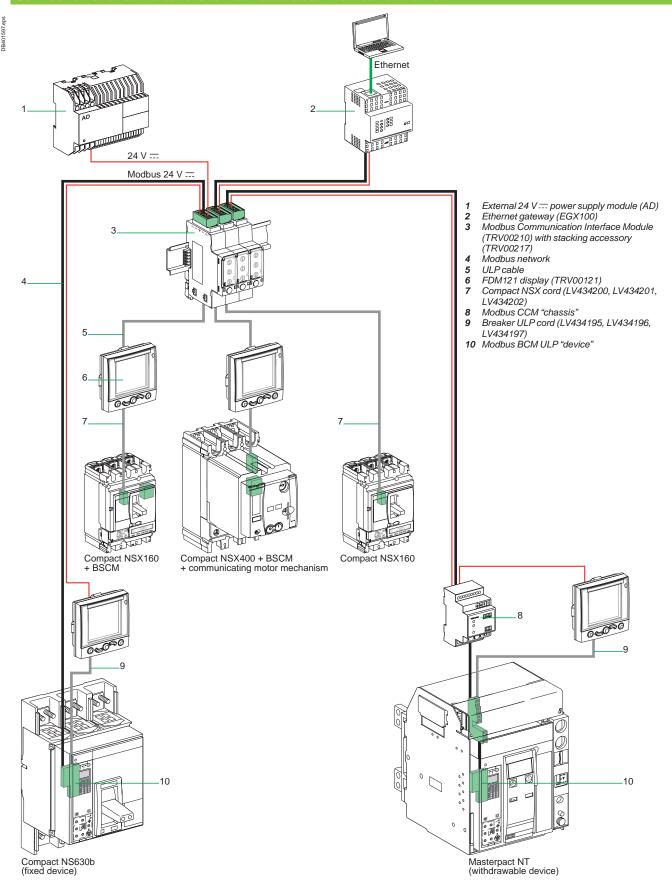
I: charge current SDT: thermal-fault signal

KA1: auxiliary relay (e.g. RBN or RTBT relay)

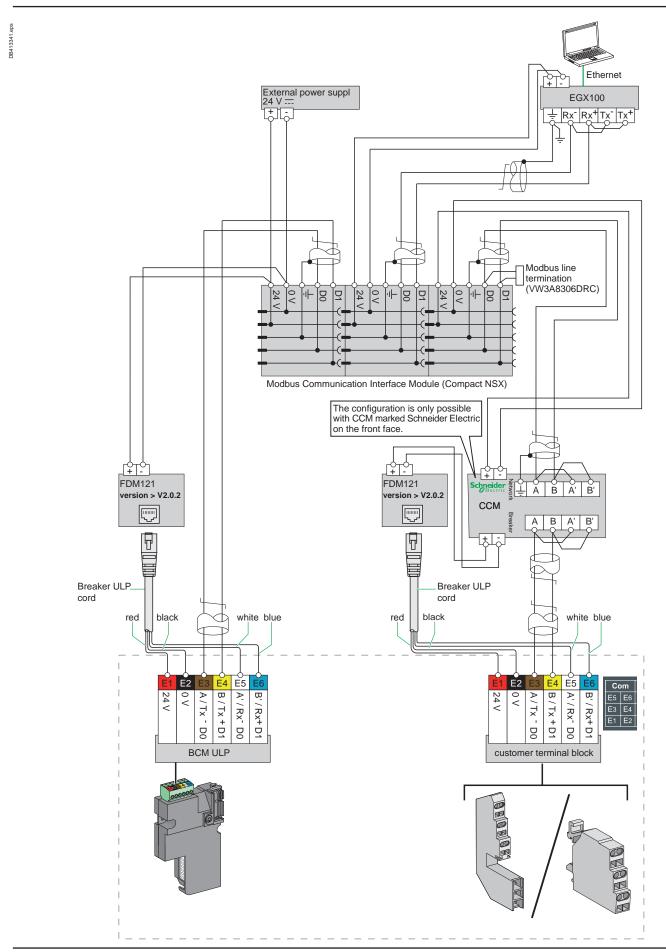
KM1: motor contactorQ: circuit breaker

## Communication

#### Connection of circuit breakers to the Modbus communication network



## Communication





# Additional characteristics

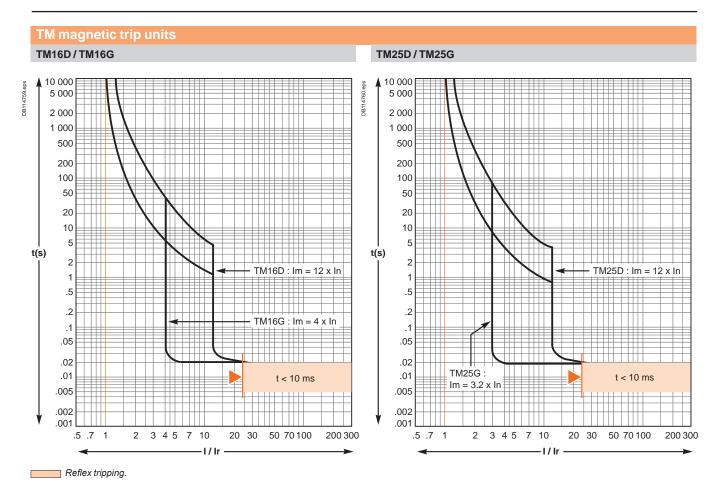
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Compact NSX400 to 630 motor protection	E-10
Compact NSX100 to 630 reflex tripping	E-12
Current and energy limiting curves	E-13
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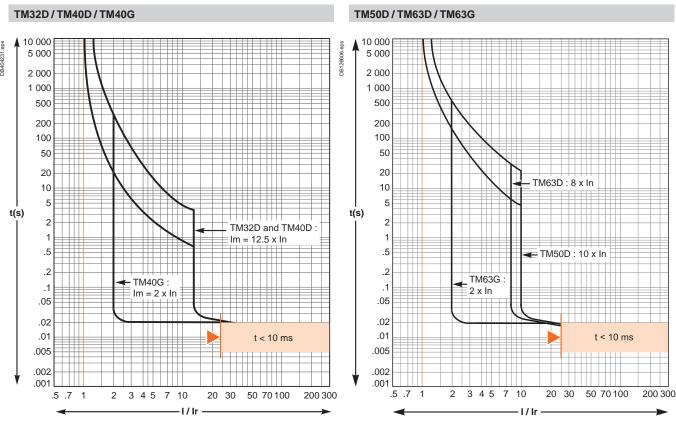
## **Tripping curves**

# Compact NSX100 to 250

Protection of distribution systems



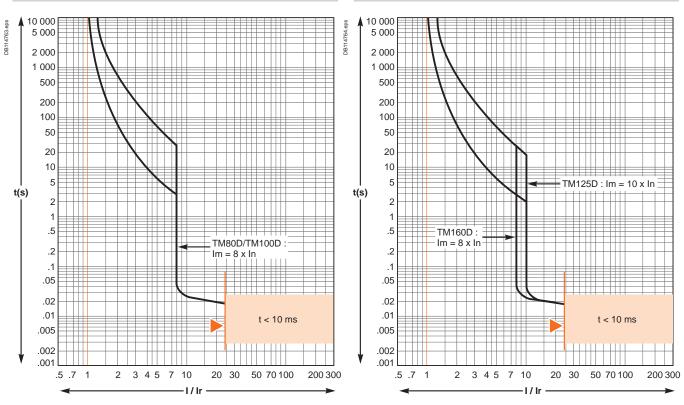




#### TM magnetic trip units (cont.)

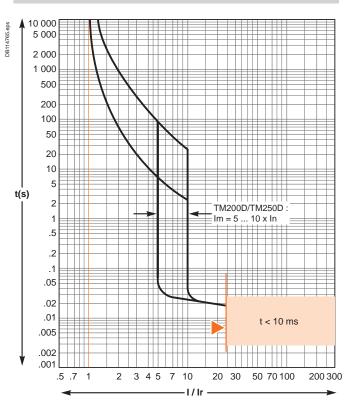
#### TM80D/TM100D

#### TM125D/TM160D



Reflex tripping.

#### TM200D/TM250D

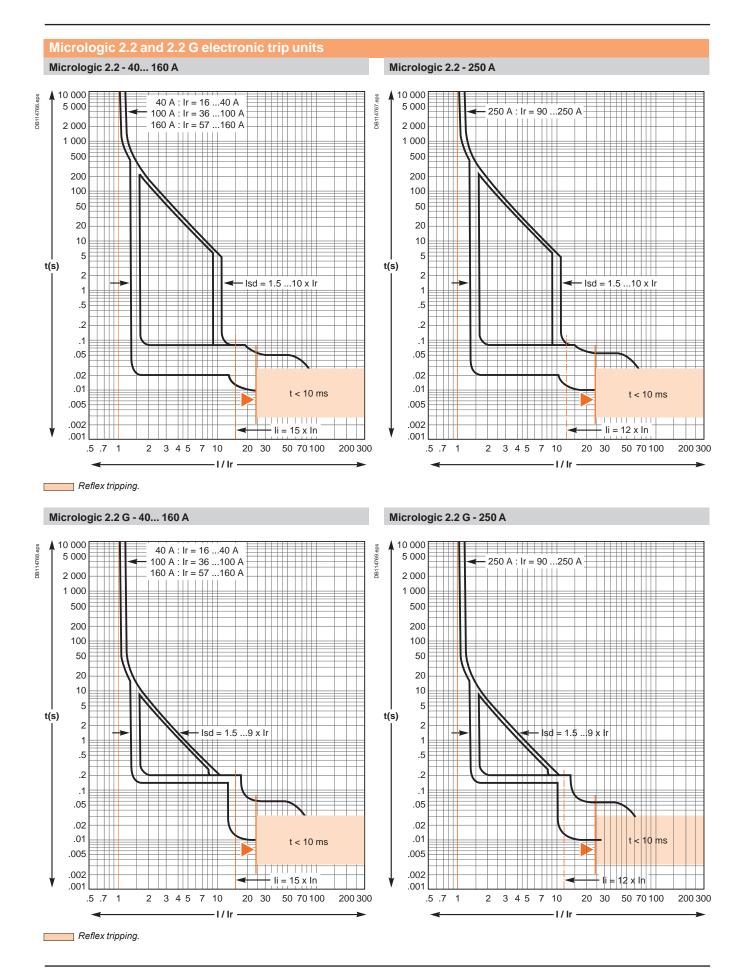


Reflex tripping.

# **Tripping curves**

Compact NSX100 to 250

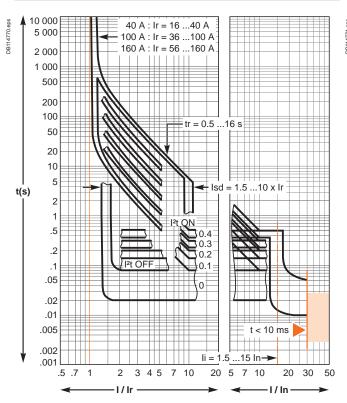
Protection of distribution systems (cont.)

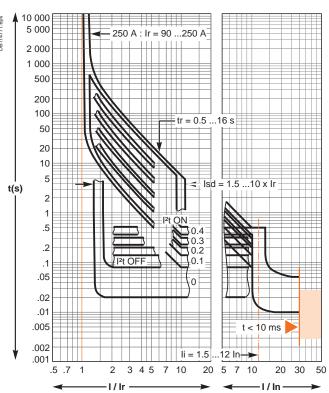


#### Micrologic 5.2 and 6.2 A or E electronic trip units

#### Micrologic 5.2 and 6.2 A or E - 40... 160 A

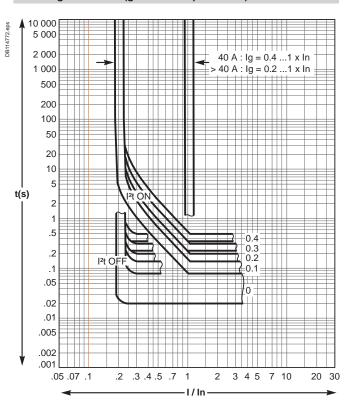
#### Micrologic 5.2 and 6.2 A or E - 250 A





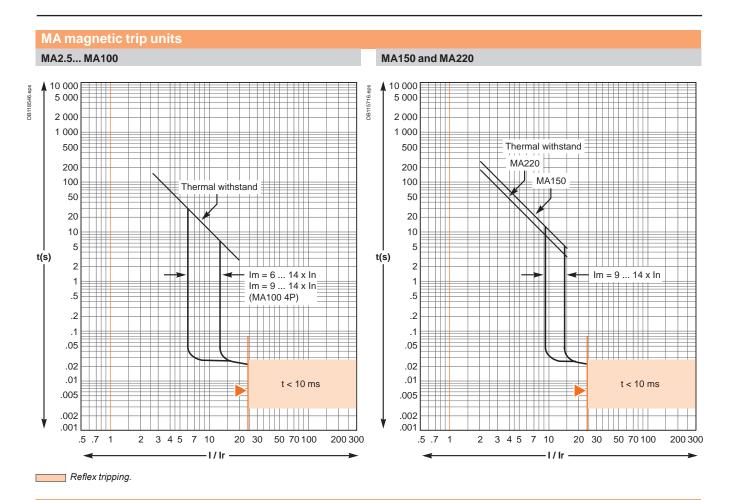
Reflex tripping.

#### Micrologic 6.2 A or E (ground-fault protection)

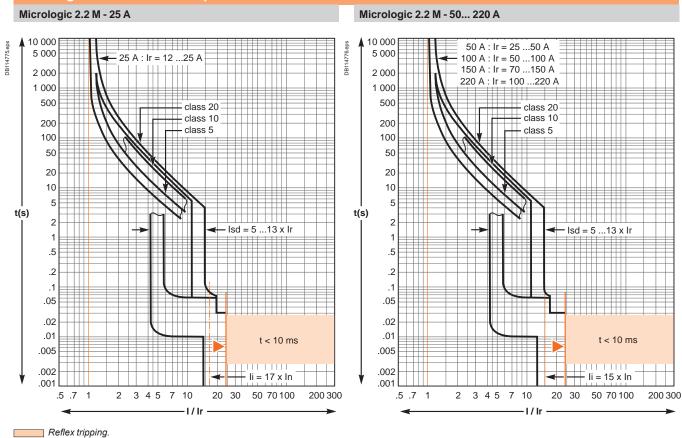


# **Tripping curves**

Compact NSX100 to 250 Motor protection



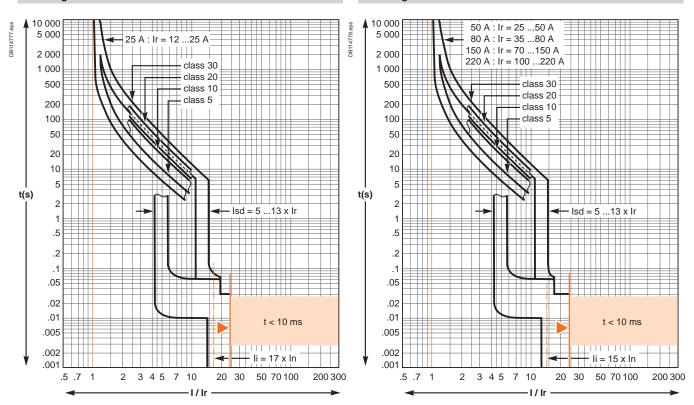
#### Micrologic 2.2 M electronic trip units



#### Micrologic 6.2 E-M electronic trip units

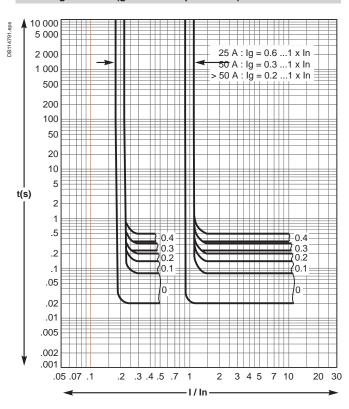
#### Micrologic 6.2 E-M - 25 A

#### Micrologic 6.2 E-M - 50... 220 A



Reflex tripping.

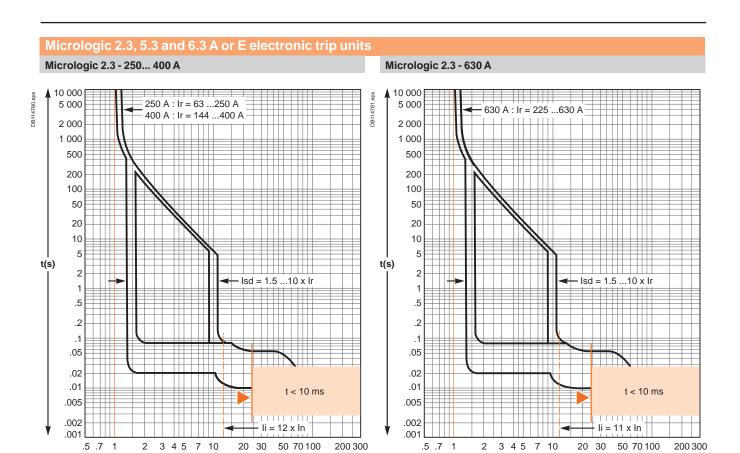
#### Micrologic 6.2 E-M (ground-fault protection)

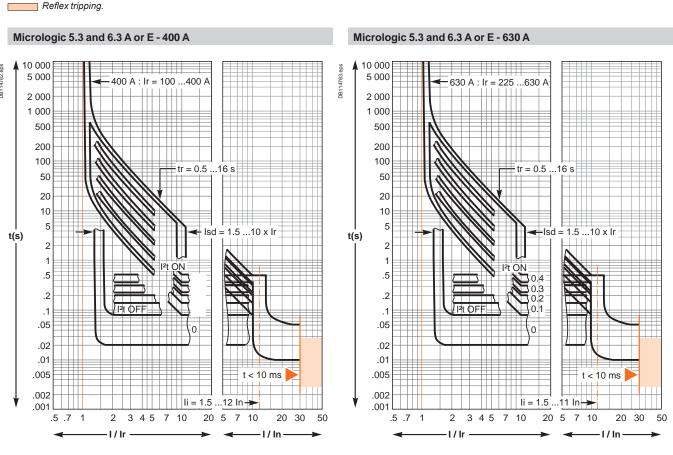


## **Tripping curves**

# Compact NSX400 to 630

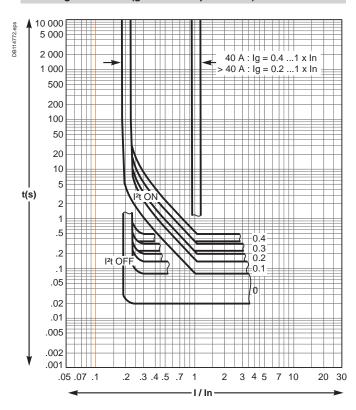
Protection of distribution systems





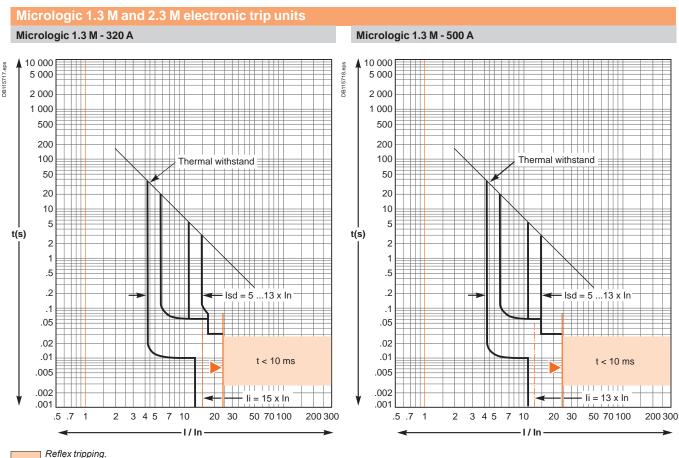
#### Micrologic 6.3 A or E electronic trip units (cont.)

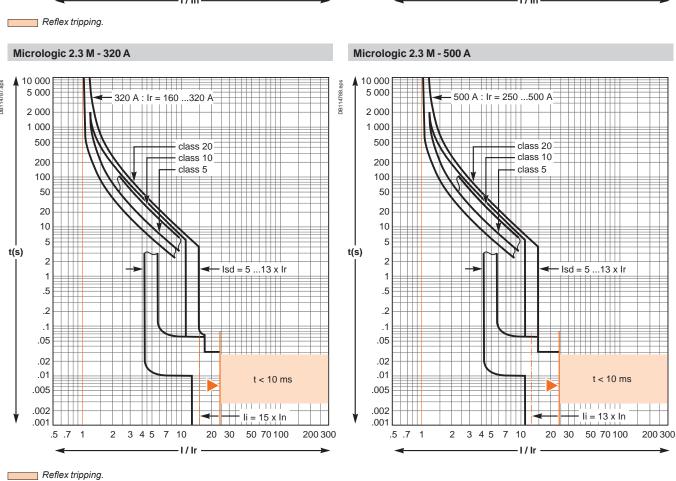
#### Micrologic 6.3 A or E (ground-fault protection)



# **Tripping curves**

Compact NSX400 to 630 Motor protection

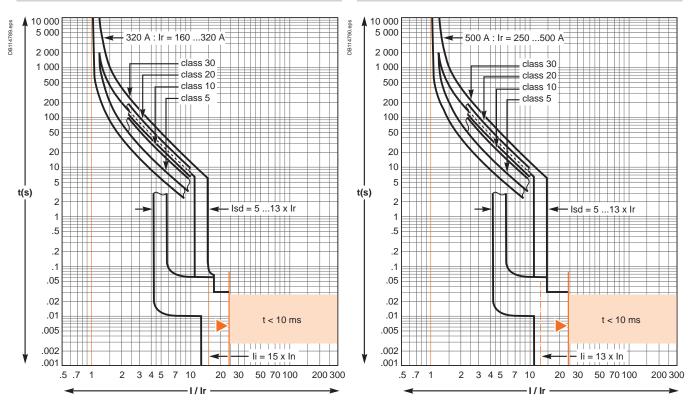




#### Micrologic 6.3 E-M electronic trip units

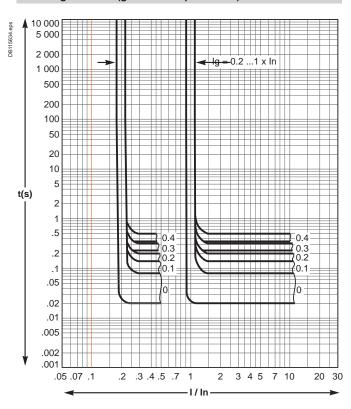
#### Micrologic 6.3 E-M - 320 A

#### Micrologic 6.3 E-M - 500 A



Reflex tripping.

#### Micrologic 6.3 E-M (ground fault protection)



# **Tripping curves**

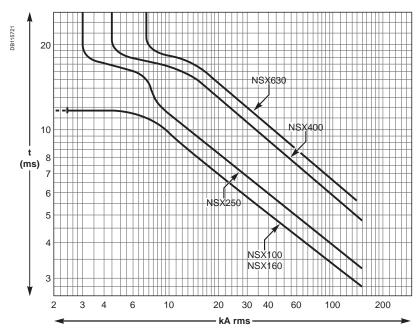
# Compact NSX100 to 630 Reflex tripping

Compact NSX100 to 630 devices incorporate the exclusive reflex-tripping system.

This system breaks very high fault currents. The device is mechanically tripped via a "piston" actuated directly by the pressure produced in the breaking units by the short-circuit.

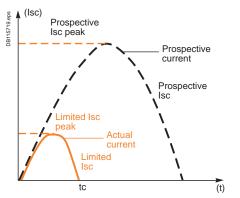
For high short-circuits, this system provides a faster break, thereby ensuring discrimination.

Reflex-tripping curves are exclusively a function of the circuit-breaker rating.



# **Current and energy limiting** curves

The limiting capacity of a circuit breaker is its aptitude to let through a current, during a short-circuit, that is less than the prospective short-circuit current.



The exceptional limiting capacity of the Compact NSX 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 NSX 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 steps:

- break three times consecutively a fault current equal to 100 % of Icu
- check that the device continues to function normally, that is:
- □ 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 busbars being deformed or broken.

#### Electromagnetic effects

Fewer 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 and energy limiting curves**

The 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)
- $\blacksquare$  thermal stress (A²s), i.e. the energy dissipated by the short-circuit in a conductor with a resistance of 1  $\Omega.$

#### Example

What is the real value of a 150 kA rms prospective short-circuit (i.e. 330 kA peak) limited by an NSX250L upstream?

The answer is 30 kA peak (curve page E-14).

#### 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 mm² and thermal stresses in A²s.

CSA		1.5 mm <sup>2</sup>	2.5 mm <sup>2</sup>	4 mm <sup>2</sup>	6 mm <sup>2</sup>	10 mm <sup>2</sup>
PVC	Cu	2.97x10 <sup>4</sup>	8.26x10 <sup>4</sup>	2.12x10 <sup>5</sup>	4.76x10⁵	1.32x10 <sup>6</sup>
	ΑI					5.41x10 <sup>5</sup>
PRC	Cu	4.10x10 <sup>4</sup>	1.39x10⁵	2.92x10⁵	6.56x10⁵	1.82x10 <sup>6</sup>
	ΑI					7.52x10 <sup>5</sup>
CSA		16 mm²	25 mm <sup>2</sup>	35 mm <sup>2</sup>	50 mm <sup>2</sup>	
PVC	Cu	3.4x10 <sup>6</sup>	8.26x10 <sup>6</sup>	1.62x10 <sup>7</sup>	3.31x10 <sup>7</sup>	
	ΑI	1.39x10 <sup>6</sup>	3.38x10 <sup>6</sup>	6.64x10 <sup>6</sup>	1.35x10 <sup>7</sup>	
PRC	Cu	4.69x10 <sup>6</sup>	1.39x10 <sup>7</sup>	2.23x10 <sup>7</sup>	4.56x10 <sup>7</sup>	
	ΑI	1.93x10 <sup>6</sup>	4.70x10 <sup>6</sup>	9.23x10 <sup>6</sup>	1.88x10 <sup>7</sup>	

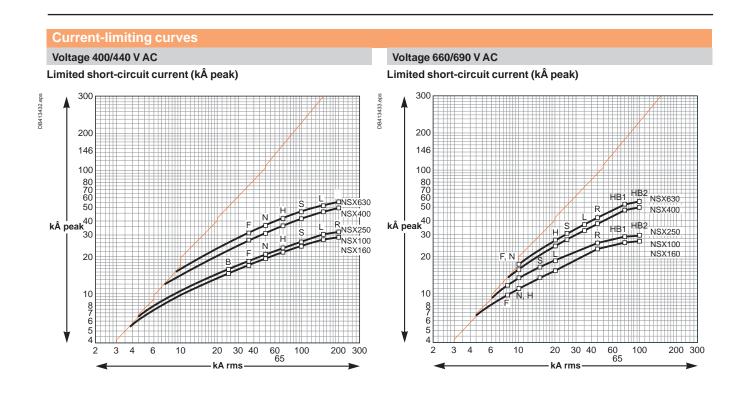
#### Example

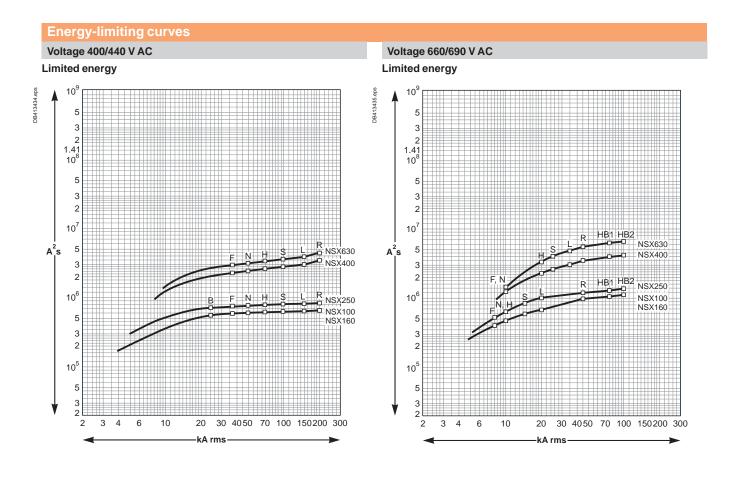
Is a Cu/PVC cable with a CSA of 10 mm<sup>2</sup> adequately protected by an NSX160F? The table above indicates that the permissible stress is 1.32x10<sup>6</sup> A<sup>2</sup>s.

All short-circuit currents at the point where an NSX160F (Icu = 35 kA) is installed are limited with a thermal stress less than  $6x10^5 \text{ A}^2\text{s}$  (curve page E-14).

Cable protection is therefore ensured up to the limit of the breaking capacity of the circuit breaker.

# **Current and energy limiting** curves





# Simplicity of catalogue numbers



# **Catalogue numbers**

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NSX100/250HB1: complete fixed/FC device	
Compact NSX100/250HB1 (85 kA 500 V - 75 kA 690 V)	F-18
NSX100/250HB2: complete fixed/FC device	
Compact NSX100/250HB2 (100 kA 500 V - 100 kA 690 V)	F-20
Trip unit accessories	
Compact and Vigicompact NSX100/160/250	F-22
nstallation and connection	
Compact and Vigicompact NSX100/160/250	F-23
Accessories	
Compact and Vigicompact NSX100/160/250	F-24
Monitoring and control, test tools	
Compact and Vigicompact NSX100/160/250	F-33

## NSX100/160/250B: complete fixed/FC device

Compact NSX100/160/250B (25 kA 380/415 V)

#### Compact NSX100/160/250B With thermal-magnetic trip unit TM-D Compact NSX100B (25 kA at 380/415 V) Rating **3P** 2d **3P** 3d **4P** 3d TM16D LV429547 LV429557 LV429567 LV429577 TM25D LV429546 LV429556 LV429566 LV429576 TM32D LV429545 LV429555 LV429565 LV429575 TM40D LV429544 LV429554 LV429564 LV429574 TM50D LV429543 LV429553 LV429563 LV429573 TM63D LV429542 LV429552 LV429562 LV429572 LV429561 TM80D LV429541 LV429551 LV429571 TM100D LV429540 LV429550 LV429560 LV429570 Compact NSX160B (25 kA at 380/415 V Rating **3P** 2d 3P 3d 4P 3d **4P** 4d LV430303 I V430313 LV430323 I V430333 TM80D TM100D LV430302 LV430312 LV430322 LV430332 TM125D LV430301 LV430311 LV430321 LV430331 TM160D LV430300 LV430310 LV430320 LV430330 Compact NSX250B (25 kA at 380/415 V Rating **3P** 2d **3P** 3d **4P** 3d **4P** 4d TM125D LV431103 LV431113 LV431123 LV431133 LV431102 LV431122 TM160D LV431112 LV431132 TM200D LV431101 LV431111 LV431121 LV431131 TM250D LV431100 LV431110 LV431120 LV431130 With electronic trip unit Micrologic 2.2 (LS<sub>o</sub>I protection) Compact NSX100B (25 kA at 380/415 V) Rating 3P 3d **4P** 3d, 4d, 3d + N/2 LV429777 LV429787 40 100 LV429775 LV429785 Compact NSX160B (25 kA at 380/415 V Rating 3P 3d 4P 3d, 4d, 3d + N/2 LV430751 100 LV430746 160 LV430745 LV430750 Compact NSX250B (25 kA at 380/415 V) **4P** 3d, 4d, 3d + N/2 100 LV431142 LV431152 LV431151 160 LV431141 250 LV431140 LV431150 With electronic trip unit Micrologic 5.2 A (LSI protection, ammeter) Compact NSX100B (25 kA at 380/415 V) Rating **3P** 3d 4P 3d, 4d, 3d + N/2, 3d + OSN LV429872 LV429877 40 LV429870 LV429875 100 Compact NSX160B (25 kA at 380/415 V) Rating 3P 3d 4P 3d, 4d, 3d + N/2, 3d + OSN 100 LV430871 LV430876 LV430870 LV430875 Compact NSX250B (25 kA at 380/415 V Rating 4P 3d, 4d, 3d + N/2, 3d + OSN 100 LV431147 LV431157 LV431156 160 LV431146

LV431145

LV431155

250 With electronic trip unit Micrologic 5.2 E (LSI protection, energy meter) To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

#### With electronic trip unit Micrologic 6.2 A (LSIG protection, ammeter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

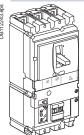
#### With electronic trip unit Micrologic 6.2 E (LSIG protection, energy meter)

# NSX100/160/250B: complete fixed/FC device

Vigicompact NSX100/160/250B (25 kA 380/415 V)

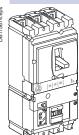
#### Vigicompact NSX100/160/250B

With thermal-magnetic trip unit TM-D



ы	Paintinib						
	Vigicompact NSX10	0B (25 kA at 380/415 V) equipped w	rith MH Vigi module (200 to 440 V)				
	Rating	<b>3P</b> 3d	<b>4P</b> 3d	<b>4P</b> 4d			
	TM16D	LV429667	LV429707	LV429967			
	TM25D	LV429666	LV429706	LV429966			
	TM32D	LV429665	LV429705	LV429965			
	TM40D	LV429664	LV429704	LV429964			
	TM50D	LV429663	LV429703	LV429963			
	TM63D	LV429662	LV429702	LV429962			
	TM80D	LV429661	LV429701	LV429961			
	TM100D	LV429660	LV429700	LV429960			
	Vigicompact NSX16	0B (25 kA at 380/415 V) equipped w	rith MH Vigi module (200 to 440 V)				
	Rating	<b>3P</b> 3d	<b>4P</b> 3d	<b>4P</b> 4d			
	TM80D	LV430343	LV430353	LV430363			
	TM100D	LV430342	LV430352	LV430362			
	TM125D	LV430341	LV430351	LV430361			
	TM160D	LV430340	LV430350	LV430360			
	Vigicompact NSX250B (25 kA at 380/415 V) equipped with MH Vigi module (200 to 440 V)						
	Rating	<b>3P</b> 3d	<b>4P</b> 3d	<b>4P</b> 4d			
	TM125D	LV431903	LV431913	LV431963			
	TM160D	LV431902	LV431912	LV431962			
	TM200D	LV431901	LV431911	LV431961			
	TM250D	LV431900	LV431910	LV431960			

#### With electronic trip unit Micrologic 2.2 (LS<sub>o</sub>I protection)



	protootion	
Vigicompact NSX10	0B (25 kA at 380/415 V) equipped w	rith MH Vigi module (200 to 440 V)
Rating	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2
40	LV429975	LV429985
100	LV429974	LV429984
Vigicompact NSX16	60B (25 kA at 380/415 V) equipped w	rith MH Vigi module (200 to 440 V)
Rating	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2
40	LV430962	LV430997
100	LV430961	LV430996
160	LV430960	LV430995
Vigicompact NSX25	60B (25 kA at 380/415 V) equipped w	rith MH Vigi module (200 to 440 V)
Rating	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2
100	LV431977	LV431987
160	LV431976	LV431986
250	LV431975	LV431985

With electronic trip unit Micrologic 5.2 A or 5.2 E (LSI protection, ammeter or energy meter)

# NSX100/160/250F: complete fixed/FC device

Compact NSX100/160/250F (36 kA 380/415 V)

#### Compact NSX100/160/250F With thermal-magnetic trip unit TM-D Compact NSX100F (36 kA at 380/415 V) Rating **3P** 2d **3P** 3d 4P 3d **4P** 4d TM16D LV429627 LV429637 LV429647 LV429657 TM25D LV429626 LV429636 LV429646 LV429656 TM32D LV429655 LV429625 LV429635 LV429645 TM40D LV429624 LV429634 LV429644 LV429654 TM50D LV429623 LV429633 LV429643 LV429653 TM63D LV429622 LV429632 LV429642 LV429652 LV429631 TM80D LV429621 LV429641 LV429651 TM100D LV429620 LV429630 LV429640 LV429650 Compact NSX160F (36 kA at 380/415 V) Rating 3P 2d **3P** 3d **4P** 3d **4P** 4d LV430623 I V430633 I V430643 I V430653 TM80D TM100D LV430622 LV430632 LV430642 LV430652 TM125D LV430621 LV430631 LV430641 LV430651 TM160D LV430620 LV430630 LV430640 LV430650 Compact NS X250F (36 kA at 380/415 V) Rating **3P** 2d **3P** 3d **4P** 3d **4P** 4d LV431623 LV431633 LV431643 LV431653 TM125D LV431622 LV431642 LV431652 TM160D LV431632 TM200D LV431621 LV431631 LV431641 LV431651 TM250D LV431620 LV431630 LV431640 LV431650 With electronic trip unit Micrologic 2.2 (LS<sub>o</sub>I protection) Compact NSX100F (36 kA at 380/415 V) DB 112223.ep **3P** 3d 4P 3d, 4d, 3d + N/2 LV429772 LV429782 100 LV429770 LV429780 Compact NSX160F (36 kA at 380/415 V) 3P 3d 4P 3d, 4d, 3d + N/2 Rating I V430771 I V430781 100 160 LV430770 LV430780 Compact NSX250F (36 kA at 380/415 V) 4P 3d, 4d, 3d + N/2 100 LV431772 LV431782 LV431781 LV431771 160 250 LV431770 LV431780 With electronic trip unit Micrologic 5.2 A (LSI protection, ammeter) Compact NSX100F (36 kA at 380/415 V) DB112224 4P 3d, 4d, 3d + N/2, 3d + OSN LV429882 LV429887 40 100 LV429880 LV429885 Compact NSX160F (36 kA at 380/415 V) 4P 3d, 4d, 3d + N/2, 3d + OSN Rating 3P 3d 100 LV430881 LV430886 LV430880 LV430885 Compact NSX250F (36 kA at 380/415 V) Rating 4P 3d, 4d, 3d + N/2, 3d + OSN 100 LV431862 LV431867 LV431861 160 LV431866 LV431865 250 LV431860

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

#### With electronic trip unit Micrologic 6.2 A (LSIG protection, ammeter)

With electronic trip unit Micrologic 5.2 E (LSI protection, energy meter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

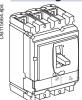
#### With electronic trip unit Micrologic 6.2 E (LSIG protection, energy meter)

# NSX100/160/250F: complete fixed/FC device (cont.)

Compact NSX100/160/250F (36 kA 380/415 V) (cont.)

#### Compact NSX100/160/250F

With magnetic trip unit MA



Compact NSX100F (36 kA at 3	80/415 V)
Rating	<b>3P</b> 3d
MA2.5	LV429745
MA6.3	LV429744
MA12.5	LV429743
MA25	LV429742
MA50	LV429741
MA100	LV429740
Compact NSX160F (36 kA at 3	80/415 V)
Rating	<b>3P</b> 3d
MA100	LV430831
MA150	LV430830
Compact NSX250F (36 kA at 3	80/415 V)
Rating	<b>3P</b> 3d
MA150	LV431749
MA220	LV431748
#!!! O O M /I O I (	((!)

#### With electronic trip unit Micrologic 2.2 M (LS<sub>o</sub>I motor protection)



Compact NSX100F (36 kA at 3	80/415 V)
Rating	<b>3P</b> 3d
25	LV429828
50	LV429827
100	LV429825
Compact NSX160F (36 kA at 3	80/415 V)
Rating	<b>3P</b> 3d
100	LV430986
150	LV430985
Compact NSX250F (36 kA at 3	80/415 V)
Rating	<b>3P</b> 3d
150	LV431161
220	LV431160

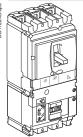
With electronic trip unit Micrologic 6.2 E-M (LSIG motor protection, energy meter)

# NSX100/160/250F: complete fixed/FC device (cont.)

Vigicompact NSX100/160/250F (36 kA 380/415 V)

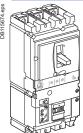
#### Vigicompact NSX100/160/250F

With thermal-magnetic trip unit TM-D



Vigicompact NS)	(100F (36 kA at 380/415 V) equipped	with MH Vigi module (200 to 440 V)	
Rating	<b>3P</b> 3d	<b>4P</b> 3d	<b>4P</b> 4d
TM16D	LV429937	LV429947	LV429957
TM25D	LV429936	LV429946	LV429956
TM32D	LV429935	LV429945	LV429955
TM40D	LV429934	LV429944	LV429954
TM50D	LV429933	LV429943	LV429953
TM63D	LV429932	LV429942	LV429952
TM80D	LV429931	LV429941	LV429951
TM100D	LV429930	LV429940	LV429950
Vigicompact NS)	(160F (36 kA at 380/415 V) equipped	with MH Vigi module (200 to 440 V)	
Rating	<b>3P</b> 3d	<b>4P</b> 3d	<b>4P</b> 4d
TM80D	LV430933	LV430943	LV430953
TM100D	LV430932	LV430942	LV430952
TM125D	LV430931	LV430941	LV430951
TM160D	LV430930	LV430940	LV430950
Vigicompact NS)	(250F (36 kA at 380/415 V) equipped	with MH Vigi module (200 to 440 V)	
Rating	<b>3P</b> 3d	<b>4P</b> 3d	<b>4P</b> 4d
TM125D	LV431933	LV431943	LV431953
TM160D	LV431932	LV431942	LV431952
TM200D	LV431931	LV431941	LV431951
TM250D	LV431930	LV431940	LV431950

#### With electronic trip unit Micrologic 2.2 (LS<sub>o</sub>I protection)



0.09.0 (_0	0. p. 0.000,			
Vigicompact NSX	(100F (36 kA at 380/415 V) equipped	with MH Vigi module (200 to 440 V)		
Rating	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2		
40	LV429972	LV429982		
100	LV429970	LV429980		
Vigicompact NSX	(160F (36 kA at 380/415 V) equipped	with MH Vigi module (200 to 440 V)		
Rating	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2		
40	LV430973	LV430983		
100	LV430971	LV430981		
160	LV430970	LV430980		
Vigicompact NSX	Vigicompact NSX250F (36 kA at 380/415 V) equipped with MH Vigi module (200 to 440 V)			
Rating	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2		
100	LV431972	LV431982		
160	LV431971	LV431981		
250	LV431970	LV431980		
licrologic 5 2 A o	r 5 2 E /I SI protection approve	notor)		

With electronic trip unit Micrologic 5.2 A or 5.2 E (LSI protection, energy meter)

# NSX100/160/250N: complete fixed/FC device

Compact NSX100/160/250N (50 kA 380/415 V)

Compact NSX1	00/160/250N			
Vith thermal-magn	etic trip unit TM-D			
	Compact NS	X100N (50 kA at 380/415 V)		
	Rating	<b>3P</b> 3d	<b>4P</b> 3d	<b>4P</b> 4d
	TM16D	LV429847	LV429857	LV429867
	TM25D	LV429846	LV429856	LV429866
	TM32D	LV429845	LV429855	LV429865
	TM40D	LV429844	LV429854	LV429864
	TM50D	LV429843	LV429853	LV429863
	TM63D	LV429842	LV429852	LV429862
IND	TM80D	LV429841	LV429851	LV429861
	TM100D	LV429840	LV429850	LV429860
	Compact NS	X160N (50 kA at 380/415 V)	_	
	Rating	<b>3P</b> 3d	<b>4P</b> 3d	<b>4P</b> 4d
	TM80D	LV430843	LV430853	LV430863
	TM100D	LV430842	LV430852	LV430862
	TM125D	LV430841	LV430851	LV430861
	TM160D	LV430840	LV430850	LV430860
	Compact NS	X250N (50 kA at 380/415 V)		
	Rating	<b>3P</b> 3d	<b>4P</b> 3d	<b>4P</b> 4d
	TM125D	LV431833	LV431843	LV431853
	TM160D	LV431832	LV431842	LV431852
	TM200D	LV431831	LV431841	LV431851
	TM250D	LV431830	LV431840	LV431850
ith electronic trip	unit Micrologic 2.2	2 (LS <sub>o</sub> I protection)		
	Compact NS	X100N (50 kA at 380/415 V)		
	Rating		<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2
71.00	40		LV429797	LV429807
	100		LV429795	LV429805
	Compact NS	X160N (50 kA at 380/415 V)		
	Rating		<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2
	100		LV430776	LV430786
NEW YORK	160		LV430775	LV430785
ALTO-	Compact NS	X250N (50 kA at 380/415 V)		
	Rating		<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2
	100		LV431872	LV431877
	160		LV431871	LV431876
	250		LV431870	LV431875
ith electronic trip		A (LSI protection, ammeter	r)	
		X100N (50 kA at 380/415 V)	Lanca	
	Rating		<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2, OSN
	40		LV429892	LV429897
	100		LV429890	LV429895
	•	X160N (50 kA at 380/415 V)		
	Rating		<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2, OSN
	100		LV430891	LV430896
A TOTAL	160	V2E0N /E0 kA ~4 200/44 E \/\	LV430890	LV430895
<del>*</del>	•	X250N (50 kA at 380/415 V)	lan ou	48.01.41.01.410.000
	Rating		<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2, OSN
	100		LV431882	LV431887
	160		LV431881	LV431886
	250		LV431880	LV431885
ith alactronic trip	unit Micrologic 5 2	E (LSI protection, energy n	notor)	

With electronic trip unit Micrologic 6.2 A (LSIG protection, ammeter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

With electronic trip unit Micrologic 6.2 E (LSIG protection, energy meter)

# NSX100/160/250N: complete fixed/FC device (cont.)

Compact NSX100/160/250N (50 kA 380/415 V) (cont.)

#### Compact NSX100/160/250N

With magnetic trip unit MA



Compact NSX100N (50 kA at 380/415 V)				
Rating	<b>3P</b> 3d			
MA2.5	LV429755			
MA6.3	LV429754			
MA12.5	LV429753			
MA25	LV429752			
MA50	LV429751			
MA100	LV429750			
Compact NSX160N (50 kA at 380/415 V)				
Rating	<b>3P</b> 3d			
MA100	LV430833			
MA150	LV430832			
Compact NSX250N (50 kA at 380/415 V)				
Rating	<b>3P</b> 3d			
MA150	LV431753			
MA220	LV431752			

#### With electronic trip unit Micrologic 2.2 M (LS<sub>o</sub>I motor protection)



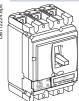
Compact NSX100N (50 kA at 380/415 V)				
Rating	<b>3P</b> 3d			
25	LV429833			
50	LV429832			
100	LV429830			
Compact NSX160N (50 kA at 380/415 V)				
Rating	<b>3P</b> 3d			
100	LV430989			
150	LV430988			
Compact NSX250N (50 kA at 380/415 V)				
Rating	<b>3P</b> 3d			
150	LV431166			
220	LV431165			

With electronic trip unit Micrologic 6.2 E-M (LSIG motor protection, energy meter)

# NSX100/160/250H: complete fixed/FC device

Compact NSX100/160/250H (70 kA 380/415 V)

#### Compact NSX100/160/250H With thermal-magnetic trip unit TM-D Compact NSX100H (70 kA at 380/415 V) Rating **3P** 3d **4P** 3d TM16D LV429677 LV429687 LV429697 TM25D LV429676 LV429686 LV429696 TM32D LV429685 LV429675 LV429695 TM40D LV429674 LV429684 LV429694 TM50D LV429673 LV429683 LV429693 TM63D LV429672 LV429682 LV429692 LV429681 LV429671 LV429691 TM80D TM100D LV429670 LV429680 LV429690 Compact NSX160H (70 kA at 380/415 V) **3P** 3d 4P 3d **4P** 4d Rating LV430673 TM80D LV430683 I V430693 TM100D LV430672 LV430682 LV430692 TM125D LV430671 LV430681 LV430691 TM160D LV430670 LV430680 LV430690 50H (70 kA at 380/415 V) Compact NSX25 Rating **3P** 3d **4P** 3d **4P** 4d TM125D LV431673 LV431683 LV431693 LV431682 LV431692 TM160D LV431672 TM200D LV431671 LV431681 LV431691 TM250D LV431670 LV431680 LV431690 With electronic trip unit Micrologic 2.2 (LS<sub>o</sub>I protection) Compact NSX100H (70 kA at 380/415 V) Rating **3P** 3d 4P 3d, 4d, 3d + N/2 LV429792 LV429802 40 LV429800 LV429790 100 Compact NSX160H (70 kA at 380/415 V) Rating **3P** 3d 4P 3d, 4d, 3d + N/2 100 LV430791 LV430801 160 LV430790 LV430800 Compact NSX250H (70 kA at 380/415 V) Rating **3P** 3d 4P 3d, 4d, 3d + N/2 100 LV431792 LV431802 LV431791 LV431801 160 250 LV431790 LV431800 With electronic trip unit Micrologic 5.2 A (LSI protection, ammeter) Compact NSX100H (70 kA at 380/415 V) **3P** 3d 4P 3d, 4d, 3d + N/2, OSN Rating LV429794 LV429804 40 LV429803 100 LV429793



Compact NSX160H (70 kA at 380/415 V) Rating **3P** 3d 4P 3d, 4d, 3d + N/2, OSN 100 LV430795 LV430805 LV430794 LV430804 160 Compact NSX250H (70 kA at 380/415 V) Rating **3P** 3d 4P 3d, 4d, 3d + N/2, OSN 100 LV431797 LV431807 LV431796 LV431806 160 250 LV431795 LV431805

#### With electronic trip unit Micrologic 5.2 E (LSI protection, energy meter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

#### With electronic trip unit Micrologic 6.2 A (LSIG protection, ammeter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

#### With electronic trip unit Micrologic 6.2 E (LSIG protection, energy meter)

# NSX100/160/250H: complete fixed/FC device (cont.)

Compact NSX100/160/250H (70 kA 380/415 V) (cont.)

#### Compact NSX100/160/250H

With magnetic trip unit MA



Compact NSX100H (70 kA at 380/415 V)			
Rating	<b>3P</b> 3d		
MA2.5	LV429765		
MA6.3	LV429764		
MA12.5	LV429763		
MA25	LV429762		
MA50	LV429761		
MA100	LV429760		
Compact NSX160H (70 kA at 380/415 V)			
Rating	<b>3P</b> 3d		
MA100	LV430835		
MA150	LV430834		
Compact NSX250H (70 kA at 380/415 V)			
Rating	<b>3P</b> 3d		
MA150	LV431757		
MA220	LV431756		
Micrologic 2.2 M (L.S. Limotor protection)			

#### With electronic trip unit Micrologic 2.2 M (LS<sub>o</sub>I motor protection)



	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			
Compact NSX100H (70 kA at 38	80/415 V)			
Rating	<b>3P</b> 3d			
25	LV429838			
50	LV429837			
100	LV429835			
Compact NSX160H (70 kA at 380/415 V)				
Rating	<b>3P</b> 3d			
100	LV430992			
150	LV430991			
Compact NSX250H (70 kA at 3	80/415 V)			
Rating	<b>3P</b> 3d			
150	LV431171			
220	I V431170			

With electronic trip unit Micrologic 6.2 E-M (LSIG motor protection, energy meter)

# NSX100/160/250NA: complete fixed/FC device Compact NSX100/160/250NA

Compact NSX1	00/160/250NA	switch-disconnector	•		
With NA switch-dis	connector unit				
	Compact N	Compact NSX100NA			
	Rating	2P	3P	4P	
	100	LV429619	LV429629	LV429639	
	Compact N	Compact NSX160NA			
	Rating	2P	3P	4P	
	160	LV430619	LV430629	LV430639	
	Compact N	Compact NSX250NA			
718	Rating	2P	3P	4P	
Astron-	250	LV431619	LV431629	LV431639	

# NSX100/160/250B/F/N/H/S/L: fixed/FC device based on separate components

Compact and Vigicompact

		Compactana	<u> </u>	
Basic frame				
Dasic Italile				
8	Compact NSX100			
		3P	4P	
DB112245.eps	NSX100B (25 kA 380/415 V)	LV429014	LV429015	
ä	NSX100F (36 kA 380/415 V)	LV429003	LV429008	
	NSX100N (50 kA 380/415 V)	LV429006	LV429011	
	NSX100H (70 kA 380/415 V)	LV429004	LV429009	
	NSX100S (100 kA 380/415 V)	LV429018	LV429019	
	NSX100L (150 kA 380/415 V)	LV429005	LV429010	
	Compact NSX160			
		3P	4P	
	NSX160B (25 kA 380/415 V)	LV430390	LV430395	
			LV430408	
	NSX160F (36 kA 380/415 V)	LV430403		
	NSX160N (50 kA 380/415 V)	LV430406	LV430411	
	NSX160H (70 kA 380/415 V)	LV430404	LV430409	
	NSX160S (100 kA 380/415 V)	LV430391	LV430396	
	NSX160L (150 kA 380/415 V)	LV430405	LV430410	
	Compact NSX250			
		3P	4P	
	NCV250D (25 kA 200/445 V)			
	NSX250B (25 kA 380/415 V)	LV431390	LV431395	
	NSX250F (36 kA 380/415 V)	LV431403	LV431408	
	NSX250N (50 kA 380/415 V)	LV431406	LV431411	
	NSX250H (70 kA 380/415 V)	LV431404	LV431409	
	NSX250S (100 kA 380/415 V)	LV431391	LV431396	
	NSX250L (150 kA 380/415 V)	LV431405	LV431410	
T		1=3.00.000	, 2	
+ Trip unit				
Distribution protection				
· ·	Thermal magnetic TM D			
DB112246.498	Thermal-magnetic TM-D	lanci	Lanca	Landa
8	Rating	<b>3P</b> 3d	<b>4P</b> 3d	<b>4P</b> 4d
in Charles	TM16D	LV429037	LV429047	LV429057
Te New	TM25D	LV429036	LV429046	LV429056
	TM32D	LV429035	LV429045	LV429055
	TM40D	LV429034	LV429044	LV429054
	TM50D	LV429033	LV429043	LV429053
	TM63D	LV429032	LV429042	LV429052
	TM80D	LV429031	LV429041	LV429051
	TM100D	LV429030	LV429040	LV429050
	TM125D	LV430431	LV430441	LV430451
	TM160D (1)	LV430430	LV430440	LV430450
	TM160D <sup>(2)</sup>	LV431432	LV431442	LV431452
	TM200D	LV431431	LV431441	LV431451
	TM250D	LV431430	LV431440	LV431450
g som.	Micrologic 2.2 (LS <sub>o</sub> I protection		24401440	124-01-00
		i -		
DB112247.eps	Rating	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2	
a Clark	Micrologic 2.2 40 A	LV429072	LV429082	
a tel	Micrologic 2.2 100 A	LV429070	LV429080	
	Micrologic 2.2 160 A	LV430470	LV430480	
	Micrologic 2.2 250 A	LV431470	LV431480	
ς <b>Α</b>	Micrologic 5.2 A (LSI protection		1 22 101 100	
	• • • •		4B 04 44 04 - N/0 04 - OCN	
0B112248.pps	Rating	3P 3d	<b>4P</b> 3d, 4d, 3d + N/2, 3d + OSN	
ä ( C	Micrologic 5.2 A 40 A	LV429091	LV429101	
	Micrologic 5.2 A 100 A	LV429090	LV429100	
Te Hall	Micrologic 5.2 A 160 A	LV430490	LV430495	
-	Micrologic 5.2 A 250 A	LV431490	LV431495	
	Micrologic 5.2 E (LSI protection	on, energy meter)		
	Rating	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2, 3d + OSN	
	Micrologic 5.2 E 40 A	LV429096	LV429106	
	Micrologic 5.2 E 40 A	LV429095	LV429105	
	Micrologic 5.2 E 160 A	LV430491	LV430496	
	Micrologic 5.2 E 250 A	LV431491	LV431496	
	Micrologic 6.2 A (LSIG protect	tion, ammeter)		
	Rating	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2, 3d + OSN	
	Micrologic 6.2 A 40 A	LV429111	LV429136	
	Micrologic 6.2 A 100 A	LV429110	LV429135	
	Micrologic 6.2 A 160 A	LV430505	LV430515	
	-			
	Micrologic 6.2 A 250 A	LV431505	LV431515	
	Micrologic 6.2 E (LSIG protect		Lancia	
	Rating	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2, 3d + OSN	
	Micrologic 6.2 E 40 A	LV429116	LV429141	
	Micrologic 6.2 E 100 A	LV429115	LV429140	
	Micrologic 6.2 E 160 A	LV430506	LV430516	
	Micrologic 6.2 E 250 A	LV430500 LV431506	LV430516	
(1) For NSX160.	MICTOROGIC U.Z L ZOUA	1 = 4 70 1000	1 = 4 = 0 10 10	

(1) For NSX160. (2) For NSX250.

# NSX100/160/250B/F/N/H/S/L: fixed/FC device based on separate components (cont.)

Compact and Vigicompact (cont.)

+ Trip unit (cont.)  Motor protection	Magnetic MA (I protection) Rating MA2.5	<b>3P</b> 3d	<b>4P</b> 3d
To her II	Rating MA2.5		<b>4P</b> 3d
TO THE US	MA2.5		<b>4P</b> 3d
TO THE US			
E State		LV429125	
	MA6.3	LV429124	
	MA12.5	LV429123	
	MA25	LV429122	
	MA50	LV429121	
			11/400400
	MA100	LV429120	LV429130
	MA150	LV430500	LV430510
	MA220	LV431500	LV431510
	Micrologic 2.2 M (LS <sub>o</sub> I protection)		
	Rating 3P 3d		
	Micrologic 2.2 M 25 A	LV429174	
Te let	Micrologic 2.2 M 50 A	LV429172	
	Micrologic 2.2 M 100 A	LV429170	
	-		
	Micrologic 2.2 M 150 A	LV430520	
	Micrologic 2.2 M 220 A	LV431520	
	Micrologic 6.2 E-M (LSIG protection, er	nergy meter)	
	Rating	<b>3P</b> 3d	
	Micrologic 6.2 E-M 25 A	LV429184	
	Micrologic 6.2 E-M 50 A	LV429182	
TO THE PARTY	Micrologic 6.2 E-M 80 A	LV429180	
ALL LANDERS		LV429160 LV430521	
	Micrologic 6.2 E-M 150 A		
	Micrologic 6.2 E-M 220 A	LV431521	
Generator protection			
	Thermal-magnetic TM-G		
	Rating	<b>3P</b> 3d	<b>4P</b> 4d
	TM16G	LV429155	LV429165
Te Tre	TM25G	LV429154	LV429164
	TM40G	LV429153	LV429163
	TM63G		LV429162
		LV429152	
	TM80G	LV430080 (1)	LV430092 (1)
	TM100G	LV430081 (1)	LV430093 <sup>(1)</sup>
	TM125G	LV430082 (1)	LV430094 (1)
	TM160G	LV430083 (1)	LV430095 (1)
	TM200G	LV430084 (1)	LV430096 (1)
	TM250G	LV430085 (1)	LV430097 (1)
920.	Micrologic 2.2 G (LS <sub>o</sub> I protection)		21700001
	- 0	<b>AD</b> 0.1	48.01.41.01.31/0
	Rating	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2
To he la	Micrologic 2.2 G 40 A	LV429076	LV429086
2 NE	Micrologic 2.2 G 100 A	LV429075	LV429085
	Micrologic 2.2 G 160 A	LV430475	LV430485
	Micrologic 2.2 G 250 A	LV431475	LV431485
Protection of public dis			
Para public dis	Micrologic 2.2 AB (LS <sub>o</sub> I protection)		
			1
	Rating		<b>4P</b> 3d, 4d, 3d + N/2
Nag Ta	Micrologic 2.2 AB 100 A		LV434550
Te man	Micrologic 2.2 AB 160 A		LV434551
	Micrologic 2.2 AB 240 A		LV434554
6 Hz 2/3 network prote			
M		meter)	
	Micrologic 5.2 A-Z (LSI protection, amn		
	Rating	<b>3P</b> 3d	
	Micrologic 5.2 A-Z 100 A	LV429089	
	Micrologic 5.2 A-Z 250 A	LV431489	
Texter			
Vigi module or in	sulation monitoring module		
/igi module			
		20	40
01010		3P	4P
5	ME type for NSX100/160 (200 to 440 V)	LV429212	LV429213
Majoria	MH type for NSX100/160 (200 to 440 V)	LV429210	LV429211
	MH type for NSX250 (200 to 440 V)	LV431535	LV431536
	MH type for NSX100/160 (440 to 550 V)	LV429215	LV429216
Te Te Ne	MH type for NSX250 (440 to 550 V)	LV423213	LV431534
4-		L4401000	
	Connection for a 4P Vigi on a 3P breaker		LV429214
nsulation monitoring m	iodule		
		3P	4P
	200 to 440 V AC	LV429459	LV429460
9	Connection for a 4P insulation monitoring		LV429214
		4	
	module on a 3P breaker		

(1) New: available October 2013.

# NSX100/250R: complete fixed/FC device

Compact NSX100/250R (200 kA 380/415 V - 45 kA 690 V)

Compact NSX100/250R					
With thermal-magnetic trip unit TM-D					
Compact NSX100R (200 kA at 380/415 V - 45 kA at 690 V)					
	Rating	<b>3P</b> 3d	<b>4P</b> 4d		
DB112222 495	TM40D	LV433200	LV433201		
	TM50D	LV433202	LV433203		
	TM63D	LV433204	LV433205		
	TM80D	LV433206	LV433207		
	TM100D	LV433208	LV433209		
N. T. D.	Compact NSX250R (200 kA at 380/415 V - 45 kA at 690 V)				
THE	Rating	<b>3P</b> 3d	<b>4P</b> 4d		
	TM125D	LV433470	LV433471		
	TM160D	LV433472	LV433473		
	TM200D	LV433474	LV433475		
	TM250D	LV433476	LV433477		
With electronic trip unit	t Micrologic 2.2 (LS <sub>o</sub> l protection	on)			
G.	Compact NSX100R (200 kA at	380/415 V - 45 kA at 690 V)			
DBH12223 dps	Rating	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2		
	40	LV433270	LV433271		
	100	LV433272	LV433273		
	Compact NSX250R (200 kA at 380/415 V - 45 kA at 690 V)				
	Rating	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2		
10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	100	LV433510	LV433511		
Marine	160	LV433512	LV433513		
- EXTE	250	LV433514	LV433515		
	Micrologic 5.2 E (LSI protection				
00112224 4pp	Compact NSX100R (200 kA at	. ,	Language		
	Rating	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2, OSN		
ä l	40	LV433277	LV433278		
	100	LV433279	LV433280		
	Compact NSX250R (200 kA at	,	(Data table ) 1/2 0001		
	Rating	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2, OSN		
	100	LV433518	LV433519		
Marie	160	LV433520	LV433521		
	250	LV433522	LV433523		
-	Micrologic 6.2 E (LSIG protect				
DB112224 aps	Compact NSX100R (200 kA at	. ,	48 0 1 4 1 0 1 1 1/0 00 1		
	Rating	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2, OSN		
8	40	LV433281	LV433282		
	100 Compact NSX250R (200 kA at	LV433283	LV433284		
		. ,	4D 2d 4d 2d   N/2 OCN		
	Rating	3P 3d	<b>4P</b> 3d, 4d, 3d + N/2, OSN		
	100 160	LV433524 LV433526	LV433525 LV433527		
Mileten	250				
~	200	LV433528	LV433529		

# NSX100/250R: complete fixed/FC device (cont.)

Compact NSX100/250R (200 kA 380/415 V - 45 kA 690 V) (cont.)

Compact NSX100/250R	
With magnetic trip unit MA	
© Compact NSX1	00R (200 kA at 380/415 V - 45 kA at 690 V)
Rating	<b>3P</b> 3d
Rating MA12.5	LV433242
MA25	LV433243
MA50	LV433244
MA100	LV433245
Compact NSX2	50R (200 kA at 380/415 V - 45 kA at 690 V)
Rating	<b>3P</b> 3d
MA150	LV433500
MA220	LV433501
With electronic trip unit Micrologic 2.2 M	I (LS <sub>o</sub> l motor protection)
	00R (200 kA at 380/415 V - 45 kA at 690 V)
Rating 25	<b>3P</b> 3d
25	LV433274
50	LV433275
100	LV433276
	50R (200 kA at 380/415 V - 45 kA at 690 V)
Rating	<b>3P</b> 3d
150	LV433516
220	LV433517
	-M (LSIG motor protection, energy meter)
Compact NSX1	00R (200 kA at 380/415 V - 45 kA at 690 V)
Rating 25	<b>3P</b> 3d
25	LV433285
50	LV433286
100	LV433287
	50R (200 kA at 380/415 V - 45 kA at 690 V)
Rating	3P 3d
150	LV433530
220	LV433531

## NSX100/250HB1: complete fixed/FC device Compact NSX100/250HB1

(85 kA 500 V - 75 kA 690 V)

Compact NSX100	)/250HB1		
With thermal-magneti			
sds:	Compact NSX100HB	1 (85 kA at 500 V - 75 kA at 690 V	
08112222.eps	Rating	<b>3P</b> 3d	<b>4P</b> 4d
	TM40D	LV433210	LV433211
	TM50D	LV433212	LV433213
	TM63D	LV433214	LV433215
	TM80D	LV433216	LV433217
	TM100D	LV433218	LV433219
NIETI	Compact NSX250HB	1 (85 kA at 500 V - 75 kA at 690 V	<b>(</b> )
THE	Rating	<b>3P</b> 3d	<b>4P</b> 4d
	TM125D	LV433478	LV433479
	TM160D	LV433480	LV433481
	TM200D	LV433482	LV433483
	TM250D	LV433484	LV433485
With electronic trip ur	nit Micrologic 2.2 (LS <sub>o</sub> l <sub>I</sub>		
8	Compact NSX100HB	1 (85 kA at 500 V - 75 kA at 690 V	) .
DB112223.498	Rating	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2
	40	LV433300	LV433301
	100	LV433302	LV433303
	Compact NSX250HB	1 (85 kA at 500 V - 75 kA at 690 V	· ')
	Rating	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2
10 8 8	100	LV433540	LV433541
N TURN	160	LV433542	LV433543
THE	250	LV433544	LV433545
With electronic trip ur	nit Micrologic 5.2 E (LSI	protection, energy meter)	
Sa Carlo	Compact NSX100HB	1 (85 kA at 500 V - 75 kA at 690 V	')
DB 112224 eps	Rating	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2,OSN
	40	LV433307	LV433308
	100	LV433309	LV433310
	Compact NSX250HB	1 (85 kA at 500 V - 75 kA at 690 V	
	Rating	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2, OSN
	100	LV433548	LV433549
7127	160	LV433550	LV433551
Total	250	LV433552	LV433553
With electronic trip ur	nit Micrologic 6.2 E (LSI	G protection, energy meter)	
		1 (85 kA at 500 V - 75 kA at 690 V	)
DB112224 eps	Rating	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2, OSN
E CONTROL	40	LV433311	LV433312
	100	LV433313	LV433314
	Compact NSX250HB	1 (85 kA at 500 V - 75 kA at 690 V	* * * * * * * * * * * * * * * * * * * *
	Rating	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2, OSN
	100	LV433554	LV433555
	160	LV433556	LV433557
Men	250	LV433558	LV433559

## NSX100/250HB1: complete fixed/FC device (cont.) Compact NSX100/250HB1

(85 kA 500 V - 75 kA 690 V) (cont.)

Compact NSX100/250HB1	
With magnetic trip unit MA	
	HB1 (85 kA at 500 V - 75 kA at 690 V)
Rating	<b>3P</b> 3d
Rating MA12.5	LV433248
MA25	LV433249
MA50	LV433250
MA100	LV433251
Compact NSX250I	HB1 (85 kA at 500 V - 75 kA at 690 V)
Rating	<b>3P</b> 3d
MA150	LV433502
MA220	LV433503
With electronic trip unit Micrologic 2.2 M (L	.S <sub>o</sub> l motor protection)
© Compact NSX100I	HB1 (85 kA at 500 V - 75 kA at 690 V)
Rating 25	<b>3P</b> 3d
25	LV433304
50	LV433305
100	LV433306
	HB1 (85 kA at 500 V - 75 kA at 690 V)
Rating	<b>3P</b> 3d
150	LV433546
220	LV433547
With electronic trip unit Micrologic 6.2 E-M	
Compact NSX100I	HB1 (85 kA at 500 V - 75 kA at 690 V)
Rating 25	<b>3P</b> 3d
25	LV433315
50	LV433316
100	LV433317
	HB1 (85 kA at 500 V - 75 kA at 690 V)
Rating	3P 3d
150	LV433560
220	LV433561

# NSX100/250HB2: complete fixed/FC device

Compact NSX100/250HB2 (100 kA 500 V - 100 kA 690 V)

Compact NSX100	)/250HB2			
With thermal-magneti	c trip unit TM-D			
		32 (100 kA at 500 V - 100 kA at 690	) V)	
ФВ 172222 498	Rating	<b>3P</b> 3d	<b>4P</b> 4d	
	TM40D	LV433220	LV433221	
	TM50D	LV433222	LV433223	
	TM63D	LV433224	LV433225	
	TM80D	LV433226	LV433227	
	TM100D	LV433228	LV433229	
TIET	Compact NSX250HE	32 (100 kA at 500 V - 100 kA at 690	) V)	
THE	Rating	<b>3P</b> 3d	<b>4P</b> 4d	
	TM125D	LV433486	LV433487	
	TM160D	LV433488	LV433489	
	TM200D	LV433490	LV433491	
	TM250D	LV433492	LV433493	
With electronic trip un	nit Micrologic 2.2 (LS <sub>o</sub> l	protection)		
		32 (100 kA at 500 V - 100 kA at 690	) V)	
овитата ава	Rating	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2	
	40	LV433330	LV433331	
	100	LV433332	LV433333	
	Compact NSX250HE	32 (100 kA at 500 V - 100 kA at 690	) V)	
	Rating	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2	
	100	LV433570	LV433571	
Na Tall	160	LV433572	LV433573	
ALE -	250	LV433574	LV433575	
With electronic trip un	nit Micrologic 5.2 E (LSI	protection, energy meter)		
Sa Caracian	Compact NSX100HE	32 (100 kA at 500 V - 100 kA at 690	) V)	
DB 112224	Rating	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2, OSN	
	40	LV433337	LV433338	
	100	LV433339	LV433340	
	Compact NSX250HE	32 (100 kA at 500 V - 100 kA at 690		
	Rating	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2, OSN	
	100	LV433578	LV433579	
A TO LOT	160	LV433580	LV433581	
ENE	250	LV433582	LV433583	
With electronic trip un		G protection, energy meter)		
	Compact NSX100HE	32 (100 kA at 500 V - 100 kA at 690		
08112224	Rating	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2, OSN	
	40	LV433341	LV433342	
	100	LV433343	LV433344	
		32 (100 kA at 500 V - 100 kA at 690		
	Rating	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2, OSN	
	100	LV433584	LV433585	
TO TEN	160	LV433586	LV433587	
The state of the s	250	LV433588	LV433589	

# NSX100/250HB2: complete fixed/FC device (cont.)

Compact NSX100/250HB2 (100 kA 500 V - 100 kA 690 V) (cont.)

Compact NSX100/250HB2	
With magnetic trip unit MA	
	HB2 (100 kA at 500 V - 100 kA at 690 V)
Rating	<b>3P</b> 3d
Rating MA12.5	LV433254
MA25	LV433255
MA50	LV433256
MA100	LV433257
Compact NSX250	HB2 (100 kA at 500 V - 100 kA at 690 V)
Rating	<b>3P</b> 3d
MA150	LV433504
MA220	LV433505
With electronic trip unit Micrologic 2.2 M (I	LS <sub>o</sub> I motor protection)
	HB2 (100 kA at 500 V - 100 kA at 690 V)
Rating 25	<b>3P</b> 3d
25	LV433334
50	LV433335
100	LV433336
Compact NSX250	HB2 (100 kA at 500 V - 100 kA at 690 V)
Rating	<b>3P</b> 3d
150	LV433576
220	LV433577
With electronic trip unit Micrologic 6.2 E-M	
Compact NSX100	HB2 (100 kA at 500 V - 100 kA at 690 V)
Rating 25	<b>3P</b> 3d
25	LV433345
50	LV433346
100	LV433347
1 (111 1/2/1	HB2 (100 kA at 500 V - 100 kA at 690 V)
Rating	<b>3P</b> 3d
150	LV433590
220	LV433591

### **Trip unit accessories**

## Compact and Vigicompact NSX100/160/250

#### Trip unit accessories External neutral CT for 3 pole breaker with Micrologic 5/6 LV429521 150-250 A LV430563 24 V DC wiring accessory for Micrologic 5/6 LV434210 24 V DC power supply connector ZSI wiring accessory for NS630b NW with NSX LV434212 ZSI module External power supply module (24 V DC - 1 A), class 4 24-30 V DC 54440 48-60 V DC 54441 100-125 V DC 54442 110-130 V AC 54443 200-240 V AC 54444 380-415 V AC 54445 **Battery module** 54446 24 V DC battery module

### Installation and connection

LV429236

2 x

## Compact and Vigicompact NSX100/160/250

# Fixed/RC device = fixed/FC device + rear connection kit Short RC kit Kit 3P Kit 4P Mixed RC kit Kit 3P Short RCs Long RCs Long RCs Kit 4P Short RCs 2 x LV429235 Lu429235 Lu429235 Lu429235 Lu429235 Lu429235

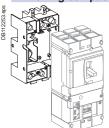
Long RCs

#### Plug-in version = fixed/FC device + plug-in kit Kit for Compact



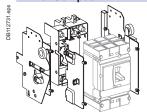
	2P (3P)	3P	4P
Plug-in kit	LV429288	LV429289	LV429290
Comprising:			
Base	= 1 x LV429265	= 1 x LV429266	= 1 x LV429267
Power connections	+ 2 x LV429268	+ 3 x LV429268	+ 4 x LV429268
Short terminal shields	+ 2 x LV429515	+ 2 x LV429515	+ 2 x LV429516
Safety trip interlock	+ 1 x LV429270	+ 1 x LV429270	+ 1 x LV429270

#### **Kit for Vigicompact**



	3P	4P	
Vigicompact plug-in kit	LV429291	LV429292	
Comprising:			
Base	= 1 x LV429266	= 1 x LV429267	
Power connections	+ 3 x LV429269	+ 4 x LV429269	
Short terminal shields	+ 2 x LV429515	+ 2 x LV429516	
Safety trip interlock	+ 1 x LV429270	+ 1 x LV429270	

### Withdrawable version = fixed/FC device + withdrawable kit Kit for Compact



Plug-in kit

Chassis side plates for base
Chassis side plates for breaker

2P (3P)
Kit for Compact
=
1 x LV429288
+
1 x LV429282
+
1 x LV429283

3P
Kit for Compact
=
1 × LV429289
+
1 × LV429282
+
1 × LV429283

4P
Kit for Compact
=
1 × LV429290
+
1 × LV429282
+
1 × LV429283



Plug-in kit

Chassis side plates for base
Chassis side plates for breaker

3P
Kit for Vigicompact
=
1 × LV429291
+
1 × LV429282
+
1 × LV429283

4P
Kit for Vigicompact
=
1 x LV429292
+
1 x LV429282
+
1 x LV429283

### **Accessories**

## Compact and Vigicompact NSX100/160/250

Connection access	Solics (ou of Al)			
Rear connections				
	2 short			LV429235
	2 long			LV429236
Bare cable connectors				
ent En	Steel connectors	1 x (1.5 to 95 mm²) ; ≤ 160 A	Set of 3	LV429242
			Set of 4	LV429243
- 60	Aluminium connectors	1 x (25 to 95 mm²) ; ≤ 250 A	Set of 3	LV429227
		( /,	Set of 4	LV429228
		1 x (120 to 185 mm²) ; ≤ 250 A	Set of 3	LV429259
		1 X (120 to 100 mm), < 200 X	Set of 4	LV429260
	Clips for connectors		Set of 10	LV429241
	Clips for connectors		Set of 10	LV 42924 1
	Aluminium connectors for 2 cables (1)	2 x (50 to 120 mm²) ; ≤ 250 A	Set of 3	LV429218
			Set of 4	LV429219
. 1000	Aluminium connectors (1) for 6 cables	6 x (1.5 to 35 mm²) ; ≤ 250 A	Set of 3	LV429248
0000			Set of 4	LV429249
			20.01	,
P	6.35 mm voltage tap for steel or aluminion	um connectors	Set of 10	LV429348
	<b>3</b> - <b>1</b>			
"Polybloc" distribution				
- 019C	160 A (40 °C) 6 cables S ≤ 10 mm <sup>2</sup>		1P	04031
	250 A (40 °C) 9 cables S ≤ 10 mm <sup>2</sup>		3P	04033
\				
			4P	04034
Terminal extensions			4P	
	45° terminal extension (1)		Set of 3	LV429223
- 6 6	45° terminal extension <sup>(1)</sup>			
			Set of 3 Set of 4	LV429223 LV429224
- 6 6	45° terminal extension <sup>(1)</sup> Edgewise terminal extensions <sup>(1)</sup>		Set of 3	LV429223
	Edgewise terminal extensions (1)		Set of 3 Set of 4 Set of 3 Set of 4	LV429223 LV429224 LV429308 LV429309
			Set of 3 Set of 4 Set of 3	LV429223 LV429224 LV429308
	Edgewise terminal extensions (1)  Right-angle terminal extensions (1)		Set of 3 Set of 3 Set of 4  Set of 3 Set of 4  Set of 3 Set of 4	LV429223 LV429224 LV429308 LV429309 LV429261 LV429262
Terminal extensions	Edgewise terminal extensions (1)		Set of 3 Set of 4  Set of 3 Set of 4  Set of 3	LV429223 LV429224 LV429308 LV429309
	Edgewise terminal extensions (1)  Right-angle terminal extensions (1)  Straight terminal extensions (1)		Set of 3 Set of 4	LV429223 LV429224 LV429308 LV429309 LV429261 LV429262 LV429263 LV429264
	Edgewise terminal extensions (1)  Right-angle terminal extensions (1)		Set of 3 Set of 4	LV429223 LV429224 LV429308 LV429309 LV429261 LV429262 LV429263
	Edgewise terminal extensions (1)  Right-angle terminal extensions (1)  Straight terminal extensions (1)  Double-L terminal extensions (1)		Set of 3 Set of 3 Set of 4	LV429223 LV429224 LV429308 LV429309 LV429261 LV429262 LV429263 LV429264 LV429221 LV429221
	Edgewise terminal extensions (1)  Right-angle terminal extensions (1)  Straight terminal extensions (1)		Set of 3 Set of 4	LV429223 LV429224 LV429308 LV429309 LV429261 LV429262 LV429263 LV429264
	Edgewise terminal extensions (1)  Right-angle terminal extensions (1)  Straight terminal extensions (1)  Double-L terminal extensions (1)  Spreaders from 35 to 45 mm pitch (1)  One-piece spreader from 35 to 45 mm		Set of 3 Set of 4	LV429223 LV429224 LV429308 LV429309 LV429261 LV429262 LV429263 LV429264 LV429221 LV429221 LV429222
	Edgewise terminal extensions (1)  Right-angle terminal extensions (1)  Straight terminal extensions (1)  Double-L terminal extensions (1)  Spreaders from 35 to 45 mm pitch (1)		Set of 3 Set of 4  3P 4P	LV429223 LV429224 LV429308 LV429309 LV429261 LV429262 LV429263 LV429264 LV429221 LV429222 LV431563 LV431564
	Edgewise terminal extensions (1)  Right-angle terminal extensions (1)  Straight terminal extensions (1)  Double-L terminal extensions (1)  Spreaders from 35 to 45 mm pitch (1)  One-piece spreader from 35 to 45 mm		Set of 3 Set of 4  Set of 3 Set of 4	LV429223 LV429224 LV429308 LV429309 LV429261 LV429262 LV429263 LV429264 LV429221 LV429222 LV431563 LV431564

<sup>(1)</sup> Supplied with 2 or 3 interphase barriers.

Crimp lugs for copper o	cable (1)		
	For cable 120 mm <sup>2</sup>	Set of 3	LV429252
n 🖺 📙	1 01 00010 120 11111	Set of 4	LV429256
4 19 12	For cable 150 mm <sup>2</sup>	Set of 3	LV429253
	1 of cable 100 film	Set of 4	LV429257
	For cable 185 mm <sup>2</sup>	Set of 3	LV429254
	1 of Cable 103 IIIIII-	Set of 4	
Crimp lugs for aluminiu	ım cahle (1)	Set 01 4	LV429258
	For cable 150 mm <sup>2</sup>	Set of 3	LV429504
, M	1 of cable 130 filling	Set of 4	LV429505
	F		
	For cable 185 mm <sup>2</sup>	Set of 3	LV429506
		Set of 4	LV429507
Insulation accessories			
	1 short terminal shield for breaker or plug-in base	3 P	LV429515
		4 P	LV429516
To la pluy			
	1 long terminal shield for breaker or plug-in base	3 P	LV429517
	riong terminal emola for breaker or play in bace	4 P	LV429518
bould's a	Interphase barriers for breaker or plug-in base	Set of 6	LV429329
	Connection adapter for plug-in base	3P 4P	LV429306 LV429307
	2 insulating screens for breaker (45 mm pitch)	3P	LV429330
		4P	LV429331

<sup>(1)</sup> Supplied with 2 or 3 interphase barriers.

### Electrical auxiliaries

#### Auxiliary contacts (changeover)



OF or SD or SDE or SDV
OF or SD or SDE or SDV low level 29450 29452 SDE adapter, mandatory for trip unit TM, MA or Micrologic 2 LV429451

#### SDx output module for Micrologic

SDx module 24/415 V AC/DC

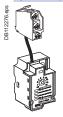
LV429532



SDTAM contactor tripping module (early-break thermal fault signal) for Micrologic 2.2 M/6.2 E-M

SDTAM 24/415 V AC/DC overload fault indication

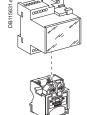
LV429424



Volt	age	rel	leas	ses
------	-----	-----	------	-----



	Voltage	MX	MN
AC	24 V 50/60 Hz	LV429384	LV429404
	48 V 50/60 Hz	LV429385	LV429405
	110-130 V 50/60 Hz	LV429386	LV429406
	220-240 V 50/60 Hz and 208-277 V 60 Hz	LV429387	LV429407
	380-415 V 50 Hz and 440-480 V 60 Hz	LV429388	LV429408
	525 V 50 Hz and 600 V 60 Hz	LV429389	LV429409
DC	12 V	LV429382	LV429402
	24 V	LV429390	LV429410
	30 V	LV429391	LV429411
	48 V	LV429392	LV429412
	60 V	LV429383	LV429403
	125 V	LV429393	LV429413
	250 V	LV429394	LV429414
MN 48 V 50/60	Hz with fixed time delay		
Composed of:	MN 48 V DC		LV429412
	Delay unit 48 V 50/60 Hz		LV429426
MN 220-240 V	50/60 Hz with fixed time delay		
Composed of:	MN 250 V DC		LV429414
·	Delay unit 220-240 V 50/60 Hz		LV429427
MN 48 V DC/A	C 50/60 Hz with adjustable time delay		
Composed of:	MN 48 V DC		LV429412
•	Delay unit 48 V 50/60 Hz		33680
MN110-130 V I	DC/AC 50/60 Hz with adjustable time delay		
Composed of:	MN 125 V DC		LV429413
•	Delay unit 110-130 V 50/60 Hz		33681
MN 220-250 V	50/60 Hz with adjustable time delay		
Composed of:	MN 250 V DC		LV429414
•	Delay unit 220-250 V 50/60 Hz		33682



Motor mechanis	sm			
Motor mechanism n	nodule supplied with SDE adap	oter		
~~~		Voltage	MT100/160	MT250
	AC	48-60 V 50/60 Hz	LV429440	LV431548
		110-130 V 50/60 Hz	LV429433	LV431540
KAP OP		220-240 V 50/60 Hz and	LV429434	LV431541
		208-277 V 60 Hz		
a com		380-415 V 50/60 Hz and	LV429435	LV431542
		440-480 V 60 Hz		
	DC	24-30 V	LV429436	LV431543
		48-60 V	LV429437	LV431544
		110-130 V	LV429438	LV431545
		250 V	LV429439	LV431546
Communicating mo	tor mechanism module suppli	ed with SDE adapter		
~~	Motor mechanism module	MTc 100/160	220-240 V 50/60 Hz	LV429441
		MTc 250	220-240 V 50/60 Hz	LV431549
000	+			
	Breaker and Status Communication Module	BSCM		LV434205
	+			
	NSX cord	Wire length L = 0.35 m		LV434200
		Wire length L = 1.3 m		LV434201
		Wire length L = 3 m		LV434202
		U > 480 V AC wire length L =	0.35 m	LV434204

#### 

I max. ammeter module

Rating (A)	100	160	250
3P	LV434849	LV434850	LV434851

<b>Current transformer mode</b>	L

DB112257.eps

dule			
Rating (A)	100	150	250
3P	LV429457	LV430557	LV431567
4P	LV429458	LV430558	LV431568

<b>Current transforme</b>	er module and voltage out	put			
Selver Services	Rating (A)	125	150	250	
	3P	LV429461	LV430561	LV431569	
	4P	LV429462	LV430562	LV431570	

Voltage presence	e indicator	
	3P/4P	LV429325

DB 1122			
	Rotary handles		
	Direct rotary handle		
ebs		With black handle	LV429337
259		With red handle on yellow front	LV429339
)B11225		MCC conversion accessory	LV429341
		CNOMO conversion accessory	LV429342
	Extended rotary handle		
ebs		With black handle	LV429338
B112260.		With red handle on yellow front	LV429340
112	II Data	With telescopic handle for withdrawable device	LV429343

Accessories for direct or extended rotary handle			
Indication auxiliary	1 early-break contact	LV429345	
	2 early-make contacts	LV429346	

#### Locks

#### Toggle locking device for 1 to 3 padlocks

By removable device

29370



By fixed device (only for 3P-4P)

LV429371



Locking of rotary handle

Keylock adapter (keylock not included) Keylock (keylock adapter not included)

Ronis 1351B.500 Profalux KS5 B24 D4Z LV429344 41940 42888

DB112263.eps

Locking of motor mechanism module

Keylock adapter + Ronis keylock (special)

LV429449



#### Interlocking

#### Mechanical interlocking for circuit breakers



With toggles

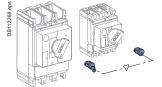
LV429354



With rotary handles

LV429369

#### Interlocking with key (2 keylocks / 1 key) for rotary handles



Keylock kit (keylock not included) (1) 1 set of 2 keylocks (1 key only, keylock kit not included)

Ronis 1351B.500 Profalux KS5 B24 D4Z LV429344 41950 42878

#### Installation accessories

#### Front-panel escutcheons



 IP30 escutcheon for all control types
 LV429525

 IP30 trip unit access escutcheon for toggle
 LV429526

 IP30 escutcheon for Vigi module
 LV429527

IP30



 IP40 escutcheon for all control types
 LV429317

 IP40 escutcheon for Vigi module
 LV429316

 IP40 escutcheon for Vigi or ammeter module
 LV429318

11-40

#### IP43 rubber toggle cover



1 toggle cover LV429319

Lead-sealing accessories



Bag of accessories

LV429375

Din rail adapter



1 adapter LV429305

#### 60 mm plate



Plate 3P Compact NSX100/250 IEC	LV429372
Plate 4P Compact NSX100/250 IFC	LV429373

(1) For only 1 device.

ulation accessories	1 connection adapter for plug-in base		3P	LV429306
000			4P	LV429307
xiliary connections	1 9-wire fixed connector (for base)			LV429273
]	1 9-wire moving connector (for circuit breaker)			LV429274
	1 support for 2 moving connectors			LV429275
	9-wire manual auxiliary connector (fixed + moving)			LV429272
g-in base accessories	2 long insulated right angle terminal extensions		Set of 2	LV429276
			, <u></u>	
	2 IP40 shutters for base			LV429271
	Base		2P (3P base)	LV429265
			3P	LV429266
	Base		4P	LV429267
	2 power connections		2/3/4P	LV429268
9				
	1 short terminal shield		2/3P	LV429515
	1 short terminal shield		4P	LV429516
and the second				
	1 safety trip interlock		2/3/4P	LV429270
ssis accessories				
	Escutcheon collar		Toggle	LV429284
	Escutcheon collar		Vigi module	LV429285
				,
<sup>1</sup> n	Locking kit (keylock not included)			LV429286
N		B 1		Luce
	Keylock (keylock adapter not included)	Ronis 1351B.500 Profalux KS5 B24 D42	7	41940 42888
	2 carriage switches (connected/disconnected position	indication)		LV429287

	10 spare toggle extensions (NSX250)		LV429313
6 %	Bag of screws		LV429312
	12 snap-in nuts (fixed/FC)	M6 for NSX100N/H/L	LV429234
	12 diap in rate (incarr 5)	M8 for NSX160/250N/H/L	LV430554
	NS retrofit escutcheon	Small cut-out	LV429528
	IP40 toggle escutcheon	Compact NS type/small cut-out	29315
	1 set of 10 identification labels		LV429226
	1 base for extended rotary handle		LV429502
	Torque limiting screws (set of 12)	3P/4P Compact NSX100-250	LV429513
	LCD display for electronic trip unit	Micrologic 5 Micrologic 6 Micrologic 6 E-M	LV429483 LV429484 LV429486
	5 transparent covers for trip unit	TM, MA, NA Micrologic 2 Micrologic 5/6	LV429481 LV429481 LV429478
dividual enclo			
5 steel enclosure	Compact NSX100/160 with black extended Compact NSX100/160 with red and yellow 6 Compact NSX250 or Vigicompact NSX100-	extended rotary handle	LV431215 LV431216 LV431217 LV431218
55 insulating enclo	Compact NXS100/160 with black extended Vigicompact NXS100/160 with black extended Compact NXS250 with black extended rotar	led rotary handle	LV429465 LV429466 LV431573

#### Visible break disconnect function

See catalogue dealing with "Compact INV products (visible break)" and the associated accessories.

The visible break disconnection function is compatible with fixed front-connected/rear-connected Compact NSX devices.

### Monitoring and control, test tools

### Compact and Vigicompact NSX100/160/250

Monitoring and co	ontrol (remote operation)		
Circuit breaker access			
Officult breaker access	Breaker Status Control Module BSCM <sup>(1)</sup>	LV434205	
	Breaker Status Control Module BSGM**	LV434203	
ULP display module (2)			
ozi display module	Switchboard front display module FDM121	TRV00121	
To	FDM mounting accessory (diameter 22 mm)	TRV00121	
0.0000	1 Divi mounting accessory (diameter 22 min)	11/400120	
ULP communication m	nodule		
	Modbus interface Modbus SL communication interface module	TRV00210	
a o	modelas mendee module	11000210	
ULP wiring accessorie			
	NSX cord L = 0.35 m	LV434200	
	NSX cord L = 1.3 m	LV434201	
	NSX cord L = 3 m	LV434202	
	NSX cord for U > 480 V AC L = 1.3 m	LV434204	
<u>_</u>	10 stacking connectors for communication interface modules	TRV00217	
	10 Modbus line terminators	VW3A8306DRC	
	RS 485 roll cable (4 wires, length 60 m)	50965	
	. to too to to assist ( Times) to tight occurry		
<b>∽</b>	5 RJ45 connectors female/female	TRV00870	
	9.10.10.003.111.003.01.01.111.0		
	10 ULP line terminators	TRV00880	
		TINVOOCO	
	10 RJ45/RJ45 male cord L = 0.3 m	TRV00803	
	10 RJ45/RJ45 male cord L = 0.5 m	TRV00806	
		TRV00810	
M ))	5 RJ45/RJ45 male cord L = 1 m		
	5 RJ45/RJ45 male cord L = 2 m	TRV00820	
	5 RJ45/RJ45 male cord L = 3 m	TRV00830	
	1 RJ45/RJ45 male cord L = 5 m 2 wires RS 485 insulated repeated	TRV00850 TRV00211	
Power supply modules		11(400211	
000	External power supply module 100-240 V AC 110-230 V DC / 24 V DC-3 A class 2	ABL8RPS24030	
	External power supply module 24 V DC-1 A OVC IV		
	24-30 V DC	54440	
AD AD	48-60 V DC	54441	
The state of the s	100-125 V AC	54442	
Jir-	110-130 V AC	54443	
	200-240 V AC	54444	
	380-415 V AC	54445	
Battery module	24 V DC hattary modula	54446	
•	24 V DC battery module	54446	
0000000			

- (1) SDE adapter mandatory for trip unit TM, MA or Micrologic 2 (LV429451).
  (2) For measurement display with Micrologic A and E or status display with BSCM.
- (3) See Telemecanique catalogue.

### Monitoring and control, test tools (cont.)

Compact and Vigicompact NSX100/160/250 (cont.)

Test tool, software,	demo	
Test tool		
DB 111 449, eps	Pocket battery for Micrologic NSX100-630	LV434206
DB111451 aps	Maintenance case Comprising: - USB maintenance interface - Power supply - Micrologic cord - USB cord - RJ45/RJ45 male cord	TRV00910
DBITI450 dps	Spare USB maintenance interface	TRV00911
DBII1482 eps	Spare power supply 110-240 V AC	TRV00915
B111 453 eps	Spare Micrologic cord for USB maintenance interface	TRV00917
DB111448 gps DB111453 gps	Bluetooth/Modbus option for USB maintenance interface	VW3A8114 (1)
Software		
DB 117158. eps	Configuration and setting software RSU Test software LTU Monitoring software RCU	LV4ST100 (2) LV4ST121 (2) LV4SM100 (2)
Demo tool		
(4) Con Toleron enime entele	Demo case for Compact NSX	LV434207

- (1) See Telemecanique catalogue.
  (2) Downloadable from http://schneider-electric.com.

### **COMPACT NSX**

Instructions			
User manual			
	Circuit breaker	(French)	LV434100
		(English)	LV434101
	Micrologic 5.6	(French)	LV434103
		(English)	LV434104
	Modbus	(French)	LV434106
		(English)	LV434107
	ULP	(French)	TRV99100
		(English)	TRV99101

### Compact NSX400 to 630

### Contents

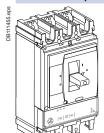
NSX400/630F: complete fixed/FC device	
Compact NSX400/630F (36 kA 380/415 V)	F-38
Vigicompact NSX400/630F (36 kA 380/415 V)	F-39
NSX400/630N: complete fixed/FC device	
Compact NSX400/630N (50 kA 380/415 V)	F-40
Vigicompact NSX400/630N (50 kA 380/415 V)	F-41
NSX400/630H: complete fixed/FC device	
Compact NSX400/630H (70 kA 380/415 V)	F-42
NSX400/630NA: complete fixed/FC device	
Compact NSX400/630NA	F-43
NSX400/630F/N/H/S/L:	
fixed/FC device based on separate components	
Compact and Vigicompact	F-44
NSX400/630R: complete fixed/FC device	
Compact NSX400/630R (200 kA 380/415 V - 45 kA 690 V)	F-45
NSX400/630HB1: complete fixed/FC device	
Compact NSX400/630HB1 (85 kA 500 V - 75 kA 690 V)	F-46
NSX400/630HB2: complete fixed/FC device	
Compact NSX400/630HB2 (85 kA 500 V - 100 kA 690 V)	F-47
Trip unit accessories	
Compact and Vigicompact NSX400/630	F-48
Installation and connection	
Compact and Vigicompact NSX400/630	F-49
Accessories	
Compact and Vigicompact NSX400/630	F-51
Monitoring and control, test tools	
Compact and Vigicompact NSX400/630	F-59

## NSX400/630F: complete fixed/FC device

Compact NSX400/630F (36 kA 380/415 V)

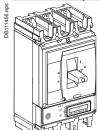
#### Compact NSX400/630F

#### Electronic trip unit Micrologic 2.3 (LS<sub>o</sub>I protection)



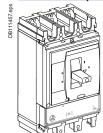
		<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2
Compact NSX400F (36 kA at 380/415 V)	250 A	LV432682	LV432683
	400 A	LV432676	LV432677
Compact NSX630F (36 kA at 380/415 V)	630 A	LV432876	LV432877

#### Electronic trip unit Micrologic 5.3 A (LSI protection, ammeter)



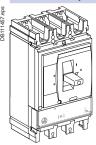
		<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2, 3d + OSN
Compact NSX400F (36 kA at 380/415 V)	400 A	LV432678	LV432679
Compact NSX630F (36 kA at 380/415 V)	630 A	LV432878	LV432879

#### Electronic trip unit Micrologic 1.3 M (I motor protection)



		<b>3P</b> 3d
Compact NSX400F 1.3 M (36 kA at 380/415V)	320 A	LV432748
Compact NSX630F 1.3 M (36 kA at 380/415V)	500 A	LV432948

#### Electronic trip unit Micrologic 2.3 M (LS<sub>o</sub>I motor protection)



		<b>3P</b> 3d
Compact NSX400F 2.3 M (36 kA at 380/415V)	320 A	LV432775
Compact NSX630F 2.3 M (36 kA at 380/415V)	500 A	LV432975

#### With electronic trip unit Micrologic 5.3 E (LSI protection, energy meter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

#### With electronic trip unit Micrologic 6.3 A (LSIG protection, ammeter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

#### With electronic trip unit Micrologic 6.3 E (LSIG protection, energy meter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

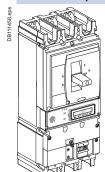
#### With electronic trip unit Micrologic 6.3 E-M (LSIG motor protection, energy meter)

# NSX400/630F: complete fixed/FC device

Vigicompact NSX400/630F (36 kA 380/415 V)

#### Vigicompact NSX400/630F

#### Electronic trip unit Micrologic 2.3 (LS<sub>o</sub>I protection)



	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2
Vigicompact NSX400F (36 kA at 380/415 V) 400	A LV432731	LV432732
Vigicompact NSX630F (36 kA at 380/415 V) 630	A LV432931	LV432932

#### With electronic trip unit Micrologic 5.3 E (LSI protection, energy meter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

#### With electronic trip unit Micrologic 6.3 A (LSIG protection, ammeter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

#### With electronic trip unit Micrologic 6.3 E (LSIG protection, energy meter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

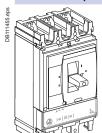
#### With electronic trip unit Micrologic 6.3 E-M (LSIG motor protection, energy meter)

## NSX400/630N: complete fixed/FC device

Compact NSX400/630N (50 kA 380/415 V)

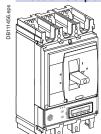
#### Compact NSX400/630N

#### Electronic trip unit Micrologic 2.3 (LS<sub>o</sub>I protection)



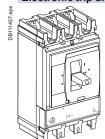
		<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2
Compact NSX400N (50 kA at 380/415 V)	250 A	LV432707	LV432708
	400 A	LV432693	LV432694
Compact NSX630N (50 kA at 380/415 V)	630 A	LV432893	LV432894

#### Electronic trip unit Micrologic 5.3 A (LSI protection, ammeter)



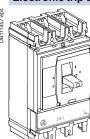
• • • • • • • • • • • • • • • • • • • •	,	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2, 3d + OSN
		<b>3F</b> 3U	4F 30, 40, 30 + 11/2, 30 + 0311
Compact NSX400N (50 kA at 380/415 V)	400 A	LV432699	LV432700
Compact NSX630N (50 kA at 380/415 V)	630 A	LV432899	LV432900

#### Electronic trip unit Micrologic 1.3 M A (I motor protection)



	<b>3P</b> 3d
Compact NSX400N 1.3 M (50 kA at 380/415V) 320 A	LV432749
Compact NSX630N 1.3 M (50 kA at 380/415V) 500 A	LV432949

#### Electronic trip unit Micrologic 2.3 M (LS<sub>o</sub>I motor protection)



		<b>3P</b> 3d
Compact NSX400N 2.3 M (50 kA at 380/415V)	320 A	LV432776
Compact NSX630N 2.3 M (50 kA at 380/415V)	500 A	LV432976

#### With electronic trip unit Micrologic 5.3 E (LSI protection, energy meter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

#### With electronic trip unit Micrologic 6.3 A (LSIG protection, ammeter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

#### With electronic trip unit Micrologic 6.3 E (LSIG protection, energy meter)

To be ordered with 2 catalogue numbers: 1 basic frame + 1 trip unit

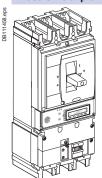
#### With electronic trip unit Micrologic 6.3 E-M (LSIG motor protection, energy meter)

# NSX400/630N: complete fixed/FC device

Vigicompact NSX400/630N (50 kA 380/415 V)

#### Vigicompact NSX400/630N

Electronic trip unit Micrologic 2.3 (LS<sub>o</sub>I protection)



		<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2
Vigicompact NSX400N (50 kA at 380/415 V)	400 A	LV432733	LV432734
Vigicompact NSX630N (50 kA at 380/415 V)	630 A	LV432933	LV432934

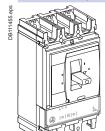
#### With electronic trip unit Micrologic 5.3 E (LSI protection, energy meter)

# NSX400/630H: complete fixed/FC device

Compact NSX400/630H (70 kA 380/415 V)

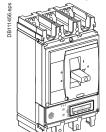
#### Compact NSX400/630H

#### Electronic trip unit Micrologic 2.3 (LS<sub>o</sub>I protection)



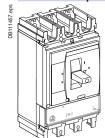
		<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2
Compact NSX400H (70 kA at 380/415 V)	250 A	LV432709	LV432710
	400 A	LV432695	LV432696
Compact NSX630H (70 kA at 380/415 V)	630 A	LV432895	LV432896

#### Electronic trip unit Micrologic 5.3 A (LSI protection, ammeter)



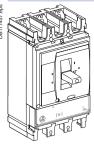
		<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2, 3d + OSN
Compact NSX400H (70 kA at 380/415 V)	400 A	LV432701	LV432702
Compact NSX630H (70 kA at 380/415 V)	630 A	LV432901	LV432902

#### Electronic trip unit Micrologic 1.3 M (I motor protection)



	<b>3P</b> 3d
Compact NSX400H 1.3 M (70 kA at 380/415V) 320 A	LV432750
Compact NSX630H 1.3 M (70 kA at 380/415V) 500 A	LV432950

#### Electronic trip unit Micrologic 2.3 M (LS<sub>o</sub>I motor protection)



		<b>3P</b> 3d
Compact NSX400H 2.3 M (70 kA at 380/415V)	320 A	LV432777
Compact NSX630H 2.3 M (70 kA at 380/415V)	500 A	LV432977

#### With electronic trip unit Micrologic 6.3 E (LSIG protection, energy meter)

Only available as separate components.

#### With electronic trip unit Micrologic 6.3 E-M (LSIG motor protection, energy meter)

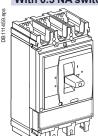
Only available as separate components.

# NSX400/630NA: complete fixed/FC device

Compact NSX400/630NA

#### Compact NSX400/630 0.3 NA switch-disconnector

With 0.3 NA switch-disconnector unit



	3P	4P
Compact NSX400 0.3 NA	LV432756	LV432757
Compact NSX630 0.3 NA, 45 mm pitch	LV432956	LV432957

### NSX400/630F/N/H/S/L: fixed/ FC device based on separate components

**Compact and Vigicompact** 

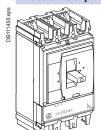
Basic frame			
	Compact NSX400		
	•	3P	4P
	NSX400F (36 kA 380/415 V)	LV432413	LV432415
1 2 2 2 2 2 2	NSX400N (50 kA 380/415 V)	LV432403	LV432408
		LV432403 LV432404	LV432409
	NSX400H (70 kA 380/415 V)		
	NSX400S (100 kA 380/415 V)	LV432414	LV432416
	NSX400L (150 kA 380/415 V)	LV432405	LV432410
	Compact NSX630		
		3P	4P
	NSX630F (36 kA 380/415 V)	LV432813	LV432815
	NSX630N (50 kA 380/415 V)	LV432803	LV432808
	,		
9	NSX630H (70 kA 380/415 V)	LV432804	LV432809
	NSX630S (100 kA 380/415 V)	LV432814	LV432816
	NSX630L (150 kA 380/415 V)	LV432805	LV432810
+ Trip unit			
Distribution protec	tion		
- Single	Micrologic 2.3 (LS <sub>o</sub> I protection)		
		lan ad	4D 24 44 04 . N/0
	Rating	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2
I I I I I I I I I I I I I I I I I I I	Micrologic 2.3 250 A	LV432082	LV432086
Call Troll	Micrologic 2.3 400 A	LV432081	LV432085
BY THE THE	Micrologic 2.3 630 A	LV432080	LV432084
, w	Micrologic 5.3 A (LSI protection, ammeter)		
		20.24	40 24 44 24 14/2 24 1 224
	Rating	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2, 3d + OSN
	Micrologic 5.3 A 400 A	LV432091	LV432094
	Micrologic 5.3 A 630 A	LV432090	LV432093
	Micrologic 5.3 E (LSI protection, energy meter)	·	· · · · · · · · · · · · · · · · · · ·
	Rating	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2, 3d + OSN
A du s			
	Micrologic 5.3 E 400 A	LV432097	LV432100
	Micrologic 5.3 E 630 A	LV432096	LV432099
	Micrologic 6.3 A (LSIG protection, ammeter)		
	Rating	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2, 3d + OSN
	Micrologic 6.3 A 400 A	LV432103	LV432106
	Micrologic 6.3 A 630 A	LV432102	LV432105
	S .	LV432102	LV432105
19.	Micrologic 6.3 E (LSIG protection, energy meter)	Trans.	T
	Rating	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2, 3d + OSN
	Micrologic 6.3 E 400 A	LV432109	LV432112
	Micrologic 6.3 E 630 A	LV432108	LV432111
Motor protection			
	Micrologic 1.3 M (I protection)		
	Rating	<b>3P</b> 3d	<b>4P</b> 3d
	•		
	Micrologic 1.3 M 320 A	LV432069	LV432078
	Micrologic 1.3 M 500 A	LV432068	LV432077
A de m			
	Micrologic 2.3 M (LS <sub>o</sub> l protection)		
	Rating	<b>3P</b> 3d	
	Micrologic 2.3 M 320 A	LV432072	
i lelalel			
To To	Micrologic 2.3 M 500 A	LV432071	
, J	Micrologic 6.3 E-M (LSIG protection, energy meter)		
	0 ( 1 , 63 ,	20.24	
	Rating	<b>3P</b> 3d	
	Micrologic 6.3 E-M 320 A	LV432075	
	Micrologic 6.3 E-M 500 A	LV432074	
Protection of public	c distribution systems		
	Micrologic 2.3 AB (LS <sub>o</sub> I protection)		
			4D 2d 4d 2d · N/2
	Rating		<b>4P</b> 3d, 4d, 3d + N/2
	Micrologic 2.3 400 A		LV434557
16 Hz 2/3 network p	rotection		
	Micrologic 5.3 A-Z (LSI protection, ammeter)		
	Rating	<b>3P</b> 3d	
	Micrologic 5.3 A-Z 630 A	LV432089	
	miorologio 0.071 Z 00071	124 402003	

# NSX400/630R: complete fixed/FC device

Compact NSX400/630R (200 kA 380/415 V - 45 kA 690 V)

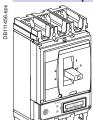
#### Compact NSX400/630R

#### Electronic trip unit Micrologic 2.3 (LS<sub>o</sub>I protection)



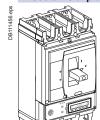
	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2
NSX400R (200 kA at 380/415 V - 45 kA at 690 V) 250 A	LV433600	LV433601
400 A	LV433602	LV433603
NSX630R (200 kA at 380/415 V - 45 kA at 690 V) 630 A	LV433700	LV433701

#### Electronic trip unit Micrologic 5.3 E (LSI protection, energy meter)



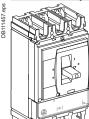
	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2, 3d + OSN
NSX400R (200 kA at 380/415 V - 45 kA at 690 V) 400 A	LV433606	LV433607
NSX630R (200 kA at 380/415 V - 45 kA at 690 V) 630 A	LV433704	LV433705

#### Electronic trip unit Micrologic 6.3 E (LSIG protection, energy meter)



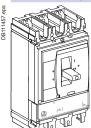
		<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2, 3d + OSN
NSX400R (200 kA at 380/415 V - 45 kA at 690 V)	400 A	LV433608	LV433609
NSX630R (200 kA at 380/415 V - 45 kA at 690 V)	630 A	LV433706	LV433707

#### Electronic trip unit Micrologic 1.3 M (I motor protection)



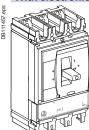
	<b>3P</b> 3d
NSX400R (200 kA at 380/415 V - 45 kA at 690 V) 320 A	LV433604
NSX630R (200 kA at 380/415 V - 45 kA at 690 V) 500 A	LV433702

#### Electronic trip unit Micrologic 2.3 M (LS<sub>o</sub>I motor protection)



					<b>3P</b> 3d
NSX400R (200 k/	A at 380/415 \	/ - 45 kA at 6	90 V) 320	) A	LV433605
NSX630R (200 k/	A at 380/415 \	/ - 45 kA at 6	90 V) 500	) A	LV433703

#### With electronic trip unit Micrologic 6.3 E-M (LSIG motor protection, energy meter)



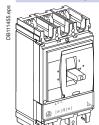
NSX400R (200 kA at 380/415 V - 45 kA at 690 V) 320 A <b>LV433610</b>		, 03	<b>3P</b> 3d
NSVS20P (200 kA at 280/445 V 45 kA at 600 V) 500 A IV422709	NSX400R (200 kA at 380/415 V - 45 kA at 690 V)	320 A	LV433610
NSA030K (200 KA at 360/4 13 V - 43 KA at 690 V) 300 A <b>LV433706</b>	NSX630R (200 kA at 380/415 V - 45 kA at 690 V)	500 A	LV433708

# NSX400/630HB1: complete fixed/FC device

Compact NSX400/630HB1 (85 kA 500 V - 75 kA 690 V)

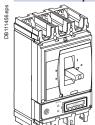
#### Compact NSX400/630HB1

#### Electronic trip unit Micrologic 2.3 (LS<sub>o</sub>I protection)



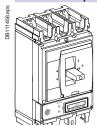
		<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2
NSX400HB1 (85 kA at 500 V - 75 kA at 690 V)	250 A	LV433620	LV433621
	400 A	LV433622	LV433623
NSX630HB1 (85 kA at 500 V - 75 kA at 690 V)	630 A	LV433720	LV433721

#### Electronic trip unit Micrologic 5.3 E (LSI protection, energy meter)



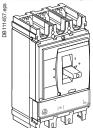
	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2, 3d + OSN
NSX400HB1 (85 kA at 500 V - 75 kA at 690 V) 400 A	LV433626	LV433627
NSX630HB1 (85 kA at 500 V - 75 kA at 690 V) 630 A	LV433724	LV433725

#### Electronic trip unit Micrologic 6.3 E (LSIG protection, energy meter)



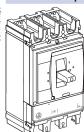
	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2, 3d + OSN
NSX400HB1 (85 kA at 500 V - 75 kA at 690 V) 400 A	LV433628	LV433629
NSX630HB1 (85 kA at 500 V - 75 kA at 690 V) 630 A	LV433726	LV433727

#### Electronic trip unit Micrologic 1.3 M (I motor protection)



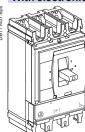
		<b>3P</b> 3d
NSX400HB1 (85 kA at 500 V - 75 kA at 690 V)	320 A	LV433624
NSX630HB1 (85 kA at 500 V - 75 kA at 690 V)	500 A	LV433722

#### Electronic trip unit Micrologic 2.3 M (LS<sub>o</sub>I motor protection)



		<b>3P</b> 3d
NSX400HB1 (85 kA at 500 V - 75 kA at 690 V)	320 A	LV433625
NSX630HB1 (85 kA at 500 V - 75 kA at 690 V)	500 A	LV433723

#### With electronic trip unit Micrologic 6.3 E-M (LSIG motor protection, energy meter)



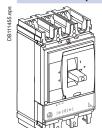
		<b>3P</b> 3d
NSX400HB1 (85 kA at 500 V - 75 kA at 690 V)	320 A	LV433630
NSX630HB1 (85 kA at 500 V - 75 kA at 690 V)	500 A	LV433728

# NSX400/630HB2: complete fixed/FC device

Compact NSX400/630HB2 (85 kA 500 V - 100 kA 690 V)

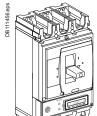
#### Compact NSX400/630HB2

#### Electronic trip unit Micrologic 2.3 (LS<sub>o</sub>I protection)



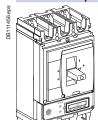
		<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2
NSX400HB2 (85 kA at 500 V - 100 kA at 690 V)	250 A	LV433640	LV433641
	400 A	LV433642	LV433643
NSX630HB2 (85 kA at 500 V - 100 kA at 690 V)	630 A	LV433740	LV433741

#### Electronic trip unit Micrologic 5.3 E (LSI protection, energy meter)



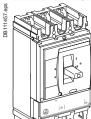
	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2, 3d + OSN
NSX400HB2 (85 kA at 500 V - 100 kA at 690 V) 400 A	LV433646	LV433647
NSX630HB2 (85 kA at 500 V - 100 kA at 690 V) 630 A	LV433744	LV433745

#### Electronic trip unit Micrologic 6.3 E (LSIG protection, energy meter)



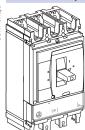
	<b>3P</b> 3d	<b>4P</b> 3d, 4d, 3d + N/2, 3d + OSN
NSX400HB2 (85 kA at 500 V - 100 kA at 690 V) 400 A	LV433648	LV433649
NSX630HB2 (85 kA at 500 V - 100 kA at 690 V) 630 A	LV433746	LV433747

#### Electronic trip unit Micrologic 1.3 M (I motor protection)



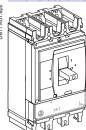
		<b>3P</b> 3d		
NSX400HB2 (85 kA at 500 V - 100 kA at 690 V)	320 A	LV433644		
NSX630HB2 (85 kA at 500 V - 100 kA at 690 V)	500 A	LV433742		

#### Electronic trip unit Micrologic 2.3 M (LS<sub>o</sub>I motor protection)



		<b>3P</b> 3d
NSX400HB2 (85 kA at 500 V - 100 kA at 690 V)	320 A	LV433645
NSX630HB2 (85 kA at 500 V - 100 kA at 690 V)	500 A	LV433743

#### With electronic trip unit Micrologic 6.3 E-M (LSIG motor protection, energy meter)



		<b>3P</b> 3d
NSX400HB2 (85 kA at 500 V - 100 kA at 690 V)	320 A	LV433650
NSX630HB2 (85 kA at 500 V - 100 kA at 690 V)	500 A	LV433748

# **Trip unit accessories**Compact and Vigicompact NSX400/630

+ Vigi module or insulation monitoring module							
	Vigi module						
DB111464.eps		Type MB  Connection for a 4P Vigi on a 3P breaker	200 to 440 V 440 to 550 V	3P LV432455 LV432453	4P LV432456 LV432454 LV432457		
	Insulation monitoring module						
DB111464.eps		<b>9 9 9</b>		3P	4P		
		200 to 440 V AC Connection for a 4P insulation monitoring module on a 3P breaker		LV432659	LV432660 LV432457		
	Trip unit accessories						
	External neutral C1	For 3 pole breaker with Micrologic 5/6					
DB112277.eps		400-630 A			LV432575		
	24 V DC wiring acc	essory for Micrologic 5/6					
DB112730.eps		24 V DC power supply connector			LV434210		
	ZSI accessory for NS630b-NW with NSX						
DB115665.eps		ZSI module			LV434212		
DB112736.eps	External power sup	oply module (24 V DC - 1 A), class 4					
	THE THE PARTY OF T	24-30 V DC			54440		
		48-60 V DC 100-125 V DC			54441 54442		
	A	110-130 V AC			54442		
		200-240 V AC			54444		
		380-415 V AC			54445		
	Battery module						
9.eps		24 V DC battery module			54446		
DB112729.eps	70000000						

### Installation and connection

Compact and Vigicompact NSX400/630

+ 1 x LV432520

#### 

#### Fixed/FC device with 52.5 mm or 70 mm pitch = fixed/FC device with 45 mm pitch + spreaders

The pitch of all Compact and Vigicompact NSX400/630 devices is 45 mm. Spreaders are available for fixed front, plug-in or withdrawable connection with pitch of 52.5 mm or 70 mm.

<b>Upstream or dov</b>	vnstream spreaders	; (1)	
§ _ [6]	52.5 mm	3P	LV432490
1466		4P	LV432491
	70 mm	3P	LV432492
		4P	LV432493

#### 

+ 1 x LV432520

		3P	4P
	Vigi plug-in kit	LV432540	LV432541
192	Comprising:		
	Base	= 1 x LV432516	= 1 x LV432517
	Power connections	+ 3 x LV432519	+ 4 x LV432519
	Short terminal shields	+ 2 x LV432591	+ 2 x LV432592
	Safety trip interlock	+ 1 x LV432520	+ 1 x LV432520
9 1		<u>'</u>	<u>'</u>

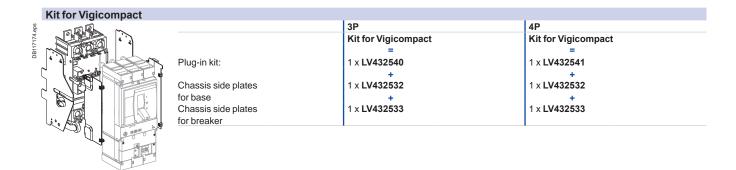
(1) Supplied with 2 or 3 interphase barriers.

Safety trip interlock

### Installation and connection (cont.)

Compact and Vigicompact NSX400/630 (cont.)

Kit for Compact				
- a		3P	4P	
		Kit for Compact	Kit for Compact	
		= 1	=	
116	Plug-in kit:	1 x LV432538	1 x LV432539	
	_	+	+	
	Chassis side plates	1 x LV432532	1 x LV432532	
	for base	+	+	
	Chassis side plates	1 x <b>LV432533</b>	1 x <b>LV432533</b>	
i. ( )	for breaker			



### Accessories

### Compact and Vigicompact NSX400/630

ear connection	ns			
	2 short			LV432475
	2 long			LV432476
re cable conn	ectors (1)			
	Aluminium connectors	1 x (35 to 300 mm <sup>2</sup> )	Set of 3	LV432479
			Set of 4	LV432480
	Aluminium connectors for 2 cables	2 x (35 to 300 mm²)	Set of 3	LV432481
		,	Set of 4	LV432482
,	6.35 mm voltage tap for steel or aluminium connect	ors	Set of 10	LV429348
				, == =====
rminal extens	ions (1)			
[0]	45° terminal extensions		Set of 3	LV432586
			Set of 4	LV432587
	Edgewise terminal extensions		Set of 3	LV432486
			Set of 4	LV432487
	Right-angle terminal extensions		Set of 3	LV432484
Programme (S)			Set of 4	LV432485
	Spreaders	52.5 mm	3P	LV432490
			4P	LV432491
		70 mm	3P	LV432492
	annan aabta (1)		4P	LV432493
inp lugs for c	opper cable (1)		0-4-40	11/400500
	For cable 240 mm <sup>2</sup>		Set of 3	LV432500
	F 11 000 3		Set of 4	LV432501
A 6	For cable 300 mm <sup>2</sup>		Set of 3 Set of 4	LV432502 LV432503
	Supplied with 2 or 3 interphase barriers		3ELUI 4	LV4323U3
mp lugs for a	aluminium cable (1)			
p.10g01010	For cable 240 mm <sup>2</sup>		Set of 3	LV432504
ШЩ			Set of 4	LV432505
	For cable 300 mm <sup>2</sup>		Set of 3	LV432506
(B)			Set of 4	LV432507
	Supplied with 2 or 3 interphase barriers			

	Insulation accessorie	98		
sde		Short terminal shield, 45 mm (1 piece)	3 P	LV432591
DB111472.eps			4 P	LV432592
DB1	1 9 9			
sd		Long terminal shield, 45 mm (1 piece)	3 P	LV432593
DB111473.eps		201g tommar oniota, 10 mm (1 proso)	4 P	LV432594
DB111				•
sd		Long terminal shield for spreaders, 52.5 mm (1 piece) (supplied with insulating plate)	3 P	LV432595
5626.e		( ), (, )	4 P	LV432596
DB115626.eps				
sde	N	Interphase barriers	Set of 6	LV432570
DB115632.eps	7			
ebs		Connection adapter for plug-in base	3P	LV432584
DB115627.eps			4P	LV432585
sde		2 insulating screens (70 mm pitch)	3P	LV432578
DB115628.eps			4P	LV432579
18G				

#### **Electrical auxiliaries**

#### Auxiliary contacts (changeover)



OF or SD or SDE or SDV OF or SD or SDE or SDV low level 29450 29452

#### SDx output module for Micrologic electronic trip unit

SDx module 24/415 V AC/DC

LV429532



SDTAM contactor tripping module (early-break thermal fault signal) for Micrologic 2.3 M/6.3 E-M SDTAM 24/415 V AC/DC overload fault indication

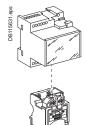
LV429424



Voltage releases



	Voltage	MX	MN
AC	24 V 50/60 Hz	LV429384	LV429404
	48 V 50/60 Hz	LV429385	LV429405
	110-130 V 50/60 Hz	LV429386	LV429406
	220-240 V 50/60 Hz and 208-277 V 60 Hz	LV429387	LV429407
	380-415 V 50 Hz and 440-480 V 60 Hz	LV429388	LV429408
	525 V 50 Hz and 600 V 60 Hz	LV429389	LV429409
DC	12 V	LV429382	LV429402
	24 V	LV429390	LV429410
	30 V	LV429391	LV429411
	48 V	LV429392	LV429412
	60 V	LV429383	LV429403
	125 V	LV429393	LV429413
	250 V	LV429394	LV429414
MN 48 V 50/60 H	z with fixed time delay	•	•
Composed of:	MN 48 V DC		LV429412
•	Delay unit 48 V 50/60 Hz		LV429426
MN 220 240 V FO	V60 Hz with fixed time delay		•



	00 V	LV723000	LV723700
	125 V	LV429393	LV429413
	250 V	LV429394	LV429414
MN 48 V 50/60 Hz	with fixed time delay		
Composed of:	MN 48 V DC		LV429412
	Delay unit 48 V 50/60 Hz		LV429426
MN 220-240 V 50/6	0 Hz with fixed time delay		
Composed of:	MN 250 V DC		LV429414
	Delay unit 220-240 V 50/60 Hz		LV429427
MN 48 V DC/AC 50	/60 Hz with adjustable time delay		
Composed of:	MN 48 V DC		LV429412
	Delay unit 48 V 50/60 Hz		33680
MN110-130 V DC/A	AC 50/60 Hz with adjustable time delay		
Composed of:	MN 125 V DC		LV429413
	Delay unit 110-130 V 50/60 Hz		33681
MN 220-250 V 50/6	0 Hz with adjustable time delay		
Composed of:	MN 250 V DC		LV429414
	Delay unit 220-250 V 50/60 Hz		33682

Motor mechanism				
Motor mechanism module		Valtage		MT400 626
AC		Voltage		MT400-630
AC		48-60 V 50/60 Hz		LV432639
		110-130 V 50/60 Hz		LV432640
		220-240 V 50/60 Hz and 208-2	77 V 60 Hz	LV432641
		380-415 V 50 Hz		LV432642
		440-480 V 60 Hz		LV432647
DC		24-30 V		LV432643
		48-60 V		LV432644
		110-130 V		LV432645
		250 V		LV432646
On	eration counter	200 V		LV432648
Communicating motor me	chanism modulo			LV 432040
	tor mechanism module	MTc 400/630	220-240 V 50/60 Hz	LV432652
Mo	or medianism module	W10 400/000	220 240 V 00/00 Hz	[21402002
Co	eaker status mmunication Module	BSCM		LV434205
+				
NS NS	X cord	Wire length L = 0.35 m		LV434200
	7,0014	Wire length L = 1.3 m		LV434201
		Wire length L = 3 m		LV434201 LV434202
			05	
		U > 480  V AC wire length $L = 0.3$	35 M	LV434204
Indication and measu	urement modules			
Ammeter module	5 (1)		Lina	Lana
	Rating (A)		400	630
	3P		LV432655	LV432855
	4P		LV432656	LV432856
I max. ammeter module			,	
- TONO	Rating (A)		400	630
	<u>3P</u>		LV434852	LV434853
Current transformer mode	مار			
	Rating (A)		400	600
	3P		LV432657	LV432857
	4P		LV432658	LV432858
Current transformer modu				
	Rating (A)		400	600
	3P		LV432653	LV432861
	4P		LV432654	LV432862
Voltage presence indicato	r			
<u>*</u>	3P/4P			LV432566

# Rotary handles Direct rotary handle With black handle With red handle on yellow front MCC conversion accessory CNOMO conversion accessory Extended rotary handle

With black handle
With red handle on yellow front
With telescopic handle for withdrawable device

Accessories for direct or extended rotary handle

Indication auxiliary

1 early-break contact
2 early-make contacts

LV432605
LV429346

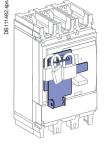
Locks

Toggle locking device for 1 to 3 padlocks

By removable device 29370



By fixed device LV432631



Locking of rotary handle

 Keylock adapter (keylock not included)
 LV432604

 Keylock (keylock adapter not included)
 Ronis 1351B.500
 41940

 Profalux KS5 B24 D4Z
 42888



Locking of motor mechanism module

 Keylock adapter (keylock not included)
 LV432649

 Keylock (keylock adapter not included)
 Ronis 1351B.500
 41940

 Profalux KS5 B24 D4Z
 42888

LV432598

LV432600

LV432603

# Interlocking Mechanical interlocking for circuit breakers With toggles LV432614 With rotary handles LV432621

# Interlocking with key (2 keylocks / 1 key) for rotary handles Keylock kit (keylock not included) (1 1 set of 2 keylocks (1 key only, keylock kit not included) (2 keylock kit not included) (3 to 2 keylock kit not included) (4 key only, keylock kit not included) (5 to 2 keylock kit not included) (6 to 2 keylock kit not included) (6 to 2 keylock kit not included) (7 to 2 keylock kit not included) (8 to 2 keylock kit not included) (8 to 2 keylock kit not included) (9 to 2 keylock

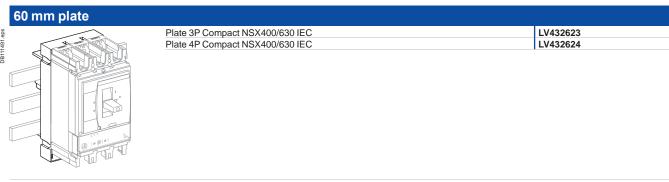
DB112268.eps

v	ks / I key ioi lotaly lialiales		
	Keylock kit (keylock not included) (1)		LV432604
	1 set of 2 keylocks	Ronis 1351B.500	41950
	(1 key only, keylock kit not included)	Profalux KS5 B24 D4Z	42878

	THE THE PARTY OF T		
	Installation accessories		
	Front-panel escutcheons		
sde		IP30 escutcheon for all control types	LV432557
DB111488.eps		IP30 trip unit access escutcheon for toggle	LV432559
	IP30	IP30 escutcheon for Vigi module	LV429527
sde		IP40 escutcheon for all control types	LV432558
DB111489.eps		IP40 escutcheon for Vigi module	LV429316
)B11		IP40 escutcheon for Vigi or ammeter module	LV429318
	IP40		
	IP43 rubber toggle cover		
sde		1 toggle cover	LV432560
111490.eps			

DB111490.eps	
--------------	--

	Lead-sealing accessories		
DB115615.eps		Bag of accessories	LV429375



_					
Plug-in/withdrawable version accessories					
	Insulation accessories	Connection adapter for plug-in base	3P	LV432584	
DB117159.eps		Connection adapter for plug-in base	4P	LV432585	
s I	Auxiliary connections	4.0 wire fixed connector (for bose)		LV429273	
7160.ep		1 9-wire fixed connector (for base)		LV4292/3	
DB117160.					
6	<b>Ma</b>				
61.eps		1 9-wire moving connector (for circuit breaker)		LV432523	
DB117161.eps					
ø		1 aupport for 2 maying connectors		LV432525	
368.ep		1 support for 3 moving connectors		LV432323	
DB 116368					
Į,	7 0				
40				Turrane	
. 985.ep		9-wire manual auxiliary connector (fixed + moving)		LV429272	
DB115889					
I	Plug-in base accessori				
64.eps		Long insulated right angle terminal extensions	Set of 2	LV432526	
DB117180.eps DB117165.eps DB117164.eps	0 0				
sde:		2 IP40 shutters for base		LV432521	
311716		Base	3P	LV432516	
ads DE	a a B	200		27402010	
17180.6					
190					
, t					
ş		Base	4P	LV432517	
7181.ep		Dase		LV402017	
DB11718					
<u>ر</u> ا					
sı	13.9.	Power connections	3/4P	LV432518	
7182.eg	66	rowel connections	3/4F	LV432310	
DB117182					
DB 117183.eps		Short terminal shields	3P	LV432591	
08117					
		Short terminal shields	4P	LV432592	
DB117184.eps		Chora Continua Silicias	ті		
DB11	000000				
sde.t	Ā	Safety trip interlock	3/4P	LV432520	
DB117171.eps					
	Chassis accessories				
	1	Escutcheon collar	Toggle	LV432534	
DB117172.eps	To 10 1				
8					
sd \		Escutcheon collar	Vigi module	LV429285	
DB117173.eps					
	<u></u>	Lastina tit floridado astinatos.		11/400000	
DB117163.eps		Locking kit (keylock not included)		LV429286	
7 B117	<b>U</b>	Keylock (keylock adapter not included) Ronis 1351B.500		41940	
٩	•	Profalux KS5 B24 D4Z		42888	
DB111426		2 carriage switches (connected/disconnected position indication)		LV429287	
180	k 🦫				

Spare parts			
	Additional toggle extension for NSX400/630		32595
V_			
	5 spare toggle extensions		LV432553
JD			
			Tive
0 - B	Bag of screws		LV432552
	Compact NS retrofit escutcheon	Small cut-out	LV432571
	IP40 toggle escutcheon	Compact NS type/small cut-out	32556
	toggio occatomoch	compactive type, amail out out	102000
	Torque limiting screws (set of 12)	3P/4P Compact NSX400-630	LV432513
<b>(</b> ()			
	1 set of 10 identification labels		LV429226
	1 base for extended rotary handle		LV432498
	•		•
Ond .			
	LCD display for electronic trip unit	Micrologic 5	LV429483
		Micrologic 6	LV429484
as		Micrologic E-M	LV429486
	5 transparent covers for electronic trip unit	Micrologic 5/6	LV432459
	5 transparent covers for electronic trip unit	Micrologic 3/6 Micrologic 2	LV432461
Individual encl	ocurac	<del> </del>	
IP55 steel enclosur	re Compact NSX400 with black extended rotary ha	andle	LV431219
	Compact NSX400 with red and yellow extended		LV431219 LV431220
	Compact NSX630 or Vigicompact NSX400/630	with black extended rotary handle	LV431221
	Compact NSX630 or Vigicompact NSX400/630	with red and yellow extended rotary handle	LV431222
IP55 insulating end			
	Compact NSX400/630 with black extended rota		LV432665
	Vigicompact NSX400/630 with black extended r	rotary nandle	LV432666

#### Visible break disconnect function

See catalogue dealing with "Compact INV products (visible break)" and the associated accessories. The visible break disconnection function is compatible with fixed front-connected/rear-connected Compact NSX devices.

# Monitoring and control, test tools

### Compact and Vigicompact NSX400/630

Monitoring and o	ontrol (remote operation)	
Circuit breaker acces	sories	
	Breaker Status Control Module BSCM	LV434205
	Dieakei Status Control Module Boolii	L4404200
ULP display module	0	
OLF display illoudie	Switchboard front display module FDM121	TRV00121
To and the second		
	FDM mounting accessory (diameter 22 mm)	TRV00128
09000		
<b>ULP</b> communication	module	
	Modbus interface Modbus SL communi	cation interface module TRV00210
<b>ULP</b> wiring accessor	es	<u>,</u>
	NSX cord $L = 0.35 \text{ m}$	LV434200
	NSX cord L = 1.3 m	LV434201
1 1/8	NSX cord L = 3 m	LV434202
	NSX cord for U > 480 V AC L = 1.3 m	LV434204
	1407 GOID IO 7 700 V 70 L = 1.3 III	LV 7J42U4
	10 stacking connectors for communication interface module	TRV00217
	10 Modbus line terminators	VW3A8306DRC (2)
	RS 485 roll cable (4 wires, length 60 m)	50965
	5 RJ45 connectors female/female	TRV00870
	10 ULP line terminators	TRV00880
	10 RJ45/RJ45 male cord L = 0.3 m	TRV00803
		TRV00806
	10 RJ45/RJ45 male cord L = 0.6 m	
(\(// ))	5 RJ45/RJ45 male cord L = 1 m	TRV00810
	5  RJ45/RJ45  male cord L = 2  m	TRV00820
	5 RJ45/RJ45 male cord L = 3 m	TRV00830
	1 RJ45/RJ45 male cord L = 5 m	TRV00850
	2 wires RS 485 insulated repeated	TRV00211
Power supply modul		
000	External power supply module 100-240 V AC 110-230 V DC	/ 24 V DC-3 A class 2 ABL8RPS24030 (2)
Million	External power supply module 24 V DC-1 A OVC IV	
A STATE OF THE STA	24-30 V DC	54440
AD	48-60 V DC	54441
	100-125 V AC	54442
Jim .	110-130 V AC	54443
	200-240 V AC	54444
	380-415 V AC	54445
Battery module	300-+13 V AC	J9940
Dattery module	24 V DC hattary module	E4440
	24 V DC battery module	54446
3233300		

<sup>(1)</sup> For measurement display with Micrologic A and E or status display with BSCM. (2) See Telemecanique catalogue.

### Monitoring and control, test

tools (cont.)

Compact and Vigicompact NSX400/630 (cont.)

#### Test tool, software, demo Test tool Pocket battery for Micrologic NSX100-630 LV434206 DB111451.eps DB111449.eps TRV00910 Maintenance case Comprising: - USB maintenance interface - Power supply - Micrologic cord - USB cord - RJ45/RJ45 male cord TRV00911 Spare USB maintenance interface TRV00915 Spare power supply 110-240 V AC TRV00917 Spare Micrologic cord for USB maintenance interface DB111453.eps VW3A8114 Bluetooth/Modbus option for USB maintenance interface Configuration and setting software RSU LV4ST100 (2) Test software LTU LV4ST121 (2) Monitoring software RCU LV4SM100 Demo tool LV434207 Demo case for Compact NSX

- (1) See Telemecanique catalogue.
- (2) Downloadable from http://schneider-electric.com.

### **COMPACT NSX**

nstructions			
Jser manual			
	Circuit breaker	(French)	LV434100
		(English)	LV434101
	Micrologic 5.6	(French)	LV434103
	· ·	(English)	LV434104
	Modbus	(French)	LV434106
		(English)	LV434107
	ULP	(French)	TRV99100
		(English)	TRV99101

# Source-changeover systems for 2 devices

Compact NSX100 to NSX630

	Manual source cha	ngeover					
	Mechanical interlocking						
sd		For toggle controlled circuit break	kers N	NSX100250			LV429354
54.e		. c. toggio comi onou onoun proun		NSX400630			LV432614
DB403054.eps				10/(100000			21402014
DE	e e a						
8		For rotary handled circuit breaker	rs N	NSX100250			LV429369
053.e	(A)	. o. rotary manage en east produce		NSX400630			LV432621
<b>JB403053.ep</b>	O						
۵							
	Key lock interlocking						
sde:		For rotary handled or remote cont	trolled circuit brea	kers			
DB403055.eps		2 locks, 1 key	F	Ronis 1351B.500			41950
DB40			F	Profalux KS5 B24 D4	4Z		42878
						l	
	Demote controlled						
	Remote controlled	source changeover					
	Plate + IVE		,		lass analysis		40.4.4.4.4.5.5.5.5.5.5.5.5.5.5.5.5.5.5.5
DB403056.eps		Source "normal"/source "repla	acement" (identi	cal voltages)	24 to 250 V DC		48 to 415 V AC 50/60 Hz
40305	00	NSV400 250/NSV400 250				_	440 V 60 Hz
Ò	300000 000 000 000 000 000 000 000 000	NSX100250/NSX100250			100054	-	00050
		Plate + IVE (1)			29351		29350
	Some	Plate			29349		29349
		IVE			29356		29352
		Auxiliary switches 2 OF + 2 SDE		4 x		4 X	29450
		Spare wiring system (device/IVE)			29365		29365
		·	Only long RC		(2)		(2)
			Plug in kit		(2)		(2)
		NSX400630/NSX100630			Lance	٠,	
		Plate + IVE (1)			32611		32610
		Plate			32609		32609
		IVE			29356		29352
		Auxiliary switches 2 OF + 2 SDE		4 x		4 x	29450
		Spare wiring system (device/IVE)			29365		29365
			Only long RC		(2)		(2)
			Plug in kit	10)//100 050 /	(2)		(2)
	0 4 1 14 41		Adaptator kit for N	NSX100250 1 X	32618	1 X	32618
	Control unit option		I			٠,	
DB403057.eps			110/127 V AC 50	0/60 Hz	220/240 V AC 50/60 Hz		380/415 V AC 50/60 Hz
1030€		ACP + control unit BA (1)			29470		440 V 60 Hz 29471
B		Plate ACP					
		Control unit BA			29363 29376		29364 29377
		ACP + control unit UA (1)	29448		29472		29473
		Plate ACP	29448		29363		29364
		Control unit UA	-		29378		29380
		ACP + control unit UA150 (1) (com		٦)	29474		29475
		Plate ACP	πταιτισατίστι σρασί	'/	29363		29364
			150				
	Control unit UA150 29379 Wiring cable between BA/UA and ACP/IVE					29381	
	Willing cable between Br	Wiring cable (1.5 meter)			29368		29368
	Communication mo	dulo			29300		23300
							50000
DB403922.eps	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	DC150 data concentrator					50823
10392	Mill Mill V	110-240 V AC / 115-125 V DC					
DB4							
	Will you will						
	-11 M M 11 -1						
	School 1991 School 1991 School 1991 School 1991 School 1991						
	100						

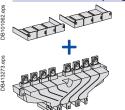
- (1) The supply voltages BA/UA control unit, ACP plate, IVE and the remote control must be identical whatever the source changeover type. (2) See products pages.

# Source-changeover systems for 2 devices

Compact NSX100 to NSX630

#### **Connection accessories**

#### Downstream coupling accessories



Short terminal shields (1 pair) + "normal" source/"replacement" s	source

	· .	
NSX100250/NSX100250/ 250 A	LV429358	LV429359
NSX400630/NSX400630/ 630 A	LV432619	LV432620

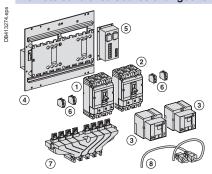
#### Long terminal shields (1 pair)



NSX100250/NSX100250	-	LV429518
NSX400630/NSX400630	-	LV432594

#### Typical composition of remote controlled source changeover

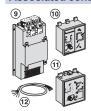
#### Remote controlled source changeover



- 1 normal device N (1)
- + 1 replacement device R (2)
- + 2 remote controls (3)
- + 1 plate with interlocking (4) with IVE (5) and its wiring (8)
- + 2 plug-in kits (if plug-in version)
- + 1 adaptor kit for NSX100...250 plug-in (if NSX400...630 with NSX100...250)
- + auxilary switches (6)
- $2\,x$  (1 OF + 1 SDE) for Compact NSX100...630
- + 1 downstream coupling accessory (7) for Compact NSX100...630 (option)
- + long RC (if back connection)

IVE voltages and remote controls are identical.

#### Associated control unit



- 1 source changeover without associated control unit
- + 1 ACP (9) with BA control unit (10)
- Or + 1 ACP (9) with UA control unit (11)
- Or + 1 ACP (9) with UA150 control unit (11)
- + extension (12) for remote UA/BA connection on front of switchboard

IVE voltages + remote control + ACP + BA or UA are identical.

Complete fixed	d/FC device without ac	oooorio	•		
Compact NSX with		Cessorie	5		
	Compact NSX				
DB112223.4eps	oompactites.	Rating	4P		
	NSX100F Micrologic AB	100	LV434562		
	NSX160F Micrologic AB	160	LV434563		
	NSX250F Micrologic AB	240	LV434564		
	NSX400F Micrologic AB	400	LV434565		
			T	T	
The leave	Comprising:		Basic frame	Micrologic AB	
<b>)</b>	NSX100F + Micrologic AB 1		LV429008	LV434550	
	NSX160F + Micrologic AB 160		LV430408	LV434551	
	NSX250F + Micrologic AB 2		LV431408	LV434554	
	NSX400F + Micrologic AB 4	00	LV432415	LV434557	
Vigicompact NSX	with Micrologic AB				
S S S S S S S S S S S S S S S S S S S	Vigicompact NSX				
DB115674-eps		Rating	4P		
	NSX100F Micrologic AB	100	LV434572		
	NSX160F Micrologic AB	160	LV434573		
	NSX250F Micrologic AB	240	LV434574		
	NSX400F Micrologic AB	400	LV434575		
	Comprising		Basic frame	Micrologic AD	Vigi module MH/MB
	Comprising: NSX100F + Micrologic AB 1	00 : MH	LV429008	Micrologic AB LV434550	LV429211
	NSX160F + Micrologic AB 1		LV430408	LV434550 LV434551	LV429211 LV429211
	NSX250F + Micrologic AB 2		LV430408	LV434551 LV434554	LV429211 LV431536
Merter	NSX400F + Micrologic AB 4		LV432415	LV434557	LV431336 LV432456
	110/11001   Milorologic/ID +	00 . WID	E1 10E110	E1-10-1001	

(cont.)

Complet fixed	/FC device without a	ccassorias						
Compact NSX wit		CCESSOTIES						
•	Compact NSX100F							
	Rating	<b>4P</b> 3d	<b>4P</b> 4d					
	TM40D	LV429644	LV429654					
	TM63D	LV429642	LV429652					
	TM80D	LV429641	LV429651					
	TM100D	LV429640	LV429650					
	Compact NSX160F							
Tell	Rating	<b>4P</b> 3d	<b>4P</b> 4d					
AVE.	TM80D	LV430643	LV430653					
	TM100D	LV430642	LV430652					
	TM125D	LV430641	LV430651					
	TM160D	LV430640	LV430650					
	Compact NSX250F	, 23 300 30						
	Rating	<b>4P</b> 3d	<b>4P</b> 4d					
	TM125D	LV431643	LV431653					
	TM160D	LV431642	LV431652					
	TM200D	LV431641	LV431651					
	TM250D	LV431640	LV431650					
	Compact NSX400F	Compact NSX400F						
		<b>4P</b> 3d	<b>4P</b> 4d					
	Micrologic 2.3	LV432677	LV432677					
Vigicompact NSX	with normal trip unit		· ·					
	Compact NSX100F							
	Rating	<b>4P</b> 3d	<b>4P</b> 4d					
	TM40D	LV429944	LV429954					
	TM63D	LV429942	LV429952					
	TM80D	LV429941	LV429951					
	TM100D	LV429940	LV429950					
	Compact NSX160F	, , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , , ,						
	Rating	<b>4P</b> 3d	<b>4P</b> 4d					
	TM80D	LV430943	LV430953					
	TM100D	LV430942	LV430952					
	TM125D	LV430941	LV430951					
ALLE .	TM160D	LV430940	LV430950					
	Compact NSX250F	1 1 1						
	Rating	<b>4P</b> 3d	<b>4P</b> 4d					
	TM125D	LV431943	LV431953					
	TM160D	LV431942	LV431952					
	TM200D	LV431941	LV431951					
	TM250D	LV431940	LV431950					
	Compact NSX400F	, == 12.12.13						
		<b>4P</b> 3d	<b>4P</b> 4d					
	Micrologic 2.3	LV432732	LV432732					
	Milotologio 2.0	1 = 102102	1					

31093

(cont.)
Visible break

#### Compact INV100 to INV630 standard version Compact INV100 For Compact NSX100 31161 Compact INV160 For Compact NSX160 31165 Compact INV200 For Compact NSX250 31163 Compact INV250 For Compact NSX250 31167 4P Compact INV320 For Compact NSX400 31169 Compact INV400 For Compact NSX400 31171

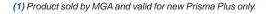
	ra	W	I AT	ort
<b>C</b>	16	VН	4 - 7	<b>91 L</b>



For INV100 to 250	31089
For INV320/400	31090

Combination w	ith Compact NSX devices		
· Account	INV100 to 250 - NSX250 combination assembly	31066	
	INV320/400 - NSX250 combination assembly	31067	
	Front alignment base for INV320/400 - NSX250 combination assembly	31064	
	INV320/400 - NSX400 combination assembly	31068	
	Flexible connection assembly for vertical INV100 to 250 with NSX horizontal N (1)	04443	
	Flexible connection assembly for vertical INV100 to 250 with NSX horizontal V (1)	04444	
M 20 m	Flexible connection assembly for vertical INV320 to 630 with NSX horizontal N (1)	04445	
	Flexible connection assembly for vertical INV320 to 630 with NSX horizontal V (1)	04446	
	Flexible connection assembly for vertical INV100 to 250 with vertical NSX250 beside	31071	
	Flexible connection assembly for vertical INV320 to 630 with vertical NSX400/630 beside	31072	

Flexible connection assembly for vertical INV320 to 630 with vertical NSX250 beside



(cont.)

nal installation					
Combination assemb					
Upstream and dow	nstream co				
INV100 to 250 -		4 snap-on bare cable	1.5 to 95 mm <sup>2</sup> ; ≤ 160 A	2x	LV429243
NSX100/160/250		connectors for cables:	10 to 185 mm <sup>2</sup> ; ≤ 250 A	2x	LV429260
		10 clips for bare cable connector		1x	LV429241
		4 right-angle terminal extensions		2x	LV429262
		2 long terminal shields		1x	LV429518
INV320/400 - NSX10	00/160/250	4 bare cable connectors:	For 1 cable, 35 mm <sup>2</sup> to 300 mm <sup>2</sup>	1x	LV432480
			For 2 cables, 35 mm <sup>2</sup> to 240 mm <sup>2</sup>	1x	LV432482
		4 right-angle terminal extensions		1x	LV432485
		1 long terminal shield		1x	LV432594
		4 snap-on bare cable	1.5 to 95 mm <sup>2</sup> ; ≤ 160 A	1x	LV429243
		connectors for cables:	10 to 185 mm <sup>2</sup> ; ≤ 250 A	1x	LV429260
		10 clips for bare cable connector	,	1x	LV429241
		4 right-angle terminal extensions		1x	LV429262
		1 long terminal shield		1x	LV429518
INV320/400 - NSX40	INV320/400 - NSX400	4 bare cable connectors:	For 1 cable, 35 mm <sup>2</sup> to 300 mm <sup>2</sup>	2x	LV432480
			For 2 cables, 35 mm <sup>2</sup> to 240 mm <sup>2</sup>	2x	LV432482
		4 right-angle terminal extensions	10 2 10 11111	2x	LV432485
		1 long terminal shield		1x	LV432594
in cabinet or enclosure		r long terminar emera		17	121402004
Combination assemb					
Upstream and dow					
INV100 to 250 -		4 snap-on bare cable	1.5 to 95 mm <sup>2</sup> ; ≤ 160 A	2x	LV429243
NSX100/160/250		connectors for cables:	10 to 185 mm <sup>2</sup> ; ≤ 250 A	2x	LV429260
		1 short terminal shield	, , , , ,	1x	LV429516
INV320/400 - NSX10	00/160/250	4 bare cable connectors:	For 1 cable, 35 mm <sup>2</sup> to 300 mm <sup>2</sup>	1x	LV432480
			For 2 cables, 35 mm <sup>2</sup> to 240 mm <sup>2</sup>	1x	LV432482
		1 short terminal shield		1x	LV432592
		4 snap-on bare cable	1.5 to 95 mm <sup>2</sup> ; ≤ 160 A	1x	LV429243
		connectors for cables:	10 to 185 mm <sup>2</sup> ; ≤ 250 A	1x	LV429260
		1 short terminal shield	.0.0 10011111 , 120071	1x	LV429516
INV320/400 - NSX40	00	4 bare cable connectors:	For 1 cable, 35 mm <sup>2</sup> to 300 mm <sup>2</sup>	2x	LV432480
			For 2 cables, 35 mm <sup>2</sup>	2x	LV432482
			to 240 mm <sup>2</sup>		

# Compact NSX 100 to NSX 630 Circuit breakers and switch-disconnectors

				Indication and meas	urement				
				Ammeter module	standard		3P	Н	4P
Requested delivery	date:			Current-transformer modu	I max	-	3P		4P
		_		Current-transformer modu			3P		4P
	ices, check the applica	ble square boxes _			ule - not available with HB1 or HB2		3P		4P
or note the quantity and enter the approp	priate information in the	e rectangles		Voltage-presence indicato Auxiliary contact	r - not available with HB1 or HB2 OF, SD, SDE or SDV		Standard	Lo	w level
Circuit broaker	or switch-disconn	octor		SDE adapter (TM, MA or N	flicrologic 2 trip units)				
Compact type	NSX100/160/250 - 16			SDX module  Remote operation					
	with R, HB1or HB2 NSX400/630			Electrical operation	Motor mechanism	AC	DC		V
Rating	A			Voltage releases	Instantaneous MX MN	AC _	_ DC		V
Circuit breaker	B, F, N, H, S, L, R, HB	31, HB2			Fixed time delay MN	AC	DC		v
Switch-disconnector					Adjust. time delay MN	AC	DC	: 🗌	V
Number of poles Number of poles	2, 3 or 4 2d, 3d or 4d			Rotary handles Direct	Black	Г	Red and ye	ellow front	
tripped					MCC conversion access.			onversion acce	ss.
Fixed device	Dlug in	Front conne		Extended	Black		Red and y	ellow front	
Plug-in/withdr. Earth-leakage	Plug-in ME, MH, MB - not ava		ole		Telescopic handle for withdrawable	device			
protection	HB1or HB2	,		Indication auxiliary	1 early-break switch		2 early-ma	ke switches	
Vigi module	Voltage not available v	with HB1 or HB2 V		Locking Toggle (1 to 3 padlocks)	Remo	vable			Fixed
Take a 11	4P option on 3P NSX			Rotary handle	Keylock adapter (keylock not include				54
Trip unit	TMD rating (40 050	) () ((A) (A)			Keylocks Ronis 1351B.500		P	rofalux KS5 B2	
Thermal-mag.	<b>TMD</b> rating (16 250 with R, HB1 and HB2	77) (4020UA)		Motor mechanism	Keylock adapter + keylock Ronis (s				00/250
	TMG rating (16 63)	A) - not available			Keylock adapter (keylock not include Keylocks Ronis 1351B.500	iea)	_ ь	NSX4 rofalux KS5 B2	00/630
	with R, HB1or HB2			Interlocking	Noyloona Norlia 100 ID.000		P	JUIGIUM NOO DZ	- D+Z
	MA rating (2.5 220			Mechanical	Toggle operated		R	otary Handle	
Electronic	with R, HB1 and HB2 Micrologic 2.2	Micrologic 2.	3	By key (2 keylocks, 1 key)			_		
* Not available with	Micrologic 2.2 G*	Micrologic 2.		for rotary handle	Keylocks Ronis 1351B.500		P	rofalux KS5 B2	4 D4Z
R, HB1 or HB2	Micrologic 2.2 AB*	Micrologic 5.		Installation accesso		.:			
	Micrologic 5.2 A*	Micrologic 5.		IP30 escutcheon for all typ	pes (toggle/rotary handle/motor mechal	nism)			
	Micrologic 5.2 E	Micrologic 5.		IP30 escutcheon for Vigi m					
	Micrologic 5.2 A-Z* Micrologic 6.2 A*	Micrologic 6. Micrologic 6.		IP40 escutcheon for all typ	es (toggle/rotary handle/motor mecha	nism)			
	Micrologic 6.2 E	Micrologic 1.		IP40 escutcheon for Vigi m					
	Micrologic 2.2 M	Micrologic 2.		IP40 escutcheon for Vigi o	r ammeter module				
	Micrologic 6.2 E-M	Micrologic 6.	3 E-M	Toggle cover Sealing accessories					
Futamal paytral CT	SDTAM Module			DIN rail adapter	NSX100/250				
External neutral CT 24 V DC power supp				3P 60 mm busbar adapter					
	y for NS630b NW/NT			_	ole configuration accessories				_
External power supp	oly module 24 V DC			Auxiliary connections	1 automatic connector fixed part wi 1 automatic connector moving part		, ,	t brooker)	-
	24-30 V DC 100-125 V AC	48-60 V DC 110-130 V AC	$\vdash$		1 support for 3 automatic connector		¬ '	support for 2	
	200-240 V AC	380-415 V AC			moving parts	_	a	automatic conn	ector
Battery module	200 2 10 1710	1 1000 110 1710		<del></del>	9-wire manual auxiliary connector (	fixed + m	noving)		
Connection				Plug-in base accessories	Long insulated terminals 2 IP4 shutters for base			,	Set of 2
Rear-connection kit		Long		Chassis accessories	Escutcheon collar		Toggle		Vigi
NCV400/2E0	Mixed	- 4 FD+- 0FD / - 400	^\		Locking kit (keylock not included)		99	_	
NSX100/250 conne		n 1.5º to 95º (< 160 / n 25º to 95º (< 250 A			2 carriage switches (conn./disconn				
		n 120 <sup></sup> to 185 <sup></sup> (< 250		Parts or plug-in	Plug-in base FC/RC	2P	3F		4P
	Distribu	tion 6 x 1.5 <sup>n</sup> to 35 <sup>n</sup>		Withdrawable kits	Set of two power connections Safety trip for advanced opening		Standard	' L	Vigi
NSX400/630 conne		um 2 cables 50 <sup>-</sup> to 1 35 <sup>-</sup> to 300 <sup>-</sup>	200		For 3P/4P chassis			Moving pa	rt
INDIA JUDIO CONNE	ciois i cable							Fixed part	
	2 rahles								
Right-angle termina		s 35 <sup>o</sup> to 240 <sup>o</sup>			or terminal shield or interphase barriers	s)			
Right-angle termina Straight extensions	l extensions NSX100	s 35 <sup>12</sup> to 240 <sup>12</sup> 0/250		Adapter for plug-in base (for Communication		s)			3 m
Right-angle termina	l extensions  NSX100 as 45° term	0/250 ninal Double-Lt			or terminal shield or interphase barriers  NSX Cord L = 0.35 m  NSX Cord U > 480 V AC L = 0.35 m			NSX Cord L = 1	
Right-angle termina Straight extensions Edgewise extension	l extensions  NSX100 as 45° term extensions	s 35 <sup>o</sup> to 240 <sup>o</sup> 0/250  ninal Double-L to extensions		<b>Communication</b> BSCM	NSX Cord L = 0.35 m NSX Cord U > 480 V AC L = 0.35 m			NSX Cord L = 1	
Right-angle termina Straight extensions	l extensions  NSX100 as 45° term	0/250 ninal Double-L to extensions oce) (4		BSCM Communicating motor mee	NSX Cord L = 0.35 m NSX Cord U > 480 V AC L = 0.35 m chanism 220-240V			NSX Cord L = 1	
Right-angle termina Straight extensions Edgewise extension	extensions   NSX100	0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250	15 mm) 70 mm) 185°	<b>Communication</b> BSCM	NSX Cord L = 0.35 m NSX Cord U > 480 V AC L = 0.35 m chanism 220-240V			NSX Cord L = 1	
Right-angle termina Straight extensions Edgewise extension Spreader Cu cable lugs	NSX100   NSX100   NSX100   NSX100   NSX100/250   NSX400/630   NSX100/250   NSX100/250   NSX400/630   NSX400	0/250 ninal Double-L to extensions on (4m) (7120" 150" 240"	15 mm) 185° 300°	BSCM Communicating motor med Switchboard front display is	NSX Cord L = 0.35 m NSX Cord U > 480 V AC L = 0.35 m chanism 220-240V			NSX Cord L = 1	
Right-angle termina Straight extensions Edgewise extension Spreader	extensions   NSX100	0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250	15 mm) 70 mm) 185°	BSCM Communicating motor me Switchboard front display I FDM mounting accessory Modbus interface Stacking accessory	NSX Cord L = 0.35 m NSX Cord U > 480 V AC L = 0.35 m chanism 220-240V			NSX Cord L = 1	
Right-angle termina Straight extensions Edgewise extension Spreader Cu cable lugs	Extensions	S 35 to 240 and a state of the	15 mm)	BSCM Communicating motor medication Switchboard front display in FDM mounting accessory Modbus interface Stacking accessory ULP line termination	NSX Cord L = 0.35 m NSX Cord U > 480 V AC L = 0.35 m chanism 220-240V module FDM121			NSX Cord L = 1	m
Right-angle termina Straight extensions Edgewise extension Spreader Cu cable lugs Al cable lugs Voltage measureme Input for connector	extensions	0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250 0/250	5 mm)	BSCM Communicating motor me Switchboard front display I FDM mounting accessory Modbus interface Stacking accessory	NSX Cord L = 0.35 m NSX Cord U > 480 V AC L = 0.35 m chanism 220-240V module FDM121  emale			NSX Cord L = 1	m
Right-angle termina Straight extensions Edgewise extension Spreader Cu cable lugs Al cable lugs Voltage measureme	extensions   NSX100	0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0	15 mm)   185   300   185   300   185   300   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185	BSCM Communicating motor medication Switchboard front display in FDM mounting accessory Modbus interface Stacking accessory ULP line termination	NSX Cord L = 0.35 m NSX Cord U > 480 V AC L = 0.35 m chanism 220-240V module FDM121			NSX Cord L = 1 NSX Cord L = 3	m
Right-angle termina Straight extensions Edgewise extension Spreader Cu cable lugs Al cable lugs Voltage measureme Input for connector	Extensions	0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0	5 mm)	BSCM Communicating motor medication Switchboard front display in FDM mounting accessory Modbus interface Stacking accessory ULP line termination	NSX Cord L = 0.35 m			NSX Cord L = 1 NSX Cord L = 3  Wire length RJ4 = 0.6 m  Wire length RJ4	5
Right-angle termina Straight extensions Edgewise extension Spreader Cu cable lugs Al cable lugs Voltage measureme Input for connector	extensions	0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0	15 mm)   185   300   185   300   185   300   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185   185	BSCM Communicating motor medication Switchboard front display in FDM mounting accessory Modbus interface Stacking accessory ULP line termination	NSX Cord L = 0.35 m NSX Cord U > 480 V AC L = 0.35 m  chanism 220-240V  module FDM121   wire length RJ45 L = 0.3 m Wire length RJ45 L = 1 m Wire length RJ45			NSX Cord L = 1 NSX Cord L = 3  Wire length RJ4 = 0.6 m Wire length RJ4	5
Right-angle termina Straight extensions Edgewise extension Spreader Cu cable lugs Al cable lugs Voltage measureme Input for connector Terminal shields	Extensions	0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0/250  0	155 mm)	BSCM Communicating motor medication Switchboard front display in FDM mounting accessory Modbus interface Stacking accessory ULP line termination	NSX Cord L = 0.35 m			NSX Cord L = 1 NSX Cord L = 3  Wire length RJ4 = 0.6 m  Wire length RJ4	5
Right-angle termina Straight extensions Edgewise extension Spreader Cu cable lugs Al cable lugs Voltage measureme Input for connector Terminal shields Interphase barriers 2 insulating screens	Extensions	S 35 to 240 to	155 mm)	BSCM Communicating motor medication Switchboard front display in FDM mounting accessory Modbus interface Stacking accessory ULP line termination	NSX Cord L = 0.35 m NSX Cord U > 480 V AC L = 0.35 m  chanism 220-240V  module FDM121   wire length RJ45 L = 0.3 m Wire length RJ45 L = 1 m Wire length RJ45			NSX Cord L = 1 NSX Cord L = 3  Wire length RJ4 = 0.6 m Wire length RJ4	5
Right-angle termina Straight extensions Edgewise extension Spreader Cu cable lugs Al cable lugs Voltage measureme Input for connector Terminal shields Interphase barriers 2 insulating screens	Extensions   NSX100     Is	S 35 to 240 to	15 mm)	BSCM Communicating motor medication Switchboard front display in FDM mounting accessory Modbus interface Stacking accessory ULP line termination	NSX Cord L = 0.35 m NSX Cord U > 480 V AC L = 0.35 m  chanism 220-240V  module FDM121   wire length RJ45 L = 0.3 m Wire length RJ45 L = 1 m Wire length RJ45			NSX Cord L = 1 NSX Cord L = 3  Wire length RJ4 = 0.6 m Wire length RJ4	5
Right-angle termina Straight extensions Edgewise extension Spreader Cu cable lugs Al cable lugs Voltage measureme Input for connector Terminal shields Interphase barriers 2 insulating screens Test tool Pocket battery for M	Extensions   NSX100     Is	S 35 to 240 to	15 mm)	BSCM Communicating motor medication Switchboard front display in FDM mounting accessory Modbus interface Stacking accessory ULP line termination	NSX Cord L = 0.35 m NSX Cord U > 480 V AC L = 0.35 m  chanism 220-240V  module FDM121   wire length RJ45 L = 0.3 m Wire length RJ45 L = 1 m Wire length RJ45			NSX Cord L = 1 NSX Cord L = 3  Wire length RJ4 = 0.6 m Wire length RJ4	5
Right-angle termina Straight extensions Edgewise extension Spreader Cu cable lugs Al cable lugs Voltage measureme Input for connector Terminal shields Interphase barriers 2 insulating screens Test tool Pocket battery for M Maintenance case	extensions	S 35 to 240 to	15 mm)	BSCM Communicating motor medication Switchboard front display in FDM mounting accessory Modbus interface Stacking accessory ULP line termination	NSX Cord L = 0.35 m NSX Cord U > 480 V AC L = 0.35 m  chanism 220-240V  module FDM121   wire length RJ45 L = 0.3 m Wire length RJ45 L = 1 m Wire length RJ45			NSX Cord L = 1 NSX Cord L = 3  Wire length RJ4 = 0.6 m Wire length RJ4	5
Right-angle termina Straight extensions Edgewise extension Spreader Cu cable lugs Al cable lugs Voltage measureme Input for connector Terminal shields Interphase barriers 2 insulating screens Test tool Pocket battery for M	extensions	S 35 to 240 to	15 mm)	BSCM Communicating motor medication Switchboard front display in FDM mounting accessory Modbus interface Stacking accessory ULP line termination	NSX Cord L = 0.35 m NSX Cord U > 480 V AC L = 0.35 m  chanism 220-240V  module FDM121   wire length RJ45 L = 0.3 m Wire length RJ45 L = 1 m Wire length RJ45			NSX Cord L = 1 NSX Cord L = 3  Wire length RJ4 = 0.6 m Wire length RJ4	5



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For each major section (Accessories, Switchgear, etc.) and for each item (Adapter for plug-in base, Connection terminal, etc.), this glossary provides:

- the page number in the concerned catalogue
- the reference standard
- the standardised IEC symbol
- the definition.

Text in quotation marks is drawn from the standards.

Accessories	•••••	
Adapter for plug-in base	► A-76	The adapter is a plastic component that can be installed upstream and/or downstream of the plug-in base and enables use of all the connection accessories of the fixed device.
Bare-cable connector	► A-75	Conducting part of the circuit breaker intended for connection to power circuits. On Compact NSX, it is an aluminium part that screws to the connection terminals of the circuit breaker. There are one or more holes (single or multiple cable connector) for the ends of bare cables.
Connection terminals	►A-74	Flat copper surface, linked to the conducting parts of the circuit breaker and to which power connections are made using bars, connectors or lugs.
One-piece spreader	►A-74	The spreader is a plastic component with copper connectors that can be installed upstream and/or downstream of a Compact NSX100 to 250 circuit breaker with a pole pitch of 35 mm. It increases the pitch of the circuit-breaker terminals to the 45 mm pitch of a NSX400/630 device to facilitate connection of large cables.
Spreaders	►A-74	Set of three (3P device) or four (4P) flat, conducting parts made of aluminium. They are screwed to the circuit-breaker terminals to increase the pitch between poles.
Circuit-breaker char	racteris	tics (IEC 60947-2)
Breaking capacity	►A-6	Value of prospective current that a switching device is capable of breaking at a stated voltage under prescribed conditions of use and behaviour. Reference is generally made to the ultimate breaking capacity (Icu) and the service breaking capacity (Ics).
Degree of protection (IP) IEC 60529	▶A-3	Defines device protection against the penetration of solid objects and liquids, using two digits specified in standard IEC 60259. Each digit corresponds to a level of protection, where 0 indicates no protection.  First digit (0 to 6): protection against penetration of solid foreign objects.  1 corresponds to protection against objects with a diameter > 50 mm, 6 corresponds to total protection against dust.  Second digit (0 to 8): protection against penetration of liquids (water).  1 corresponds to protection against falling drops of water (condensation), 8 corresponds to continuous immersion.  The enclosure of Compact NSX circuit breakers provides a minimum of IP40 (protection against objects > 1 mm) and can reach IP56 (protection against dust and powerful water jets) depending on the installation conditions.
Degree of protection against external mechanical impacts (IK)	► A-6	Defines the aptitude of an object to resist mechanical impacts on all sides, indicated by a number from 0 to 10 (standard IEC 62262). Each number corresponds to the impact energy (in Joules) that the object can handle according to a standardised procedure.  0 corresponds to no protection, 1 to an impact energy of 0.14 Joules, 10 to an impact energy of 20 Joules. Compact NSX provide IK07 (2 Joules) and can provide IK08 (5 Joules) depending on the installation conditions.
Durability	►A-6	The term "durability" is used in the standards instead of "endurance" to express the expectancy of the number of operating cycles which can be performed by the equipment before repair or replacement of parts. The term "endurance" is used for specifically defined operational performance.
Electrical durability IEC 60947-1	►A-6	With respect to its resistance to electrical wear, equipment is characterised by the number of on-load operating cycles, corresponding to the service conditions given in the relevant product standard, which can be made without re replacement.

Frame size	► A-74	"A term designating a group of circuit breakers, the external physical dimensions of which are common to a range of current ratings. Frame size is expressed in amperes corresponding to the highest current rating of the group. Within a frame size, the width may vary according to the number of poles. This definition does not imply dimensional standardization."  Compact NSX has two frame sizes covering 100 to 250 A and 400 to 630 A.	
Insulation class	► A-3	Defines the type of device insulation in terms of earthing and the corresponding safety for user, in one of three classes.  Class I. The device is earthed. Any electrical faults, internal or external, or caused by the load, are cleared via the earthing circuit, thus ensuring user safety.  Class II. The device is not connected to a protective conductor. User safety is ensured by reinforced insulation around the live parts (an insulating case and no contact with live parts, i.e. plastic buttons, moulded connections, etc.) or double insulation.  Class III. The device may be connected only to SELV (safety extra-low voltage) circuits. The Compact NSX are class II devices (front) and may be installed through the door in class II switchboards (standards IEC 61140 and IEC 60664-1), without reducing insulation, even with a rotary handle or motor mechanism module.	
Making capacity		Value of prospective making current that a switching device is capable of making at a stated voltage under prescribed conditions of use and behaviour. Reference is generally made to the short-circuit making capacity Icm.	
Maximum break time	►A-17	Maximum time after which breaking is effective, i.e. the contacts separated and the current completely interrupted.	
Mechanical durability	►A-6	With respect to its resistance to mechanical wear, equipment is characterised by the number of no-load operating cycles which can be effected before it becomes necessary to service or replace any mechanical parts.	
Non-tripping time	►A-19	This is the minimum time during which the protective device does not operate in of pick-up overrun, if the duration of the overrun does not exceed the correspond voluntary time delay.	
Pollution degree of environment conditions IEC 60947-1 IEC 60664-1	▶ A-6	"Conventional number based on the amount of conductive or hygroscopic dust, ionized gas or salt and on the relative humidity and its frequency of occurrence, resulting in hygroscopic absorption or condensation of moisture leading to reduction in dielectric strength and/or surface resistivity". Standard IEC 60947-1 distinguishes four pollution degrees.  Degree 1. No pollution or only dry, non-conductive pollution occurs.  Degree 2. Normally, only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation may be expected.  Degree 3. Conductive pollution occurs, or dry, non-conductive pollution occurs which becomes conductive due to condensation.  Degree 4. The pollution generates persistent conductivity caused, for instance, by conductive dust or by rain or snow. Compact NSX meets degree 3, which corresponds to industrial applications.	
Prospective short-circuit current	► E-13	Current that would flow through the poles if they remained fully closed during the short-circuit.	
Rated current (In)	►A-6	This is the current that the device can carry continuously with the contacts closed and without abnormal temperature rise.	
Rated impulse withstand voltage (Uimp)	► A-6	"The peak value of an impulse voltage of prescribed form and polarity which the equipment is capable of withstanding without failure under specified conditions of test and to which the values of the clearances are referred. The rated impulse withstand voltage of an equipment shall be equal to or higher than the values stated for the transient overvoltages occurring in the circuit in which the equipment is fitted".	
Rated insulation voltage (Ui)	►A-6	"The rated insulation voltage of an equipment is the value of voltage to which dielectric tests and creepage distances are referred. In no case shall the maximum value of the rated operational voltage exceed that of the rated insulation voltage".	
Rated operational current (le)		"A rated operational current of an equipment is stated by the manufacturer and takes into account the rated operational voltage, the rated frequency, the rated duty, the utilization category and the type of protective enclosure, if appropriate".	
Rated operational voltage (Ue)	►A-6	"A value of voltage which, combined with a rated operational current, determines the application of the equipment and to which the relevant tests and the utilisation categories are referred. For multipole equipment, it is generally stated as the voltage between phases".  This is the maximum continuous voltage at which the equipment may be used.	

#### Rated short-time withstand current (lcw)

"Value of short-time withstand current, assigned to the equipment by the manufacturer, that the equipment can carry without damage, under the test conditions specified in the relevant product standard". Generally expressed in kA for 0.5, 1 or 3 seconds. This is an essential characteristic for air circuit breakers. It is not significant for moulded-case circuit breakers for which the design targets fast opening and high limiting capacity.

#### Service breaking capacity (Ics)

► A-6

Expressed as a percentage of Icu, it provides an indication on the robustness of the device under severe conditions. It is confirmed by a test with one opening and one closing/opening at Ics, followed by a check that the device operates correctly at its rated current, i.e. 50 cycles at In, where temperature rise remains within tolerances and the protection system suffers no damage.

#### Short-circuit making capacity (lcm) ▶ A-62

Value indicating the capacity of the device to make and carry a high current without repulsion of the contacts. It is expressed in kA peak.

#### Suitability for isolation

page G-5)

► A-3 (see also Positive contact indication,

This capability means that the circuit breaker meets the conditions below.

- In the open position, it must withstand, without flashover between the upstream and downstream contacts, the impulse voltage specified by the standard as a function of the Uimp indicated on the device.
- It must indicate contact position by one or more of the following systems:
- □ position of the operating handle
- □ separate mechanical indicator
- □ visible break of the moving contacts
- Leakage current between each pole, with the contacts open, at a test voltage of
- 1.1 x the rated operating voltage, must not exceed:
- □ 0.5 mA per pole for new devices
- □ 2 mA per pole for devices already subjected to normal switching operations
- □ 6 mA, the maximum value that must never be exceeded.
- It must not be possible to install padlocks unless the contacts are open. Locking in the closed position is permissible for special applications. Compact NSX complies with this requirement by positive contact indication.

#### Suitable for isolation with positive > A-3 contact indication

(see also Suitability for isolation, page



Suitability for isolation is defined here by the mechanical reliability of the position indicator of the operating mechanism, where:

- the isolation position corresponds to the O (OFF) position
- the operating handle cannot indicate the "OFF" position unless the contacts are effectively open.

The other conditions for isolation must all be fulfilled:

- locking in the open position is possible only if the contacts are effectively open
- leakage currents are below the standardised limits
- overvoltage impulse withstand between upstream and downstream connections.

#### Ultimate breaking capacity (Icu)

► A-6

Expressed in kA, it indicates the maximum breaking capacity of the circuit breaker. It is confirmed by a test with one opening and one closing/opening at Icu, followed by a check that the circuit is properly isolated. This test ensures user safety.

#### jommunication.....

G2)

►A-29

(Breaker status and control module)

The optional BSCM for Compact NSX is used to acquire device status indications and control the communicating remote-control function. It includes a memory used to manage the maintenance indicators. It serves as a converter between the analog outputs of the device indication contacts (O/F, SD, SDE) and the digital communicating functions.

#### **Ethernet TCP/IP**

► A-30

(Transmission Control Protocol / Internet Protocol)

Ethernet is a very common network protocol and complies with IEEE standard 802.3. Ethernet TCP/IP is the protocol that brings web functions to Ethernet networks. Most PCs have an Ethernet 10/100 card (10 or 100 Mbit/s) for connection to the internet. Data communicated from Compact NSX via Modbus are accessible on a PC via a TCP/IP-Modbus gateway such as MPS100 or EGX100.

#### **Network**

order to share data and resources.

Open protocol

A protocol for system communication, interconnection or data exchange for which technical specifications are public, i.e. there are no restrictions on access or implementation. An open protocol is the opposite of a proprietary protocol.

Set of communicating devices that are interconnected by communication lines in

**Protocol** 

► A-30

Standardised specification for dialog between digital components that exchange data. It is an operating mode based on the length and structure of binary words and it must be used by all the components exchanging data between themselves. Communication is not possible without using a protocol.

RJ45 connector	► A-16	Universal, 8-wire connector that is widely used in digital communication networks. The RJ45 connector is used to interconnect computer equipment (Ethernet, Modbus, etc.), telephones and audiovisual equipment.
RS485 Modbus	► A-18	Modbus is the most widely used communication protocol in industrial networks. It operates in master-slave mode. An RS485 multipoint link connects the master and slaves via a pair of wires offering throughputs of up to 38400 bits/second over distances up to 1200 m). The master cyclically polls the slaves which send back the requested information.  The Modbus protocol uses frames containing the address of the targeted slave, the function (read, write), the datum and the CRC (cyclical redundancy check).
SDTAM	► A-85	Relay module with two static outputs specifically for the motor-protection Micrologic trip units 1 M, 2 M and 6 E-M. An output, linked to the contactor controller, opens the contactor when an overload or other motor fault occurs, thus avoiding opening of the circuit breaker. The other output stores the opening event in memory.
SDx	► A-85	Relay module with two outputs that remotes the trip or alarm conditions of Compact NSX circuit breakers equipped with a Micrologic electronic trip unit.
Static output	► A-85	Output of a relay made up of a thyristor or triac electronic component. The low switching capability means that a power relay is required. This is the case for the SDx and SDTAM outputs.
ULP (Universal Logic Plug)	►A-33	Connection system used by Compact NSX to communicate information to the Modbus interface via a simple RJ45 cable. Compatible modules are indicated by the symbol opposite.
Components		
ASIC (Application Specific Integrated Circuit)	► A-10	Integrated circuit designed, built and intended for a specific application. It carries out repetitive sequences of instructions engraved in the silicon chip. For that reason, it is extremely reliable because it cannot be modified and is not affected by environment conditions.  Micrologic trip units use an ASIC for the protection functions. The ASIC cyclically polls the network status at a high frequency, using the values supplied by captors. Comparison with the settings forms the basis for orders to the electronic trip units.
Microprocessor	►A-10	A microprocessor is a more general purpose device than an ASIC. In Micrologic, a microprocessor is used for measurements and it can be programmed. It is not used for the main protection functions that are carried out by the ASIC.
Controls	•••••	
Communicating motor mechanism	►A-86	For Compact NSX remote control via the communication system, a communicating motor mechanism is required. Except for the communication function, it is identical to the standard motor mechanism module and connects to and controlled by the BSCN module.
CNOMO machine-tool rotary handle	× ►A-88	Handle used for machine-tool control enclosures and providing IP54 and IK08.
Direct rotary handle	►A-88	This is an optional control handle for the circuit breaker. It has the same three positions I (ON), O (OFF) and TRIPPED as the toggle control. It provides IP40, IK07 and the possibility, due to its extended travel, of using early-make and early-break contacts. It maintains suitability for isolation and offers optional locking using a keylock or a padlock.
Emergency off	► A-87	In a circuit equipped with a circuit breaker, this function is carried out by an opening mechanism using an MN undervoltage release or an MX shunt release in conjunction with an emergency off button.
Extended rotary handle	►A-88	Rotary handle with an extended shaft to control devices installed at the rear of switchboards. It has the same characteristics as direct rotary handles. It offers multiple locking possibilities using a keylock, a padlock or a door interlock.
Failsafe remote tripping	► A-87	Remote tripping is carried out by an opening mechanism using an MN undervoltage release in conjunction with an emergency off button. If power is lost, the protection device opens the circuit breaker.

Manual toggle control This is the standard control mechanism for the circuit breaker, with a toggle that can ► A-93 be flipped up or down. In a moulded-case circuit breaker (MCCB), there are three positions, I (ON), O (OFF) and TRIPPED. Once in the TRIPPED position, manual reset is required by switching to O (OFF position before reclosing. The TRIPPED position does not offer isolation with positive contact indication. This is guaranteed only by the O (OFF) position. MCC rotary handle Handle used for motor control centres and providing IP43 and IK07. ►A-88 The optional motor mechanism module is used to remotely open, close and recharge Motor mechanism module ►A-86 the circuit breaker. Discrimination | Cascading..... Cascading Cascading implements the current-limiting capacity of a circuit breaker, making it possible to install downstream circuit breakers with lower performance levels. The upstream circuit breaker reduces any high short-circuit currents. This makes it possible to install downstream circuit breakers with breaking capacities less than the prospective short-circuit current at their point of installation. The main advantage of cascading is to reduce the overall cost of switchgear. Because the current is limited throughout the circuit downstream of the limiting circuit breaker, cascading applies to all the devices located downstream. **Current discrimination** Discrimination based on the difference between the current-protection settings of the circuit breakers. The difference in settings between two successive circuit breakers in a circuit must be sufficient to allow the downstream breaker to clear the fault before the upstream breaker trips. Discrimination Discrimination is ensured between upstream and downstream circuit breakers if, ► A-10 when a fault occurs, only the circuit breaker placed immediately upstream of the fault Discrimination is the key to ensuring the continuity of service of an installation. **Energy discrimination** This function is specific to Compact NSX (see Reflex tripping on page G-7) and ► A-10 supplements the other types of discrimination. **Partial discrimination** Discrimination is partial if the conditions for total discrimination are not met up to the ► A-10 ultimate short-circuit current Icu, but only up to a lesser value. This value is called the discrimination limit. If a fault exceeds the discrimination limit, both circuit breakers Time discrimination Discrimination based on the difference between the time-delay settings of the circuit breakers. The upstream trip unit is delayed to provide the downstream breaker the time required to clear the fault. **Total discrimination** ►A-10 Total discrimination is ensured between upstream and downstream circuit breakers

Zone selective interlocking (ZSI) ► A-20

A number of circuit breakers with Micrologic electronic trip units are interconnected one after another by a pilot wire. In the event of a short-time or ground fault:

if, for all fault values, from overloads up to solid short-circuits, only the downstream

circuit breaker trips and the upstream circuit breaker remains closed.

- in the absence of information from downstream, the circuit breaker directly concerned by the fault (i.e. located just upstream of the fault) shifts to the shortest time delay and sends a signal upstream
- the upstream device, on receiving the signal from the downstream device, maintains its normal time delay.

In this manner, the fault is cleared rapidly by the circuit breaker closest to the fault.

## Environment.....

EMC (Electromagnetic compatibility) ▶ A-3

EMC is the capacity of a device not to disturb its environment during operation (emitted electromagnetic disturbances) and to operate in a disturbed environment (electromagnetic disturbances affecting the device). The standards define various classes for the types of disturbances. Micrologic trip units comply with annexes F and J in standard IEC IE60947-2.

Power loss 
▶ B-10
Pole resistance

The flow of current through the circuit-breaker poles produces Joule-effect losses caused by the resistance of the poles.

#### Product environmental profile (PEP) ▶ A-2

LCA: Life-cycle assessment ISO 14040

An assessment on the impact of the construction and use of a product on the environment, in compliance with standard ISO 14040, Environmental management, life-cycle assessment (LCA), principles and framework.

For Compact NSX, this assessment is carried out using the standardised EIME (Environmental Impact and Management Explorer) software, which makes possible comparisons between the products of different manufacturers.

It includes all stages, i.e. manufacture, distribution, use and end of life, with set usage assumptions:

- use over 20 years at a percent load of 80% for 14 hours per day and 20% for ten hours
- according to the European electrical-energy model. It provides the information presented below.
- Materials making up the product: composition and proportions, with a check to make sure no substances forbidden by the RoHS directive are included.
- Manufacture: on Schneider Electric production sites that have set up an environmental management system certified ISO 14001.
- Distribution: packaging in compliance with the 94/62/EC packaging directive (optimised volumes and weights) and optimised distribution flows via local centres.
- Use: no aspects requiring special precautions for use. Power lost through Joule effect in Watts (W) must be < 0.02% of total power flowing through the circuit breaker. Based on the above assumptions, annual consumption from 95 to 200 kWh.
- End of life: products dismantled or crushed. For Compact NSX, 81% of materials can be recycled using standard recycling techniques. Less than 2% of total weight requires special recycling.

#### Product environmental profile (PEP) ▶ A-2

Environmental indicators

Environmental indicators are also frequently used for the PEP (sheet available on request for Compact NSX):

- Depletion of natural resources
- Depletion of energy
- Depletion of water
- Potential for atmospheric warming (greenhouse effect)
- Potential for stratospheric ozone depletion
- Creation of atmospheric ozone (ozone layer)
- Acidification of air (acid rain)
- Production of hazardous waste.

#### **RoHS** directive

(Restriction of Hazardous substances)

European directive 2002/95/EC dated 27 January 2003 aimed at reducing or eliminating the use of hazardous substances. The manufacturer must attest to compliance, without third-party certification. Circuit breakers are not included in the list of concerned products, which are essentially consumer products. That not withstanding, Schneider Electric decided to comply with the RoHS directive. Compact NSX products are designed in compliance with RoHS and do not contain

Compact NSX products are designed in compliance with RoHS and do not contain (above the authorised levels) lead, mercury, cadmium, hexavalent chromium or flame retardants (polybrominated biphenyls PBB and polybrominated diphenyl ether PBDE).

#### Safety clearances

► A-2

► A-2

When installing a circuit breaker, minimum distances (safety clearances) must be maintained between the device and panels, bars and other protection systems installed nearby. These distances, which depend on the ultimate breaking capacity, are defined by tests carried out in accordance with standard IEC 60947-2.

#### Temperature derating

**▶ B-8** 

An ambient temperature varying significantly from  $40^{\circ}\text{C}$  can modify operation of magnetic or thermal-magnetic protection functions. It does not affect electronic trip units. However, when electronic trip units are used in high-temperature situations, it is necessary to check the settings to ensure that only the permissible current for the given ambient temperature is let through.

#### Vibration withstand

IEC 60068-2-6

**▶** B-2

Circuit breakers are tested in compliance with standard IEC 60068-2-6 for the levels required by merchant-marine inspection organisations (Veritas, Lloyd's, etc.):

- 2 to 13.2 Hz: amplitude of ±1 mm
- 13.2 to 100 Hz: constant acceleration of 0.7 g.

#### WEEE directive

**►A-2** 

(Waste of Electrical and Electronic Equipment)

European directive on managing the waste of electrical and electronic equipment. Circuit breakers are not included in the list of concerned products. However, Compact NSX products respect the WEEE directive.



#### **Current harmonics** Non-linear loads cause harmonic currents that flow in the 50 Hz (or 60 Hz) ► A-22 distribution system. Total harmonic current is the sum of sinusoidal AC currents for which the rms values can be measured and broken down into: ■ the fundamental current at the 50/60 Hz frequency of the distribution system, with an rms value of IH1 ■ harmonic currents with whole, odd multiples (3, 5, 7, etc.) of the 50/60 Hz frequency, called the third-order, fifth-order, etc. harmonics. For example, IH<sub>3</sub>, the third-order harmonic at 150/180 Hz, IH<sub>s</sub>, the fifth-order harmonic at 250/300 Hz, etc. The presence of harmonics in the system must be monitored and limited because it results in temperature rise, currents in the neutral (caused by the third-order harmonics and multiples), malfunctions of sensitive electronic devices, etc. Micrologic E trip units take into account harmonics up to order 15 in the THDI and THDU calculations. Non-linear load Systems producing harmonics are present in all industrial, commercial and residential sectors. Harmonics are caused by non-linear loads. A load is said to be non-linear when the current drawn does not have the same waveform as the supply voltage. Typically, loads using power electronics are non-linear. Examples of non-linear loads include computers, rectifiers, variable-speed drives, arc furnaces and fluorescent lighting. Total harmonic distortion of current ▶ A-23 THDI characterises the distortion of the current wave by harmonics. It indicates the quantity of harmonics in the resulting waveform. It is expressed in (THDI) The higher the THDI, the more the current is distorted by harmonics. THDI should remain below 10%. Above that level, there is said to be harmonic pollution that is considered severe when it rises above 50%. Total harmonic distortion of voltage ▶ A-23 THDU characterises the distortion of the voltage wave by harmonics. It indicates the quantity of harmonics in the resulting waveform. It is expressed in (THDU) The higher the THDU, the more the system voltage is distorted by harmonics. It is advised not to exceed 5% for low-voltage systems. Voltage harmonics For each current harmonic IHk, there is a voltage harmonic UHk of the same order k, ► A-22 where the resulting voltage is the sum of the two waves. The voltage wave is therefore distorted with respect to the standard sinusoidal wave.

		The voltage wave is therefore distorted with respect to the standard sindsoldar wave.
Measurements	•••••	••••••
Contact wear	► A-25	Each time Compact NSX opens, the Micrologic 5 / 6 trip unit measures the interrupted current and increments the contact-wear indicator as a function of the interrupted current, according to test results stored in memory.
Current transformer with iron-core toroid	▶10	It is made up of a coil wound around an iron frame through which a power busbar runs. The current flowing in the bar, on passing through the sensor, induces a magnetic field that reverses for each half period. This variation in the field in turn creates an induced current in the coil. This current is proportional to the current flowing in the bar. It is sufficient to supply the measurement electronics. The disadvantage of iron-core measurement current transformers (CT) is that they rapidly saturate for currents > 10 ln.
Current transformer with Rogowski toroid or air-core CT	▶ 10	It is made up of a coil without an iron frame, through which a power busbar runs. The output voltage at the coil terminals is proportional to the current flowing through the bar. The result is a current transformer (CT) with a voltage output. The advantage is that it never saturates whatever the primary current and thus enables measurement of high currents. The output is however a very low current that is too low to supply the measurement electronics.  For Micrologic, Rogowski CTs measure the current and a second CT, with an iron core, provides the electrical supply.
Demand current, demand power and peak values	►A-23	Average of the instantaneous current or power values over an adjustable fixed or sliding time interval. The highest value observed over the time interval is the peak value. The time interval runs from the last reset.
Instantaneous current	►A-23	True rms value of the current measured by the current transformers over a sliding time interval. Available on Micrologic 5/6 A or E.

Instantaneous voltage	► A-23	True rms value of the voltage measured by the voltage sensors over a sliding time interval. Available on Micrologic 5/6 A or E.		
Maximeters/minimeters	► A-22	Micrologic 5 and 6 A or E can record the minimum and maximum values of electric parameters over set time periods.		
Overvoltage category (OVC - Overvoltage category) IEC 60947-1. Annex H	► A-34	Standard IEC 60664-1 stipulates that it is up to the user to select a measurement device with a sufficient overvoltage category, depending on the network voltage a the transient overvoltages likely to occur.  Four overvoltage categories define the field of use for a device.  Cat. I. Devices supplied by a SELV isolating transformer or a battery.  Cat. II. Residential distribution, handheld or laboratory tools and devices connected to standardised 2P + earth electrical outlets (230 V).  Cat. III. Industrial distribution, fixed distribution circuits in buildings (main low voltage switchboards, rising mains, elevators, etc.).  Cat. IV. Utility substations, overhead lines, certain industrial equipment.		
Percent load	► A-25	Percentage of current flowing through the circuit breaker with respect to its rated current. Micrologic 6 E-M offers this information and can sum it over the total operating time to provide the load profile for the following ranges, 0 to 49%, 50 to 79%, 80 to 89% and $\geq$ 90%.		
Phase sequence	► A-25	The order in which the phases are connected (L1, L2, L3 or L1, L3, L2) determines the direction of rotation for three-phase asynchronous motors. Micrologic 6 E-M trip units provide this information.		
Power and energy metering (consumption)	►A-23	The digital electronics in Micrologic 5/6 E calculate the instantaneous power level apparent (S in kVA), active (P in kW) and (Q in kV), and integrate over a time inter to determine the corresponding energies (kVAh, kWh kvarh). Calculations are for each phase and for the total.		
Time-stamped histories	► A-25	Micrologic trip units store information on events (e.g. alarms and their cause) that a time-stamped to within a millisecond.		
$oldsymbol{P}_{rotection}$	• • • • • • • • • • • • • • • • • • • •			
Ground-fault protection G (Ig)	►A-21	Protection function specific to electronic circuit breakers, symbolised by G (Ground). This protection can calculate high-threshold residual earth-leakage currents (in the order of tens of Amperes) on the basis of phase-current measurements. Micrologic 5/6 offers this protection function with adjustable pick-up Ig and time delay.		
Instantaneous protection I (Ii)	► A-21	This protection supplements lsd. It provokes instantaneous opening of the device. The pick-up may be adjustable or fixed (built-in). This value is always lower than the contact-repulsion level.		
Long-time protection L (Ir)	► A-21	Protection function where the adjustable Ir pick-up determines a protection curve similar to the thermal-protection curve (inverse-time curve I²t). The curve is generally determined on the basis of the Ir setting which corresponds to a theoretically infinite tripping time (asymptote) and of the point at 6 Ir at which the tripping time depends on the rating.		
Magnetic protection (Im)	► A-16	Short-circuit protection provided by magnetic trip units (see this term). The pick-up setting may be fixed or adjustable.		
Neutral protection (IN)	►A-18	The neutral is protected because all circuit-breaker poles are interrupted. The setting may be that used for the phases or specific to the neutral, i.e. reduced neutral (0.5 times the phase current) or OSN (oversized neutral) at 1.6 times the phase current. For OSN protection, the maximum device setting is limited to 0.63 ln.		
Residual-current earth-leakage protection (IΔn)	►A-36	Protection provided by Vigi modules, in which the residual-current toroids directly detect low-threshold earth-leakage currents (in the order of tens of mA) caused by insulation faults.		
Short-delay protection S (Isd)	► A-21	Protection function specific to electronic circuit breakers, symbolised by S (Short delay or short time). This protection supplements thermal protection. The reaction time is very short, but has a slight time delay to enable discrimination with the upstream device. The short-delay pick-up lsd is adjustable from approximately 1.5 to 10 lr.		
Short-delay protection with fixed time delay So (Isd)	►A-19	Short-delay protection, but with a fixed time delay. This function is available on Micrologic 2. It is symbolised by So. It ensures discrimination with downstream devices.		

### Glossarv

protection	

► A-17

Overload protection provided by thermal trip units (see this term) using an inverse-

### $oldsymbol{R}$ elays and auxiliary contacts.....

#### **Auxiliary contact**

IEC 60947-1

"Contact included in an auxiliary circuit and mechanically operated by the switching

**Break contact** 

►A-88

"Control or auxiliary contact which is open when the main contacts of the mechanical switching device are closed and closed when they are open".

IEC 60947-1

► A-88

Make contact IEC 60947-1

IEC 60947-1

"Control or auxiliary contact which is closed when the main contacts of the mechanical switching device are closed and open when they are open".

Relay (electrical)

► A-20

"Device designed to produce sudden, predetermined changes in one or more electrical output circuits when certain conditions are fulfilled in the electrical input circuits controlling the device".

Relay module with static output

► A-85

Output of a relay made up of a thyristor or triac electronic component. The low interrupting capacity means that a power relay is required. This is the case for the SDx and SDTAM outputs.

# $S_{witchgear}$ .....

#### Circuit breaker

IEC 60947-2



**►**A-6

"Mechanical switching device, capable of making, carrying and breaking currents under normal circuit conditions and also making, carrying for a specified time and breaking currents under specified abnormal circuit conditions such as those of short circuit". Circuit breakers are the device of choice for protection against overloads and short-circuits. Circuit breakers may, as is the case for Compact NSX, be suitable

#### Circuit-breaker utilisation category ▶ A-6 IEC 60947-2

The standard defines two utilisation categories, A and B, depending on breaker discrimination with upstream breakers under short-circuit conditions.

- Category A. Circuit breakers not specifically designed for discrimination applications.
- Category B. Circuit breakers specifically designed for discrimination, which requires a short time-delay (which may be adjustable) and a rated short-time withstand current in compliance with the standard.

Compact NSX100 to 630 circuit breakers are category A, however, by design, they provide discrimination with downstream devices (see the Complementary technical

Contactor ► A-38 IEC 60947-1

"Mechanical switching device having only one position of rest, operated otherwise than by hand, capable of making, carrying and breaking currents under normal circuit conditions including operating overload conditions". A contactor is provided for frequent opening and closing of circuits under load or slight overload conditions. It must be combined and coordinated with a protective device against overloads and short-circuits, such as a circuit breaker.

#### Contactor utilisation categories IEC 60947-4-1

►A-39

The standard defines four utilisation categories, AC1, AC2, AC3 and AC4 depending on the load and the control functions provided by the contactor. The class depends on the current, voltage and power factor, as well as contactor withstand capacity in terms of frequency of operation and endurance.

**Current-limiting circuit breaker** IEC 60947-2

► A-38

"A circuit-breaker with a break-time short enough to prevent the short-circuit current reaching its otherwise attainable peak value".

Disconnector

IEC 60947-3

"Mechanical switching device which, in the open position, complies with the requirements specified for the isolating function". A disconnector serves to isolate upstream and downstream circuits. It is used to open or close circuits under no-load conditions or with a negligible current level. It can carry the rated circuit current and, for a specified time, the short-circuit current.

#### Switch-disconnector

IEC 60947-3



#### ► A-60

"Switch which, in the open position, satisfies the isolating requirements specified for a disconnector". A switch-disconnector serves for switching and isolation. The switch function breaks the circuit under load conditions and the disconnection function isolates the circuit. Protection is not provided. It may be capable of making shortcircuit currents if it has the necessary making capacity, but it cannot break shortcircuit currents. Compact NSX100 to 630 NA switch-disconnectors have a making capacity.

# Switch-disconnector utilisation category

IEC 60947-3

The standard defines six utilisation categories, AC-21A or B, AC-22 A or B, AC23 A or B. They depend on the rated operational current and the mechanical durability (A for frequent operation or B for infrequent operation). Compact NSX NA switch-disconnectors comply with utilisation categories AC22A or AC23A.

pump, under-load protection detects when the pump is no longer primed.

safety function that operates before the others in the event of a very high short-

# $oldsymbol{T}$ hree-phase asynchronous motors and their protection.....

► A-61

<del>-</del>		<del>-</del>
Locked-rotor protection (Ijam)	► A-46	This function steps in when the motor shaft cannot or can no longer drive the load. The result is a high overcurrent.
Long-start protection (llong)	►A-46	An overly long start means the current drawn remains too high or too low for too long, with respect to the starting current. In all cases, the load cannot be driven and the start must be interrupted. The resulting temperature rise must be taken into account before restarting.
Phase-unbalance or phase- loss protection (lunbal)	► A-45	This protection function steps in if the current values and/or the unbalance in the three phases supplying the motor exceeds tolerances. Currents should be equal and displacement should be one third of a period. Phase loss is a special case of phase unbalance.
Starting current	►A-40	Start-up of a three-phase, asynchronous motor is characterised by:  ■ a high inrush current, approximately 14 In for 10 to 15 ms  ■ a starting current, approximately 7.2 In for 5 to 30 seconds  ■ return to the rated current after the starting time.
Starting time	► A-40	Time after which the motor ceases to draw the starting current and falls back to the operating current Ir ( $\leq$ In).
Thermal image of the rotor and stator	►A-46	The thermal image models the thermal behaviour of a motor rotor and stator, taking into account temperature rise caused by overloads or successive starts, and the cooling constants. For each motor power rating, the algorithm takes into account a theoretical amount of iron and copper which modifies the cooling constants.
Thermal protection		Protection against overcurrents following an inverse time curve $l^2t$ = constant, which defines the maximum permissible temperature rise for the motor. Tripping occurs after a time delay that decreases with increasing current.
Trip class IEC 60947-4-1	►A-40	The trip class determines the trip curve of the thermal protection device for a motor feeder. The standard defines trip classes 5, 10, 20 and 30. These classes are the maximum durations, in seconds, for motor starting with a starting current of 7.2 Ir, where Ir is the thermal setting indicated on the motor rating plate.
Under-load protection (lund)	► A-46	This function steps in when the driven load is too low. It detects a set minimum phase current which signals incorrect operation of the driven machine. In the example of a

### Trip units

<b>■</b> rip units	• • • • • • • • • • • • • • • • • • • •	••••••
Electronic trip unit (Micrologic)	► A-18	Trip unit that continuously measures the current flowing through each phase and the neutral if it exists. For Micrologic, the measurements are provided by built-in current sensors linked to an analog-digital converter with a high sampling frequency. The measurement values are continuously compared by the ASIC to the protection settings. If a setting is overrun, a Mitop release trips the circuit-breaker operating mechanism.  This type of trip unit offers much better pick-up and delay setting accuracy than thermal-magnetic trip units. It also provides a wider range of protection functions.
Magnetic release	► A-16	Release actuated by a coil or a lever. A major increase in the current (e.g. a short-circuit) produces in the coil or the lever a change in the magnetic field that moves a core. This trips the circuit breaker operating mechanism. Action is instantaneous. The pick-up setting may be adjustable.
Reflex tripping	► A-6	Compact NSX circuit breakers have a patented reflex-tripping system based on the energy of the arc and that is independent of the other protection functions. It operates extremely fast, before the other protection functions. It is an additional

circuit.

Release IEC 60947-1		Device, mechanically connected to a mechanical switching device (e.g. a circuit breaker), which releases the holding means and permits the opening or the closing of the switching device. For circuit breakers, releases are often integrated in a trip unit.
Shunt release (MX)	►A-83	This type of release operates when supplied with current. The MX release provokes circuit-breaker opening when it receives a pulse-type or maintained command.
Thermal-magnetic trip unit	►A-16	Trip unit combining thermal protection for overloads and magnetic protection.
Thermal release	► A-16	Release in which a bimetal strip is heated by the Joule effect. Above a temperature- rise threshold that is a function of the current and its duration (I²t curve = constant, which is representative of temperature rise in cables), the bimetal strip bends and releases the circuit-breaker opening mechanism. The pick-up setting may be adjustable.
Undervoltage release (MN)	► A-87	This type of release operates when the supply voltage drops below the set minimum.



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