EcoStruxure
Innovation At Every Level

Pact Series

ComPact NSX & NSXm

Catalog 2019
Molded-case circuit breakers
and switch-disconnectors
from 16 to 630 A - up to 690 V

• WEB1 cat.2019

se.com

Life Is On | Schneider Electric

...SUSTAINABILITY READY

Contribute to a better world — with MasterPact MTZ circuit breakers you can enhance sustainability.

Build superior sustainable and efficient properties by reducing CO_2 emissions, utility and operating costs as well as improving the well-being of property occupants for both new construction and renovation projects.

Green Premium™

Experience the difference today at schneider-electric.com/green-premium

Achieve Green Building certification with MasterPact MTZ:

In compliance with ISO 14025 PEP Ecopassport program, Schneider Electric publishes a comprehensive Life Cycle Analysis of our product, providing the environmental data you need to achieve Green Building certifications.

For example, MasterPact MTZ contributes to 4 LEED™ points:

- Building Product Disclosure and Optimization
- Advanced Energy Metering

Circular performance	Resource performance	Well-being performance

With the addition of digital modules, the circuit breaker can be upgraded and modernized at any time after installation without disrupting electrical service.

Better durability with improved mechanical and electrical performance along with remote monitoring to help facilitate predictive maintenance.

The embedded class 1 metering allows active power and energy to be monitored, helping facility managers reduce their CO_2 emissions and energy costs when connected to any building and energy management system.

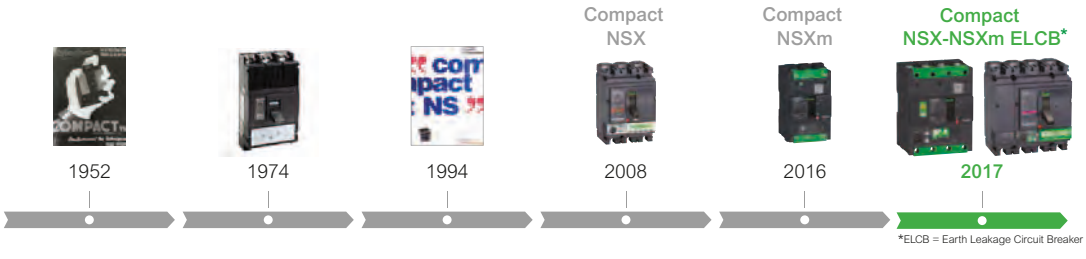
MasterPact MTZ is fully RoHS and REACH compliant.

ComPact NSX and NSXm Molded case circuit breakers

The world is becoming more electric, digitized, decarbonized and decentralized. Our digitized LV products are powered by innovation at every level enabling enhanced connectivity, real-time operations and smart analytics. They bring improved safety and security. They help you to improve reliability and performance – and to prepare for the future of power distribution.

Built on 60 years of innovative and reliable protection, ComPact™ NSX molded case circuit breakers up to 630A are the industry leader across the globe. The newcomer to the ComPact family, the NSXm, is bringing more innovation and an ergonomic design. The comprehensive and optimized ComPact NSX and NSXm range of circuit breakers covers all your protection needs.

ComPact is an integral part of EcoStruxure™ Power – Schneider's open, interoperable, IoT-enabled system architecture. Through this platform, we deliver enhanced value around safety, reliability, efficiency, sustainability, and connectivity for our customers. We leverage technologies in IoT, mobility, sensing, cloud, analytics, and cybersecurity to deliver Innovation at Every Level. This includes Connected Products, Edge Control, and Apps, Analytics & Services. EcoStruxure has been deployed in 450,000+ installations, with the support of 9,000 system integrators, connecting over 1 billion devices.



se.com/compact-nsx

Watch the video

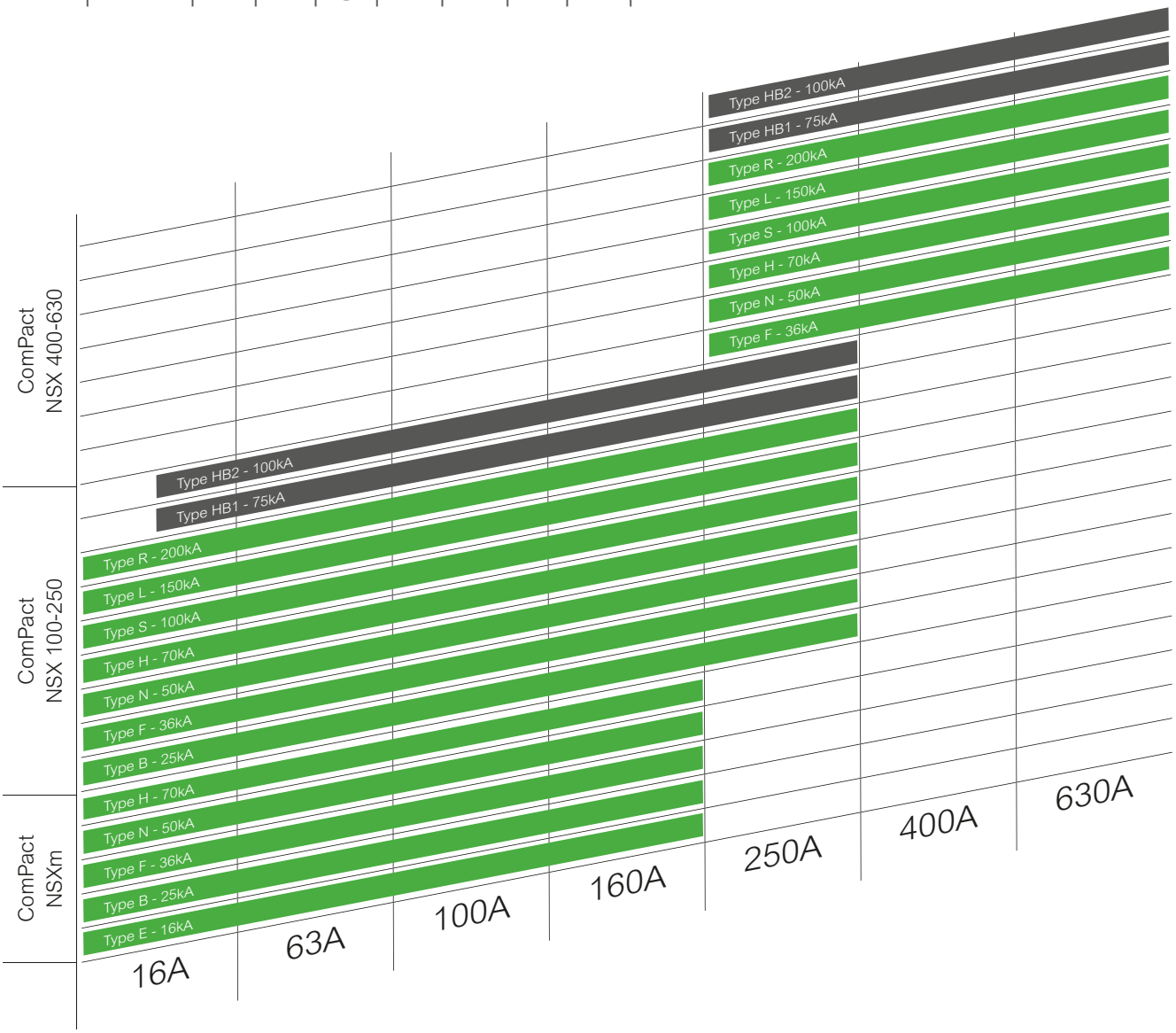
ComPact NSX and NSXm, even more innovative and efficient

ComPact circuit breakers feature Schneider Electric's exclusive Roto-Active Breaking System; it reduces the effects of short circuits of your installation.

Today, the ComPact range is optimized with a high level of breaking capacities, outstanding selectivity and cascading. It offers more advanced functions and ergonomic designs for easy installation and operations.

Ten performance levels

HB2 | HB1 | R | L | S | H | N | F | B | E



Icu = (kA rms) at 690V AC

Icu = (kA rms) at 415V AC

Brand new innovation: add functions to your panel with the same footprint

The smallest earth leakage circuit breaker*:

ComPact NSXm with MicroLogic Vigi 4.1 embedded:

- Save space: earth leakage protection in the MCCB frame size
- For safety and security: thermal, short-circuit and earth leakage protection
- Trip alarming contacts: earth leakage, thermal, short circuit
- Pre Alarm contact: for earth leakage at 50% IΔn

ComPact NSX with MicroLogic Vigi 4:

- Save space: earth leakage protection in the MCCB frame size
- For safety and security: thermal, short-circuit and earth leakage protection
- Easy to use, the system is simplified with the same frame size and for the same panel support
- Trip alarming contacts: earth leakage, thermal, short circuit.
- MicroLogic “Alarm” version: signals the earth leakage fault without tripping

ComPact NSX with MicroLogic Vigi 7 E:

- Save space: earth leakage protection in the MCCB frame size.
- Trip alarming: earth leakage, thermal, short circuit
- Pre Alarm function (contact or COM): for earth leakage from 50 to 80% IΔn
- Digital capability with COM and Data management (settings, measurement, trip & test history)
- Earth leakage function self-test without tripping for all the electronic chain
- MicroLogic “Alarm” version: signals the earth leakage fault without tripping

* Embedded earth leakage protection in ComPact NSX and NSXm comes with additional overload and short-circuit protection.

With EcoStruxure Power, your electrical system has something to say

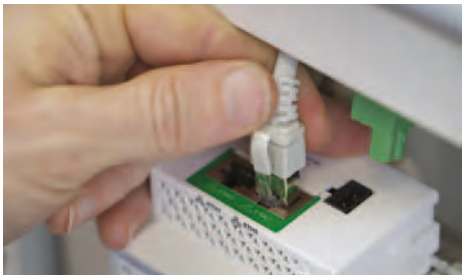
Give it a voice with Smart Panels, an EcoStruxure Power solution. Improve uptime with our integrated energy and asset-monitoring technologies. By combining cutting-edge hardware and software with unparalleled connectivity, Smart Panels enable you to pinpoint overloads and inefficiencies proactively, make informed decisions that improve operational efficiency … and finally stop chasing vague alarms.

ComPact NSX with MicroLogic 5, 6 and 7 E contributes to energy efficiency.

1. Measure

Monitor power usage, power quality, and asset status, and discover opportunities to save energy.

2. Connect



Because Smart Panels connect via Ethernet, they use minimal bandwidth and allow you to monitor your building in real time.

3. Act

Comprehensive data and detailed email alerts help you proactively increase operational efficiency, energy efficiency, reliability, and safety.

With ComPact NSX, upgrade quickly to smarter functions

The trip units are interchangeable, you remain flexible to upgrade your panel from basic to advanced functions. You can also add PowerLogic PowerTag NSX to your basic circuit breakers in order to have energy measurment and alarming.

As ComPact NSX is part of the Smart Panels system, all measurement provided by ComPact NSX can be digitized for transmission to local and remote management software and solutions.

When incorporated into Smart Panels, these data can be computed by energy management software, enabling thorough analysis of energy consumptions across the building and identification of potential savings.

With ComPact NSX, address high-demanding applications

ComPact NSX remains the highest-rated breaking capacity in its class:

- 100kA at 690V.
- Extended breaking capacity comes in the same space-saving frame sizes as ComPact NSX models.

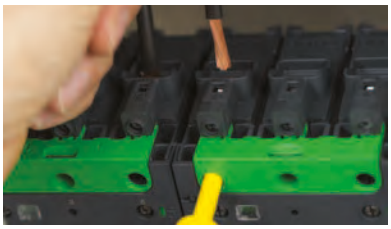
With ComPact NSXm, experience efficiency that clicks

ComPact NSXm, optimized for your needs:

The ComPact NSXm range of circuit breakers and switch disconnectors is a new comer in the ComPact NSX family. It is one of the smallest on the market with innovative features.

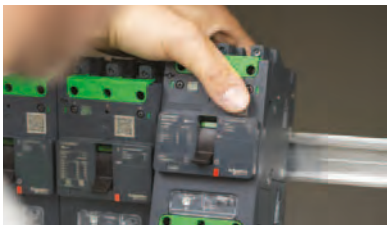
It features:

- EverLink connectors
- Spring type auxiliaries externally visible
- Built-in DIN rail and plate mount capability



Improving wiring efficiency
Reliable connections with patented and proven EverLink™ Technology.

One-click auxiliaries
Field-installable, externally visible, and easy to wire.

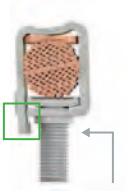


Flexible installation
Click your breaker into place with built-in DIN rail and plate mount capability

EverLink Patented Technology

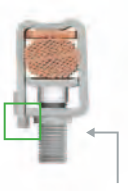
EverLink is a new connection method on circuit breakers with patented creep compensation technology built directly into the terminal. Bare cables are safe as compression lugs and you save space and time in your panel assembly.

Installation



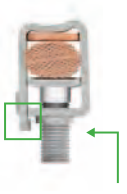
Space for spring effect
Untightened

Tightening



In contact
Tightened

Over time



Creep-compensating effect

Spring maintains contact pressure:
Creep compensation

With ComPact NSX and NSXm, cover all standard and specific applications

Schneider Electric helps on your work every step of the way

1 Design

EcoStruxure Power Design - Ecodial software

Single-line diagram design software that calculates and sizes your electric installation.

EcoStruxure Power Built software

Quick configuration and quotation tool for switchboards.

3 Build

Build faster

Flexible installation in your switchboards, EverLink patented connectors for easy, safe and reliable cable connections. Work with field-installable accessories and auxiliaries.

2 Configure and order

Product Selector

Configure and order ComPact NSX and ComPact NSXm and and ensure accuracy.

4 Operate and maintain

Upgrade and support

Upgrade your installation with smarter functions.

Quick access to customer care center and expert support.

Continuity of service

Bring the best solution to your customer.

General contents

ComPact NSXm & NSX
Overview of applications

The ComPact NSX and NSXm circuit breakers and swith-disconnectors are the best choice for all standards and specific applications.

> ComPact INS/INV [a]
LVPED213024EN

> FuPact [a]
LVPED216031EN

> Substitution and technical guide ComPact NSX high performances [b]
LVPED508025EN

> ComPact NSX, ComPact INS/INV, MasterPact NW DC - DC PV [c]
LVPED208006EN

> TransferPact (source-changeover systems [d]
LVPED216028EN

> Complementary technical information
LVPED318033EN

Buildings

ComPact NSXm devices up to 160 A (70 kA/415 V) are equipped with thermal magnetic trip units.
ComPact NSX devices up to 630A (200kA/415V) are equipped with Magnetic, Thermal Magnetic, basic electronic trip units (MicroLogic 2) and advanced electronic trip units (MicroLogic 5/6) which offer embedded metering and communication.
Both devices can protect against insulation faults thanks to their embedded earth leakage protection.
ComPact NSXm & NSX can be easily installed at all levels in distribution systems, from main LV switchboard to the subdistribution boards and enclosures.

Industrial buildings, Machines, Ventilation and Water Treatment

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 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.

Buildings and Industrial buildings

A switch-disconnector version of ComPact NSXm & NSX circuit breakers is available for circuit control and isolation. All add-on functions of both circuit breakers may be combine with the basic switch-disconnector function.
For information on other switch-disconnector ranges, see the ComPact INS/INV catalog and for fusegear protection see FuPact catalog [a].

Marine

ComPact NSX HB1/HB2 up to 630 A circuit breakers have the best-in-class breaking capacity for Marine applications (100 kA/690 V).
Devices can be equipped with Thermal Magnetic, basic electronic trip units (MicroLogic 2) and advanced electronic trip units (MicroLogic 5/6) which offer embedded metering and communication.
Standard ComPact NSX breakers AC and DC ranges can be used for military navy inside the main and emergency switchboards [b].

Special applications

The ComPact NSX range offers a number of versions for special protection applications:
- Service connection to public distribution systems
- Generators
- Industrial control panels
- 16 Hz 2/3 systems
- 400 Hz systems [1].

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.

[1] ComPact NSXm maybe used on 400 Hz systems.

Photovoltaic

ComPact NSX DC PV range up to 500 A (1000V DC) is the best choice for photovoltaic generation from 10 kW to 500 kW.
Circuit breakers can be used for over-current protection.
Circuit breakers and switches can be used for isolation during maintenance phase
ComPact NSX is part of a Schneider Electric photovoltaic architecture which offers AC and DC protection, control and meetering, inverters for DC to AC voltages and PV modules [c].

Oil & Gas

ComPact NSX up to 630 A offers the Highest breaking capacity in its class mainly required in Oil&Gas industry:
- up to 100 kA at 690 V
- up to 200 kA at 415 V.

Devices can be equipped with Thermal Magnetic, basic electronic trip units (MicroLogic 2) and advanced electronic trip units (MicroLogic 5/6) which offer embedded metering and communication
ComPact NSX range offers outstanding selectivity at 415 V and 690 V [b].

Critical Power Supplies

ComPact NSX DC range up to 1200 A (5 kA/600 V DC) perfectly meets the requirements of UPS manufacturers keeping the same compact footprint as the standard ComPact NSX range.

Batteries are usually used for emergency power supply and circuit breakers are used to protect the battery circuit (between the battery and the circuit) [c].

To ensure a continuous supply of power, some electrical installations are connected to two power sources [d]:
- 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 mechnaical 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.

Same technology, same offer, simpler names

We're making it easier for you to navigate across the wide range of our world-class digital offerings and select with confidence the offers that are right for you and your needs.

EcoStruxure Architecture

To enable brand consistency, relevance and impact, we are reinforcing our EcoStruxure™ architecture and digital customer lifecycle tools to ensure a seamless experience from the CAPEX to OPEX phases of each project, bridging our entire ecosystem of partners, services providers and end users.

EcoStruxure is our IoT-enabled open and interoperable system architecture and platform. EcoStruxure delivers enhanced values around safety, reliability, efficiency, sustainability and connectivity for our customers. EcoStruxure leverages advancements in IoT, mobility, sensing, cloud, analytics, and cybersecurity technologies to deliver Innovation At Every Level from Connected Products; Edge Control; and Apps, Analytics & Services: our IoT technology Levels.

Old names	New names
Ecodial	EcoStruxure Power Design
Ecoreal	EcoStruxure Power Build
Ecoreach	EcoStruxure Power Commission
Masterpact MTZ mobile App	EcoStruxure Power Device App

MasterPact MTZ and the Pact Series

Future-proof your installation with Schneider Electric's low and medium voltage Pact Series. Built on legendary Schneider Electric innovation, the Pact Series comprises world-class circuit breakers, switches, residual current devices and fuses, for all standard and specific applications. Experience robust performance with this comprehensive range of EcoStruxure-ready switchgear, for all applications from 16 to 6300A.

Building on the strengths of the Pact Series, MasterPact MTZ is the next generation of high power low voltage circuit breakers, designed to protect electrical systems from damage caused by overloads, short circuits and equipment ground faults. MasterPact MTZ embeds advanced digital technologies and MicroLogic X control units helping to contribute to safety and energy efficiency, and keeping you future-ready.

Old names	New names
Compact	ComPact
Masterpact	MasterPact
Micrologic	MicroLogic
Transferpact	TransferPact
Fupact	FuPact

Select your circuit breakers and switch-disconnectors

Characteristics and performance

ComPact NSXm circuit breakers from 16 to 160 A up to 690 V

PB114894_L+41.eps

ComPact NSXm.

Common characteristics

Rated voltages	Insulation voltage (V)	Ui		800
	Insulation voltage for ELCB [1] (V)	Ui		500
	Impulse withstand voltage (kV)	Uimp		8
	Operational voltage (V)	Ue	AC 50/60 Hz	690
	Operational voltage for ELCB [1] (V)	Ue	AC 50/60 Hz	440
Suitability for isolation		IEC/EN 60947-2		yes
Utilisation category				A
Pollution degree		IEC 60664-1		3

Circuit breakers

Breaking capacity levels

Breaking capacity (kA rms)				
	Icu	AC 50/60 Hz	220...240 V	
			380...415 V	
			440 V	
			500 V	
			525 V	
			660...690 V	
Service breaking capacity (kA rms)				
	Ics	AC 50/60 Hz	220...240 V	
			380...415 V	
			440 V	
			500 V	
			525 V	
			660...690 V	
Durability (C-O cycles)		Mechanical		
		Electrical	440 V	In/2
				In
			690 V	In/2
				In

Protection and measurements

Overload / short-circuit protection	Thermal magnetic
	Electronic with Earth Leakage Protection (ELCB)
Options	Device status/control
	For ELCB [1]: alarming and fault differenciation

Installation / connections

Dimensions and weights			
Dimensions (mm) W x H x D			3P
			4P
			ELCB [1]
Weight (kg)			3P
			4P
			ELCB [1]
Connections			
Pitch (mm)			Standard
			With spreaders
EverLink lug Cu or Al [2] cables	Cross-section (mm²)		Rigid
			Flexible
Crimp lugs Cu or Al	Cross-section (mm²)		Rigid
			Flexible

Source changeover system

Manual mechanical interlocking

[1] ELCB: Earth Leakage Circuit Breaker (MicroLogic Vigi 4.1).
[2] Al up to 100 A.

Characteristics and performance

ComPact NSXm circuit breakers from 16 to 160 A up to 690 V

Common characteristics			
Control	Manual	With toggle	◉
		With direct or extended rotary handle	◉
		With side rotary handle	◉
Versions	Fixed		◉

	NSXm up to 63 A					NSXm from 80 to 160 A and ELCB [1]				
	E	B	F	N	H	E	B	F	N	H
	25	50	85	90	100	25	50	85	90	100
	16	25	36	50	70	16	25	36	50	70
	10	20	35	50	65	10	20	35	50	65
	8	10	15	25	30	-	-	-	-	-
	-	-	10	15	22	-	-	-	-	-
	-	-	-	10	10	-	-	-	-	-
	25	50	85	90	100	25	50	85	90	100
	16	25	36	50	70	16	25	36	50	70
	10	20	30	50	65	10	20	30	50	65
	8	10	10	25	30	-	-	-	-	-
	-	-	10	15	22	-	-	-	-	-
	-	-	-	2.5	2.5	-	-	-	-	-
	20000									
	20000									
	10000									
	10000									
	5000									
	◉					◉				
						◉				
	◉									
	◉									
	81 x 137 x 80									
	108 x 137 x 80									
	108 x 144 x 80									
	1.06									
	1.42									
	1.63									
	27									
	35									
	95									
	70									
	120									
	95									
	◉					◉				

Characteristics and performance

ComPact NSX circuit breakers from 100 to 250 A up to 690 V

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ComPact NSX single-pole.

PB107524_23.eps

ComPact NSX two-pole.

ComPact circuit breakers			
Number of poles			
Control	manual	toggle	
		direct or extended rotary handle	
	electric		
Connections	fixed	front connection	
		rear connection	
	withdrawable	front connection	
		rear connection	
Electrical characteristics as per IEC/EN 60947-2			
Rated current (A)	**In**	40 °C	
Rated insulation voltage (V)	**Ui**		
Rated impulse withstand voltage kV)	**Uimp**		
Rated operational voltage (V)	**Ue**	AC 50/60 Hz	
		DC	
Type of circuit breaker			
Ultimate breaking capacity (kA rms)	**Icu**	AC 50/60 Hz	220/240 V
			380/415 V
			440 V
			500/525 V
			660/690 V
		DC	250 V (1P)
			500 V (2P)
Service breaking capacity (kA rms)	**Ics**	% Icu	
Suitability for isolation			
Utilisation category			
Durability (C-O cycles)	mechanical		
	electrical	277 V	In/2
			In
Protection and measurements			
Type of trip units			
Ratings		**In**	
Overload protection (thermal)	long time threshold	**Ir**	
Short-circuit protection (magnetic)	instantaneous pickup	**Im**	value indicated for AC [1] real value for DC
Add-on earth-leakage protection	Vigi add-on combination with Vigirex relay		
Additional indication and control auxiliaries			
Indication contacts			
Voltages releases	MX shunt release		
	MN undervoltage release		
Installation			
Accessories	terminal extensions and spreaders		
	terminal shields and interphase barriers		
	escutcheons		
Dimensions (mm)	W x H x D		
Weight (kg)			
Source changeover system			
Manual mechanical interlocking			

[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.

Characteristics and performance

ComPact NSX circuit breakers from 100 to 250 A up to 690 V

	NSX100		NSX160		NSX250
	1	2	1	2	1
	◉	◉	◉	◉	◉
	-	-	-	-	-
	-	-	-	-	-
	◉	◉	◉	◉	◉
	◉	◉	◉	◉	◉
	-	-	-	-	-
	-	-	-	-	-
	100	100	160	160	250
	750	750	750	750	750
	8	8	8	8	8
	277	690	277	690	277
	250	500	250	500	-
	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 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 %	100 %	100 %	100 %	100 %
	◉	◉	◉	◉	◉
	A	A	A	A	A
	20000	20000	20000	20000	10000
	20000	20000	20000	20000	10000
	10000	10000	10000	10000	5000
	built-in thermal-magnetic		built-in thermal-magnetic		built-in thermal-magnetic
	16 20 25 30 40	50 63 80 100	125 160		160 200 250
	fixed		fixed		fixed
	16 20 25 30 40	50 63 80 100	125 160		160 200 250
	fixed		fixed		fixed
	190 190 300 300 500	500 500 640 800	1000 1250		850 850 850
	260 260 400 400 700	700 700 800 1000	1200 1250		- - -
	-	-	-	-	-
	-	◉	-	◉	-
	-	◉	-	◉	-
	-	◉	-	◉	-
	-	◉	-	◉	-
	◉	◉	◉	◉	◉
	◉	◉	◉	◉	◉
	◉	◉	◉	◉	◉
	35 x 161 x 86	70 x 161 x 86	35 x 161 x 86	70 x 161 x 86	35 x 161 x 86
	0.7	1.2	0.7	1.2	0.7
	◉	◉	◉	◉	◉

Characteristics and performance

ComPact NSX circuit breakers from 100 to 250 A up to 690 V

PB105112.eps

ComPact NSX100/160/250.

PB110406_40.eps

ComPact NSX250 R.

PB110420.eps

ComPact NSX250 HB2.

Common characteristics

Rated voltages	Insulation voltage (V)	Ui		800
	Insulation voltage for ELCB [6]	Ui		500
	Impulse withstand voltage (kV)	Uimp		8
	Operational voltage (V)	Ue	AC 50/60 Hz	690
	Operation voltage for ELCB [6]	Ue	AC 50/60 Hz	440
Suitability for isolation			IEC/EN 60947-2	yes
Utilisation category				A
Pollution degree			IEC 60664-1	3

Circuit breakers

Breaking capacity levels

Electrical characteristics as per IEC/EN 60947-2

Rated current (A)	**In**	40 °C		
Number of poles				
Breaking capacity (kA rms)				
	Icu	AC 50/60 Hz	220/240 V	
			380/415 V	
			440 V	
			500 V	
			525 V	
			660/690 V	
Service breaking capacity (kA rms)				
	Ics	AC 50/60 Hz	220/240 V	
			380/415 V	
			440 V	
			500 V	
			525 V	
			660/690 V	
Durability (C-O cycles)		Mechanical		
		Electrical	440 V	In/2
				In
			690 V	In/2
				In

Characteristics as per UL 508

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

Protection and measurements

Short-circuit protection	Magnetic only		
Overload / short-circuit protection	Thermal magnetic		
	Electronic		
		with neutral protection (Off-0.5-1-OSN) [1]	
		with ground-fault protection	
		with zone selective interlocking (ZSI) [2]	
Display / I, U, f, P, E, THD measurements / interrupted-current measurement			
Options	Power Meter display on door		
	Operating assistance		
	Counters		
	Histories and alarms		
	Metering Com		
	Device status/control Com		
Earth-leakage protection	By Vigi add-on [3]		
	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	mm²

Source-changeover system

Manual mechanical interlocking	
Automatic source-changeover	

[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 add-on is not available for breaking capacity levels HB1/HB2.
[4] There is no 160 A frame, use 250 A frame with lower rating trip units for R, HB1, HB2.
[5] 2P circuit breaker in 3P case for B and F types, only with thermal-magnetic trip unit.
[6] Earth Leakage Circuit Breaker (MicroLogic Vigi 4.2 and 7.2 E).

Characteristics and performance

ComPact NSX circuit breakers from 100 to 250 A up to 690 V

Common characteristics

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

NSX100									NSX160 [4]						NSX250								
B	F	N	H	S	L	R	HB1	HB2	B	F	N	H	S	L	B	F	N	H	S	L	R	HB1	HB2
100						**100**			**160**						**250**						**250**		
2 [5], 3, 4						3, 4			2 [5], 3, 4						2 [5], 3, 4						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	12	36	50	65	70	80	85	100	15	30	36	50	65	70	15	30	36	50	65	70	80	85	100
-	11	35	35	40	50	65	80	100	-	22	35	35	40	50	-	22	35	35	40	50	65	80	100
-	4	10	10	15	20	45	75	100	-	8	10	10	15	20	-	8	10	10	15	20	45	75	100
50000						20000			40000						20000						20000		
50000						20000			40000						20000						20000		
30000						10000			20000						10000						10000		
20000						10000			15000						10000						10000		
10000						5000			7500						5000						5000		
-	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 86			105 x 161 x 86						105 x 161 x 86								
140 x 161 x 86						140 x 161 x 86			140 x 161 x 86						140 x 161 x 86								
2.05						2.4			2.2						2.4								
2.4						2.8			2.6						2.8								
35/45 mm						35/45 mm			35/45 mm						35/45 mm								
300						300			300						300								
⦿									⦿						⦿								
⦿									⦿						⦿								

Characteristics and performance

ComPact NSX circuit breakers from 400 to 630 A up to 690 V

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ComPact NSX400/630.

PB111001.eps

ComPact NSX630 R.

PB111013.eps

ComPact NSX630 HB2.

Common characteristics

Rated voltages	Insulation voltage (V)	Ui		800
	Insulation voltage for ELCB [4]			500
	Impulse withstand voltage (kV)	Uimp		8
	Operational voltage (V)	Ue	AC 50/60 Hz	690
	Operation voltage for ELCB [4]	Ue	AC 50/60 Hz	440
Suitability for isolation			IEC/EN 60947-2	yes
Utilisation category				A
Pollution degree			IEC 60664-1	3

Circuit breakers

Breaking capacity levels

Electrical characteristics as per IEC/EN 60947-2

Rated current (A)	**In**	40 °C		
Number of poles				
Breaking capacity (kA rms)				
	Icu	AC 50/60 Hz	220/240 V	
			380/415 V	
			440 V	
			500 V	
			525 V	
			660/690 V	
Service breaking capacity (kA rms)				
	Ics	AC 50/60 Hz	220/240 V	
			380/415 V	
			440 V	
			500 V	
			525 V	
			660/690 V	
Durability (C-O cycles)		Mechanical		
		Electrical	440 V	In/2
				In
			690 V	In/2
				In

Characteristics as per UL 508

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

Protection and measurements

Short-circuit protection	Magnetic only	
Overload / short-circuit protection	Thermal magnetic	
	Electronic	
	with neutral protection (Off-0.5-1-OSN) [1]	
	with ground-fault protection	
	with zone selective interlocking (ZSI) [2]	
Display / I, U, f, P, E, THD measurements / interrupted-current measurement		
Options	Power Meter display on door	
	Operating assistance	
	Counters	
	Histories and alarms	
	Metering Com	
	Device status/control Com	
Earth-leakage protection	By Vigi add-on [3]	
	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	mm²

Source-changeover system

Manual mechanical interlocking
Automatic source-changeover

[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 add-on is not available for breaking capacity levels HB1/HB2.
[4] Earth Leakage Circuit Breaker (MicroLogic Vigi 4.3 and 7.3 E)

Characteristics and performance

ComPact NSX circuit breakers from 400 to 630 A up to 690 V

Common characteristics

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

A

NSX400

F	N	H	S	L	R	HB1	HB2
400					**400**		
3, 4					3, 4		
40	85	100	120	150	200	-	-
36	50	70	100	150	200	-	-
30	42	65	90	130	200	-	-
25	30	50	65	70	80	85	100
20	22	35	40	50	65	80	100
10	10	20	25	35	45	75	100
40	85	100	120	150	200	-	-
36	50	70	100	150	200	-	-
30	42	65	90	130	200	-	-
25	30	50	65	70	80	85	100
10	11	11	12	12	65	80	100
10	10	10	12	12	45	75	100
15000					15000		
12000					12000		
6000					6000		
6000					6000		
3000					3000		
85	85	85	-	-	-	-	-
35	50	65	-	-	-	-	-
20	10	20	-	-	-	-	-
◉							
-							
◉							
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◉							
◉							
◉							
◉							
140 x 255 x 110							
185 x 255 x 110							
6.05							
7.90							
45/52.5 mm							
45/70 mm							
4 x 240							
◉							
◉							

NSX630

F	N	H	S	L	Ir = 225 - 500 A R	HB1	HB2	Ir = 501 - 630 A R	HB1	HB2
630					**630**					
3, 4					3, 4					
40	85	100	120	150	200	-	-	200	-	-
36	50	70	100	150	200	-	-	200	-	-
30	42	65	90	130	200	-	-	200	-	-
25	30	50	65	70	80	85	100	80	85	100
20	22	35	40	50	65	80	100	65	80	100
10	10	20	25	35	45	75	100	45	75	100
40	85	100	120	150	200	-	-	200	-	-
36	50	70	100	150	200	-	-	200	-	-
30	42	65	90	130	200	-	-	200	-	-
25	30	50	65	70	80	85	100	80	85	100
10	11	11	12	12	65	80	100	-	-	-
10	10	10	12	12	45	75	100	-	-	-
15000					15000					
8000					8000					
4000					4000					
6000					6000					
2000					2000					
85	85	85	-	-	-	-	-	-	-	-
35	50	65	-	-	-	-	-	-	-	-
20	20	20	-	-	-	-	-	-	-	-
◉										
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◉										
◉										
140 x 255 x 110										
185 x 255 x 110										
6.2										
8.13										
45/52.5 mm										
45/70 mm										
4 x 240										
◉										
◉										

Characteristics and performance

ComPact NSXm switch-disconnectors from 50 to 160 A NA

Installation standards require upstream protection.
However ComPact NSXm 50 to 160 NA switch-disconnectors are self-protected by their high-set magnetic release.

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ComPact NSXm switch-disconnectors.

Common characteristics

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

Switch-disconnectors

Electrical characteristics as per IEC/EN 60947-3

Conventional thermal current (A)	Ith 40 °C			
Number of poles				
Operational current (A) depending on the utilisation category	Ie	AC 50/60 Hz		
			220/240 V	
			380/415 V	
			440/480 V	
			500/525 V	
			660/690 V	
Short-circuit making capacity (kA peak)	Icm	min. (switch-disconnector alone)		
		max. (protection by upstream circuit breaker)		
Rated short-time withstand current (A rms)	Icw	for	1 s	
			3 s	
			20 s	
Durability (C-O cycles)	mechanical			
	electrical	AC		
			440 V	Ie/2
				Ie
			690 V	Ie/2
				Ie
Positive contact indication				
Pollution degree				

Additional indication and control auxiliaries

Indication contacts		
Voltage releases	MX shunt trip release	
	MN undervoltage release	

Installation / connections

Dimensions and weights

Dimensions (mm) W x H x D		3P
		4P
Weight (kg)		3P
		4P

Connections

Pitch (mm)		Standard
		With spreaders
EverLink lug Cu or Al [1] cables	Cross-section (mm²)	Rigid
		Flexible
Crimp lugs Cu or Al	Cross-section (mm²)	Rigid
		Flexible

Source-changeover systems

Manual mechanical interlocking	

[1] Al up to 100 A.

Characteristics and performance

ComPact NSXm switch-disconnectors from 50 to 160 A NA

Common characteristics			
Control	Manual	With toggle	◉
		With direct or extended rotary handle	◉
		With side rotary handle	◉
Versions	Fixed		◉

	NSXm50NA	NSXm100NA	NSXm160NA
	50	**100**	**160**
	3, 4	3, 4	3, 4
	AC22A / AC23A	**AC22A / AC23A**	**AC22A / AC23A**
	50	100	160 / 100
	50	100	160 / 100
	50	100	160 / 100
	50	100	160 / 100
	50	100	160 / 100
	1.28	2.13	2.13
	150	150	150
	900	1500	1500
	900	1500	1500
	200	335	335
	20000	20000	20000
	AC22A / AC23A	**AC22A / AC23A**	**AC22A / AC23A**
	20000 / 20000	20000 / 20000	20000 / 20000
	10000 / 10000	10000 / 10000	10000 / 10000
	10000 / 6000	10000 / 6000	10000 / 6000
	5000 / 3000	5000 / 3000	5000 / 3000
	◉	◉	◉
	3	3	3
	◉	◉	◉
	◉	◉	◉
	◉	◉	◉
	81 x 137 x 80		
	108 x 137 x 80		
	1.06		
	1.42		
	27		
	35		
	95		
	70		
	120		
	95		
	◉		

Characteristics and performance

ComPact NSX switch-disconnectors from 100 to 630 A NA

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

A

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ComPact NSX100 to 250 NA.

PB119116.eps

ComPact NSX400 to 630 NA.

> Discover our specific switch-disconnectors offer:
ComPact INS/INV

LVPED213024EN

[1] 2P in 3P case.

Common characteristics

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

Switch-disconnectors

Electrical characteristics as per IEC/EN 60947-3

Conventional thermal current (A)	Ith 60 °C			
Number of poles				
Operational current (A) depending on the utilisation category	Ie	AC 50/60 Hz		
			220/240 V	
			380/415 V	
			440/480 V	
			500/525 V	
			660/690 V	
		DC		
			250 V (1 pole)	
			500 V (2 poles in series)	
			750 V (3 poles in series)	
Short-circuit making capacity (kA peak)	Icm	min. (switch-disconnector alone)		
		max. (protection by upstream circuit breaker)		
Rated short-time withstand current (A rms)	Icw	for	1 s	
			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 500 V (2 poles in series)	In/2
Positive contact indication				
Pollution degree				

Protection

Add-on earth-leakage protection	By Vigi add-on	
	By Vigirex relay	

Additional indication and control auxiliaries

Indication contacts		
Voltages releases	MX shunt release	
	MN undervoltage release	
Voltage-presence indicator		
Current-transformer module		
Ammeter module		
Insulation monitoring module		

Remote communication by bus

Device-status indication		
Device remote operation		
Operation counter		

Installation / connections

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

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

Manual mechanical interlocking	
Automatic source-changeover	

Characteristics and performance

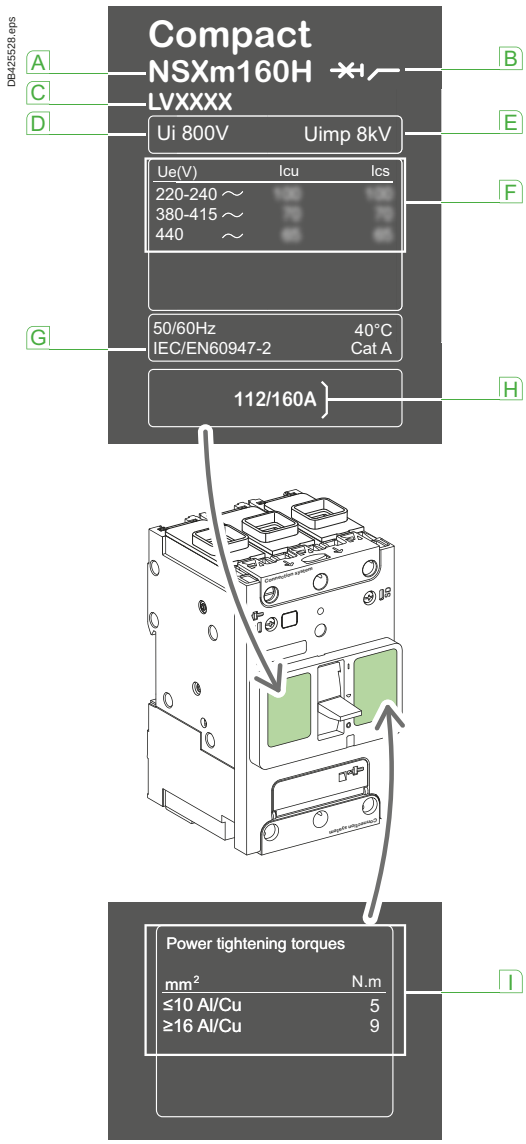
ComPact NSX switch-disconnectors from 100 to 630 A NA

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
	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	
	◉			◉	
	◉			◉	

General characteristics of the ComPact range



Standardised characteristics indicated on the rating plate:

- A Type of device: frame size and breaking capacity class
- B Circuit breaker/switch-disconnector symbol.
- C Commercial reference.
- D Ui: rated insulation voltage.
- E Uimp: rated impulse withstand voltage.
- F Ue: operational voltage.
- G Reference standard.
- H Circuit breaker rating.
- I Power connections tightening torques.

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

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Green Premium™ Product

Compliance with standards

ComPact NSX and NSXm circuit breakers and switch-disconnectors comply with the following:

- ■ international standards:
- □ IEC 60947-1: general rules
- □ IEC 60947-2: circuit breakers
- □ IEC 60947-3: switch-disconnectors
- □ IEC 60947-4-1: contactors and motor starters [1]
- □ IEC 60947-5-1 and following: control circuit devices and switching elements; automatic control components
- ■ European standards (EN 60947-1, EN 60947-2, EN 60947-3 and EN 60947-5-1):
- □ China CCC
- □ EAC (Customs Union)
- ■ the specifications of the marine classification companies (Veritas, Lloyd's Register of Shipping, Det Norske Veritas, etc.), recommendations issued by the CNOMO organisation for the protection of machine tools.

Pollution degree

ComPact NSX and NSXm circuit breakers and switch-disconnectors 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 and NSXm circuit breakers have successfully passed the tests defined by the following standards for extreme atmospheric conditions.
Dry cold and dry heat:

- ■ IEC 60068-2-1: dry cold at -55 °C
- ■ IEC 60068-2-2: dry heat at +85 °C.

Damp heat (tropicalization)

- ■ IEC 60068-2-30: damp heat (temperature + 55 °C and relative humidity of 95 %).
- ■ IEC 60068-2-52: severity 2 - Cycling salt mist.

Environment

ComPact NSX and NSXm respects the European environment directive EC/2002/95 concerning the restriction of hazardous substances (RoHS) and is Green Premium.
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 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 and NSXm circuit breakers may be used between -25 °C and +70 °C. For temperatures higher than 40 °C, (For ComPact NSX: +65 °C for circuit breakers used to protect motor feeders) devices must be derated (pages E-8 to E-9 and E-14 to E-17).
- ■ Circuit breakers should be put into service under normal ambient, operating-temperature 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 and NSXm circuit breakers in the original packing is -50 °C [2] [3] and +85 °C.

[1] For ComPact NSX
[2] For ComPact NSXm: - 40 °C for ComPact NSXm MicroLogic Vigi 4.1.
[3] For ComPact NSX: -40 °C for MicroLogic control units with an LCD screen and MicroLogic Vigi 4.

General characteristics of the ComPact range

Electromagnetic compatibility

ComPact NSX and NSXm 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 NSXm 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
- IEC/EN 61000-4-8: Power frequency magnetic field immunity test
- IEC/EN 61000-4-11: Voltage dips, short interruptions and voltage variations immunity tests
- CISPR 11: Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement.

Suitable for isolation with positive contact indication

All ComPact NSX and NSXm devices 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 and NSXm devices 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

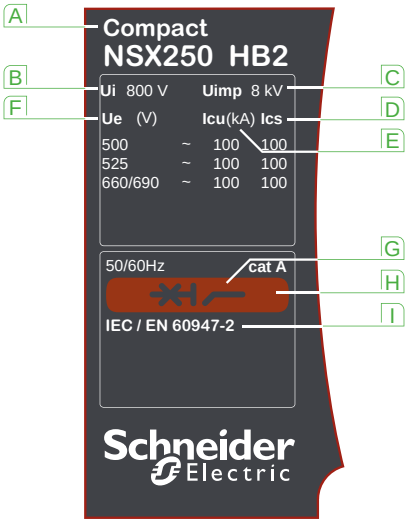
- With toggle: IP40, IK07.
- With direct rotary handle: IP40 IK07.

Circuit breaker installed in a switchboard

ComPact NSXm
- With toggle: IP40, IK07.
- With direct rotary handle: IP40, IK07.
- With extended rotary handle: IP54 or IP65 IK08
- With side rotary handle: IP54 or IP65 IK08.

ComPact NSX
- With toggle: IP40, IK07.
- With direct rotary handle:
  - standard / VDE: IP40, IK07
  - MCC: IP43 IK07
  - CNOMO: IP54 IK08
- With extended rotary handle: IP55 IK08
- With motor mechanism: IP40 IK07.

For more detail about IP, see page E-7.



DB413275.eps

Standardised characteristics indicated on the rating plate:
- A Type of device: frame size and breaking capacity class
- B Ui: rated insulation voltage.
- C Uimp: rated impulse withstand voltage.
- D Ics: service breaking capacity.
- E Icu: ultimate breaking capacity for various values of the rated operational voltage Ue
- F Ue: operational voltage.
- G Circuit breaker/switch-disconnector symbol.
- H Colour label indicating the breaking capacity class.
- I Reference standard.

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

ComPact NSX special applications
High performances at 690 V

ComPact NSX R/HB1/HB2 circuit breaker is designed specifically for the needs of systems operating at 690 V.

PB110420.eps

ComPact NSX100 to 250.

PB111013.eps

ComPact NSX400 to 630.

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 690 V applications.

Enhancing solutions
- Using smaller frames for 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, EN 60947-2, EN 60947-3 and EN 60947-5.1) and corresponding national standards:
  - China CCC
  - EAC (Customs Union)
- the specifications of the marine classification companies (Veritas, Lloyd's Register of Shipping, Det Norske Veritas, etc.), recommendations issued by the CNOMO organisation for the protection of machine tools.

ComPact NSX special applications
High performances at 690 V

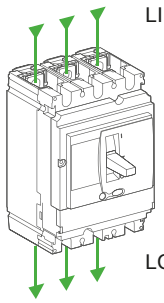
Circuit breakers			NSX100-250 [1]			NSX400			NSX630					
Breaking capacity levels			R	HB1	HB2	R	HB1	HB2	R	HB1	HB2	R	HB1	HB2
Electrical characteristics														
Breaking capacity (kA rms)									Ir < 500 A			Ir > 501 A		
Icu	AC 50/60 Hz	220/240 V	200	-	-	200	-	-	200	-	-	200	-	-
		380/415 V	200	-	-	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
Service breaking capacity (kA rms)									Ir < 500 A			Ir > 501 A		
Ics	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	-	-	-

[1] There is no 160 A frame, use the 250 A frame with lower rating trip units.

Offer structure

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

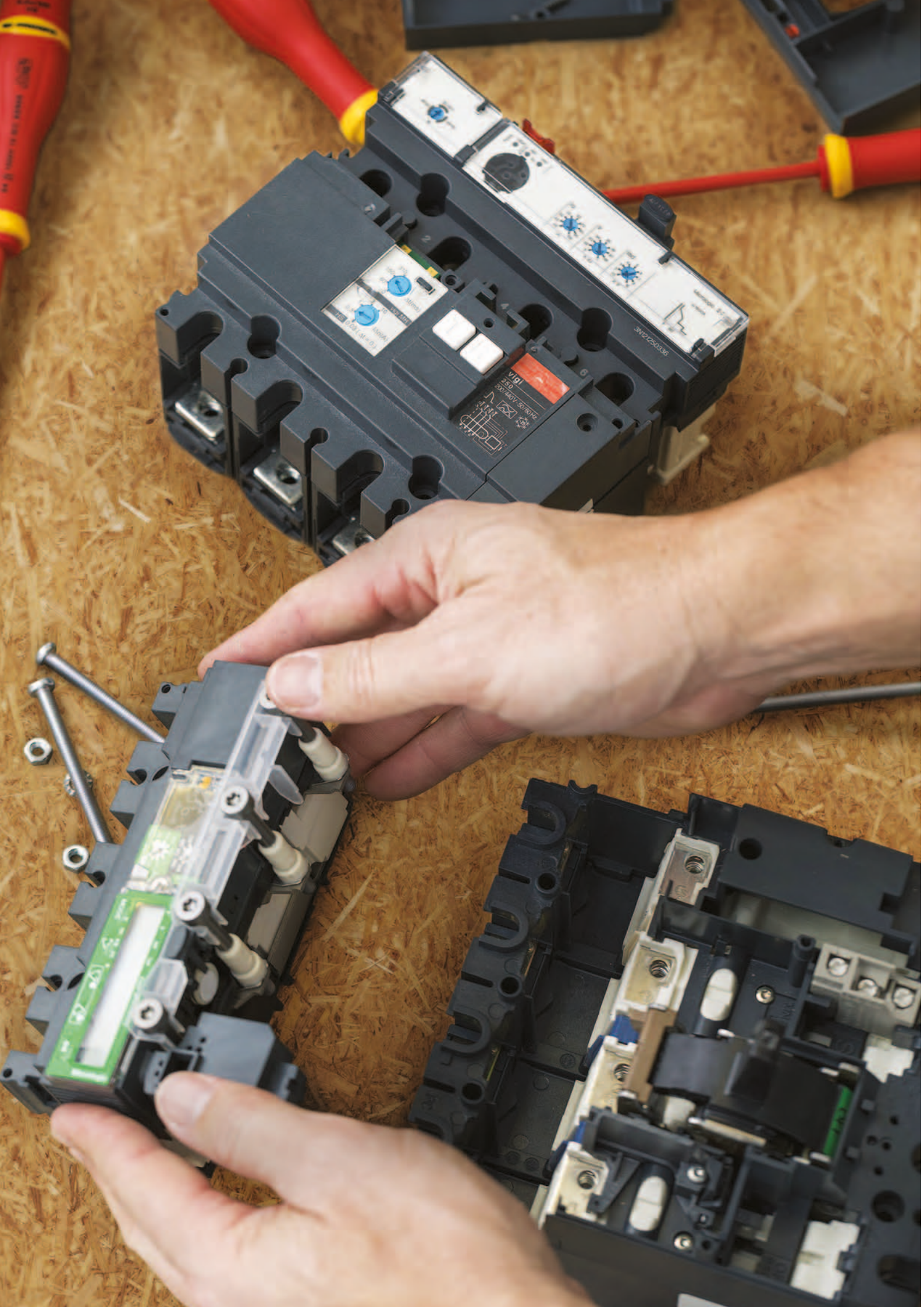
- 100 A frame and 250 A frame, there is no 160 A frame. The 125 - 160 A trip units are used in a 250 A frame.
- All R, HB1 and HB2 circuit breakers are restricted for use as line-load connection. They can not have power fed from the bottom of the circuit breaker. They will be marked with Line and Load markings.
- ComPact NSX400-630 R/HB1/HB2, U > 440 V, Icu 20 kA, Line/Load connection possible with insulation screen.
- All trip units will be assembled in the factory.



For breaking capacities R/HB1/HB2.

Type of protection		Distribution protection		Motor protection	
		TMD	MicroLogic	MA	MicroLogic
 PB110406_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.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

> Substitution and technical guide
ComPact NSX high performances
LVPED508025EN

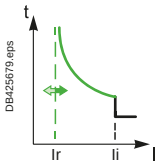
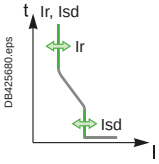
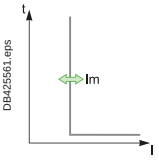
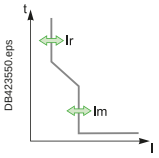


Select your protection

B

Overview of trip units

ComPact NSXm has a built-in trip unit.

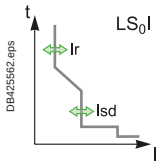
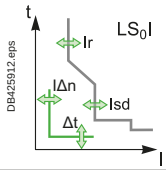
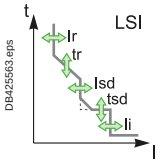
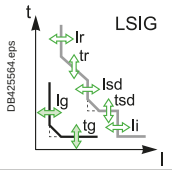
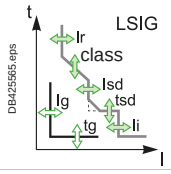
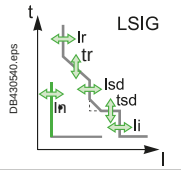
	ComPact NSXm up to 160 A		ComPact NSX up to 250 A	
	 PB114894_17.eps	 PB119117_L20.eps	 PB119162.eps	 PB103193_20.eps
	TM-D distribution	**MicroLogic Vigi 4.1 Distribution and earth leakage protection**	**MA Distribution and motors**	**TM-D distribution TM-G generators**
	 DB425679.eps	 DB425680.eps	 DB425561.eps	 DB423550.eps
Settings & indications	Pick-up set in amps using dials Non-adjustable time delay			
Front indication	◉	◉	◉	◉
Test connector		◉		
Self test	◉	◉	◉	◉
Measurements				
Amps				
Power				
Diagnostic & Maintenance				
Status indication	◉	◉	◉	◉
Operating assistance				
Control				
Voltage release	◉	◉	◉	◉
Motor mechanism			◉	◉
Communication				
Modbus SL			◉	◉
Ethernet			◉	◉
Local display			◉	◉
Input / Output control				
SDx		◉		
I/O module			◉	◉
Earth Leakage				
Integrated protection		◉		
Vigi Add-on module			◉	◉
External relay	◉		◉	◉

[1] Only for MicroLogic 6 electronic.
[2] Only for MicroLogic E.

Overview of trip units

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.

ComPact NSX up to 630 A

	MicroLogic 2 and 1.3 1.3 M Motors (I only) 2.2/2.3 A Distribution 2.2/2.3 AB Service connection (public distribution) 2.2 G Generators 2.2/2.3 M Motors	**MicroLogic Vigi 4** 4.2/4.3 Distribution and earth leakage protection 4.2/4.3 AB Service connection (public distribution) 4.2/4.3 AL	**MicroLogic 5 / 6 A** 5.2/5.3/6.2/6.3 A Distribution and generators 5.2/5.3 A-Z 16Hz 2/3 networks	**MicroLogic 5 / 6 E** 5.2/5.3/6.2/6.3 E Distribution and generators 6.2/6.3 E-M Motors	**MicroLogic Vigi 7 E** 7.2/7.3 E Distribution and earth leakage protection 7.2/7.3 E AL
				 	
	Pick-up set in amps using dials Non-adjustable time delay				
	●	●	●	●	●
	●	●	●	●	●
	●	●	●	●	●
			●	●	●
				●	●
	●	●	●	●	●
			●	●	●
	●	●	●	●	●
	●	●	●	●	●
	●	●	●	●	●
	●	●	●	●	●
	●	●	●	●	●
	●	●	●	●	●
			●	●	●
	●	●	●	●	●
		●			●
	●		●	●	
	●		●	●	

Protection of distribution systems
ComPact NSXm TM thermal-magnetic trip units

ComPact NSXm has a built-in thermal magnetic trip units.

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ComPact NSXm 160.

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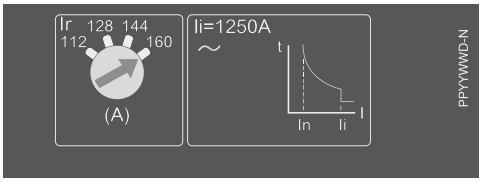


TM-D thermal-magnetic trip units

Circuit breakers equipped with thermal-magnetic trip units are used mainly in industrial and commercial electrical distribution applications for protection of cables on distribution systems supplied by transformers.

Protection

Thermal protection (Ir)

Thermal overload protection based on a bimetal strip providing an inverse time curve I^2t, corresponding to a temperature rise limit. Above this limit, the deformation of the strip trips the circuit breaker operating mechanism.
This protection operates according to:
- **Ir** that can be adjusted in amps from 0.7 to 1 times the rating of the circuit breaker (16 A to 160 A), corresponding to settings from 11 to 160 A for the range of products
- a non-adjustable time delay, defined to ensure protection of the cables.

Magnetic protection (Im)

Short-circuit protection with a fixed pick-up Im that initiates instantaneous tripping if exceeded with a non adjustable time delay to ensure selectivity and cascading.

Protection versions

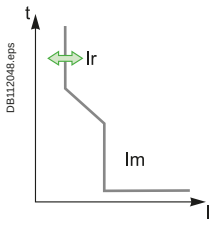
- 3-pole:
  - 3P 3D: 3-pole frame (3P) with detection on all 3 poles (3D).
- 4-pole:
  - 4P 3D: 4-pole frame (4P) with detection on 3 poles (3D).
  - 4P 4D: 4-pole frame (4P) with detection on all 4 poles (same threshold for phases and neutral).

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

Protection of distribution systems

ComPact NSXm TM thermal-magnetic trip units

Thermal-magnetic trip units TM16D to 160D



Ratings (A)	In at 40 °C [1]	16	25	32	40	50	63	80	100	125	160
Circuit breaker	ComPact NSXm	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉
Thermal protection											
Pick-up (A) tripping between 1.05 and 1.20 Ir	Ir = In x ...	adjustable in amps from 0.7 to 1 x In									
Time delay (s)	tr	non-adjustable									
Magnetic protection											
Pick-up (A)	Im	fixed									
accuracy ±20 %	ComPact NSXm	500	600	600	600	600	800	1000	1250	1250	1250
Time delay	tm	fixed									
Neutral protection											
Unprotected neutral	4P 3D	no detection									
Fully protected neutral	4P 4D	1 x Ir									

[1] If the circuit breakers are used in high-temperature environments, the setting must take into account the thermal limitations of the circuit breaker. See the temperature derating table.

B

Protection of distribution systems
ComPact NSX 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.

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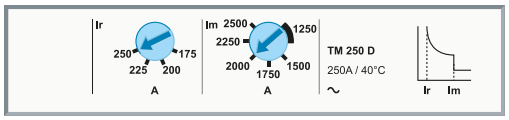

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ComPact NSX250 F.

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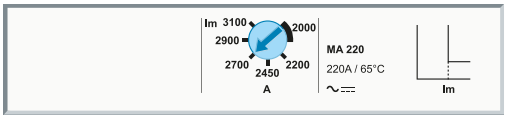


TM-D and TM-G thermal-magnetic trip units

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 resistance of the cable).

Protection

Thermal protection (Ir)

Thermal overload protection based on a bimetal strip providing an inverse time curve I^2t, corresponding to a temperature rise limit. Above this limit, the deformation of the strip trips the circuit breaker operating mechanism.
This protection operates according to:
- Ir that can be adjusted in amps from 0.7 to 1 times the rating of the trip unit (16 A to 250 A), corresponding to settings from 11 to 250 A for the range of trip units
- a non-adjustable time delay, defined to ensure protection of the cables.

Magnetic protection (Im)

Short-circuit protection with a fixed or adjustable pick-up Im that initiates instantaneous tripping if exceeded.
- TM-D: fixed pick-up, Im, for 16 to 160 A ratings and adjustable from 5 to 10 x In for 200 and 250 A ratings
- fixed pick-up for 16 to 63 A ratings.

Protection against insulation faults
Two solutions are possible by adding:
- a Vigi add-on acting directly on the trip unit of the circuit breaker
- a Vigirex relay connected to an MN or MX voltage release.

Protection versions

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

MA magnetic trip units

In distribution applications, circuit breakers equipped with MA magnetic-only trip units are used for:
- short-circuit protection of secondary windings of LV/LV transformers with overload protection on the primary side.
- as an alternative to a switch-disconnector at the head of a switchboard in order to provide short-circuit protection.

Their main use is however for motor protection applications, in conjunction with a thermal relay and a contactor or motor starter.

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

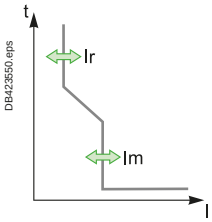
- 3-pole (3P 3D): 3-pole frame (3P) with detection on all 3 poles (3D).
- 4-pole (4P 3D): 4-pole frame (4P) with detection on 3 poles (3D).

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

Protection of distribution systems

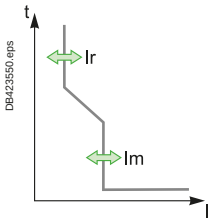
ComPact NSX TM thermal-magnetic and MA magnetic trip units

Thermal-magnetic trip units TM16D to 250D



Ratings (A)	In at 40 °C [1]	16	25	32	40	50	63	80	100	125	160	200	250
Circuit breaker	ComPact NSX100	◉	◉	◉	◉	◉	◉	◉	◉	-	-	-	-
	ComPact NSX160	-	-	◉	◉	◉	◉	◉	◉	◉	◉	-	-
	ComPact NSX250	-	-	-	-	-	◉	◉	◉	◉	◉	◉	◉
Thermal protection													
Pick-up (A) tripping between 1.05 and 1.20 Ir	**Ir** = In x ...	adjustable in amps from 0.7 to 1 x In											
Time delay (s)	**tr**	non-adjustable											
	tr at 1.5 x In	120 to 400											
	tr at 6 x Ir	15											
Magnetic protection													
Pick-up (A) accuracy ±20 %	**Im**	fixed										adjustable	
	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											
Neutral protection													
Unprotected neutral	4P 3D	no detection											
Fully protected neutral	4P 4D	1 x Ir											

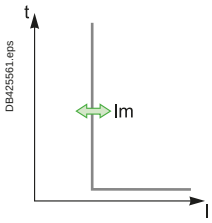
Thermal-magnetic trip units TM16G to 250G



Ratings (A)	In at 40 °C [1]	16	25	40	63	80	100	125	160	200	250
Circuit breaker	ComPact NSX100	◉	◉	◉	◉	◉	◉	-	-	-	-
	ComPact NSX160	-	◉	◉	◉	◉	◉	◉	◉	-	-
	ComPact NSX250	-	-	-	-	-	-	-	◉	◉	◉
Thermal protection											
Pick-up (A) tripping between 1.05 and 1.20 Ir	**Ir** = In x ...	adjustable in amps from 0.7 to 1 x In									
Time delay (s)	**tr**	non-adjustable									
	tr at 1.5 x In	120 to 400									
	tr at 6 x Ir	-									
Magnetic protection											
Pick-up (A) accuracy ±20 %	**Im**	fixed									
	ComPact NSX100	63	80	80	125	200	320	-	-	-	-
	ComPact NSX160	-	80	80	125	200	320	440	440	-	-
	ComPact NSX250	-	-	-	-	-	-	-	440	440	520
Time delay	**tm**	fixed									
Neutral protection											
Unprotected neutral	4P 3D	no									
Fully protected neutral	4P 4D	1 x Ir									

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

Magnetic trip units MA 2.5 to 220



Ratings (A)	In at 65 °C [1]	2.5	6.3	12.5	25	50	100 [1]	150	220
Circuit breaker	ComPact NSX100	◉	◉	◉	◉	◉	◉	-	-
	ComPact NSX160	-	-	-	◉	◉	◉	◉	-
	ComPact NSX250	-	-	-	-	-	◉	◉	◉
Instantaneous magnetic protection									
Pick-up (A) accuracy ±20 %	**Im** = In x ...	Adjustable from 6 to 14 x In (settings 6, 7, 8, 9, 10, 11, 12, 13, 14)						Adjustable from 9 to 14 x In (settings 9, 10, 11, 12, 13, 14)	
Time delay (ms)	tm	fixed							

[1] MA100 3P adjustable from 6 to 14 x In.
MA100 4P adjustable from 9 to 14 x In.

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

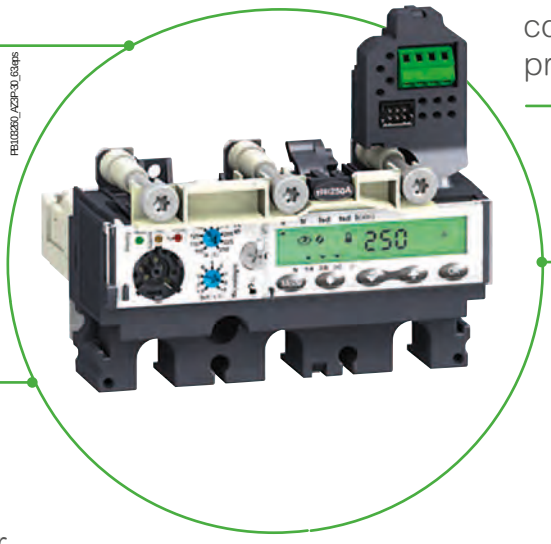
Protection of distribution systems
Overview of functions

Measurement

Energy management is the challenge of present and future generations. To meet this requirement MicroLogic E incorporates all the measuring functions of a power meter.

Diagnostics & Maintenance

Optimal continuity of services as well as extended life of equipment is one of customer main concerns. For that purpose MicroLogic A and E trip units contributes to corrective, preventive and predictive maintenance.



Protection

MicroLogic 5 (LSI), 6 (LSIG) and 7 (LSIR) offer a large long time delay setting range (0.4 to 1 xIn) and protection accuracy for a wide temperature range (-25 to +70 C).

Communication

- Protection Control Unit, provides local information for network operation and maintenance, as well as remote information for higher functions of control, monitoring, energy efficiency and assets management.
- To comply with those requirements MicroLogic trip unit and Enerlin⊗X communication system provides access to status, electrical values and devices control using Ethernet and Modbus SL communication protocols.

Protection of distribution systems
ComPact NSXm + NSX circuit breakers trip units

Understanding the names of MicroLogic electronic trip units

Example: MicroLogic 6.3 E-M	6	3	E	M
	Protection	Frame	Measurements	Applications
	1: I **2**: LS_0I **4**: LS_0IR **5**: LSI **6**: LSIG **I**: Instantaneous **L**: Long time **R**: Residual current **S_0**: Short time [2] (fixed delay) **S**: Short time **G**: Ground fault	**1**: NSXm 16 to 160  **2**: NSX 100/160/250  **3**: NSX 400/630 	**A**: Ammeter  **E**: Energy 	Distribution, otherwise **G**: Generator **AB**: Public distribution [1] **M**: Motors **Z**: 16 Hz 2/3 [1]

Examples				
MicroLogic 1.3	Instantaneous only	400 or 630 A	-	Distribution
MicroLogic 2.3	LS_0I	400 or 630 A	-	Distribution
MicroLogic Vigi 4.1	LS_0IR	16 to 160 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 NSXm and NSX R, HB1, HB2.
[2] LS_0I protection is standard on MicroLogic 2. To ensure selectivity, it offers short-time protection S_0 with a non-adjustable delay and instantaneous protection.

Protection of distribution systems
ComPact NSX MicroLogic 2 and 1.3 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/R/ HB1/HB2.
They provide:
■ standard protection of distribution cables
■ indication of:
□ overloads (via LEDs)
□ overload tripping (via the SDx relay module).

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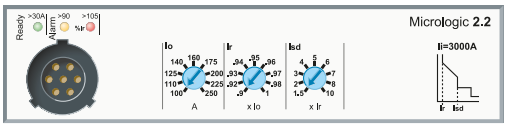

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SDx remote indication relay module with its terminal block.

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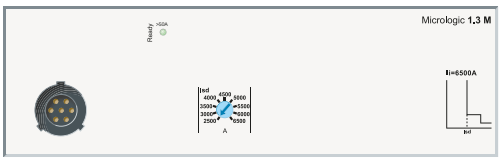

Note: all the trip units have a transparent lead-sealable cover that protects access to the adjustment dials.

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 B-50).

Protection

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 selectivity 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
□ 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.

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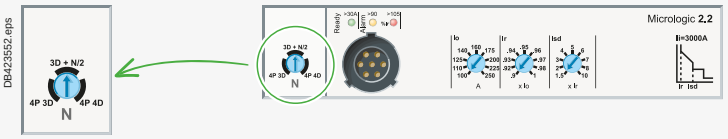
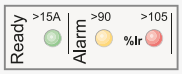


Indications

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

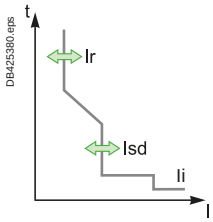
An overload trip signal can be remoted by installing an SDx relay module inside the circuit breaker.
This module receives the signal from the MicroLogic electronic trip unit via an optical link and makes it available on the terminal block. The signal is cleared when the circuit breaker is reclosed. For description, see page C-28.

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-poles (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-poles versions for motor protection, see page B-30.

Protection of distribution systems
ComPact NSX MicroLogic 2 and 1.3 trip units

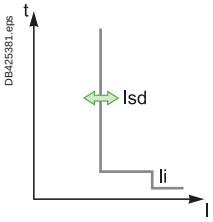
MicroLogic 2



Ratings (A)	In at 40 °C [1]		40	100	160	250	400	630
Circuit breaker	ComPact NSX100		◉	◉	-	-	-	-
	ComPact NSX160		◉	◉	◉	-	-	-
	ComPact NSX250		◉	◉	◉	◉	-	-
	ComPact NSX400		-	-	-	◉	◉	-
	ComPact NSX630		-	-	-	◉	◉	◉
L Long-time protection								
Pick-up (A) tripping between 1.05 and 1.20 Ir		Io	value depending on trip unit rating (In) and setting on dial					
	In = 40 A	Io =	18	18	20	23	25	28	32	36	40
	In = 100 A	Io =	40	45	50	55	63	70	80	90	100
	In = 160 A	Io =	63	70	80	90	100	110	125	150	160
	In = 250 A (NSX250)	Io =	100	110	125	140	160	175	200	225	250
	In = 250 A (NSX400)	Io =	70	100	125	140	160	175	200	225	250
	In = 400 A	Io =	160	180	200	230	250	280	320	360	400
	In = 630 A	Io =	250	280	320	350	400	450	500	570	630
	Ir = Io x ...		9 fine adjustment settings from 0.9 to 1 (0.9 - 0.92 - 0.93 - 0.94 - 0.95 - 0.96 - 0.97 - 0.98 - 1) for each value of Io					
Time delay (s) accuracy 0 to -20%	**tr**		non-adjustable					
		1.5 x Ir	400					
		6 x Ir	16					
		7.2 x Ir	11					
Thermal memory			20 minutes before and after tripping					
S_0 Short-time protection with fixed time delay								
Pick-up (A) accuracy ±10 %	**Isd** = Ir x ...		1.5	2	3	4	5	6	7	8	10
Time delay (ms)	**tsd**		non-adjustable					
	Non-tripping time		20					
	Maximum break time		80					
I Instantaneous protection								
Pick-up (A) accuracy ±15 %	Ii non-adjustable		600	1500	2400	3000	4800	6900			
	Non-tripping time		10 ms								
	Maximum break time		50 ms								

[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.

MicroLogic 1.3 M

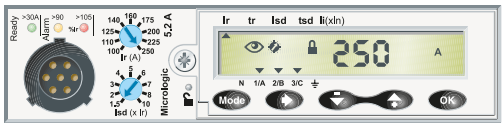


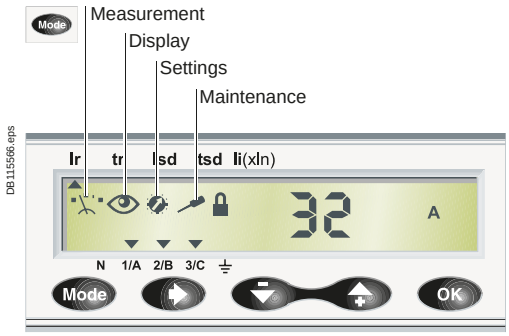
Ratings (A)	In at 65 °C [1]		320	500
Circuit breaker	ComPact NSX400		◉	-
	ComPact NSX630		◉	◉
S Short-time protection				
Pick-up (A) accuracy ±15 %	**Isd**		Adjustable directly in amps	
			9 settings: 1600, 1920, 2240, 2560, 2880, 3200, 3520, 3840, 4160 A	9 settings: 2500, 3000, 3500, 4000, 4500, 5000, 5500, 6000, 6500 A
Time delay (ms)	**tsd**		Non-adjustable	
	Non-tripping time		10	
	Maximum break time		60	
I Instantaneous protection				
Pick-up (A) accuracy ±15 %	**Ii** non-adjustable		4800	6500
	Non-tripping time		0	
	Maximum break time		30 ms	

[1] Motor standards require operation at 65 °C. Circuit-breaker ratings are derated to take this requirement into account.

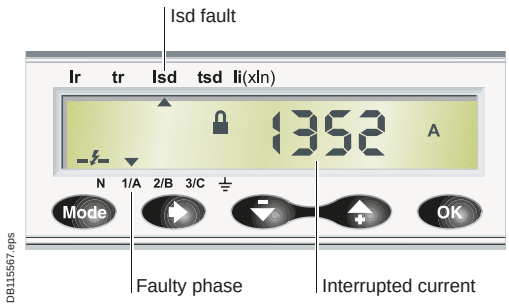
Protection of distribution systems
ComPact NSX MicroLogic 5 / 6 A or E trip units

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/R/HB1/HB2. 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.

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

Overloads: Long time protection (Ir)

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

Short-circuits: Short-time protection (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^2t On).

Short-circuits: Instantaneous protection (Ii)

Instantaneous protection with adjustable pick-up **Ii**.

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^2t On).

Neutral protection

- On 4-pole circuit breakers, this protection can be set via the keypad:
  - Off: neutral unprotected
  - 0.5: neutral protection at half the value of the phase pick-up, i.e. 0.5 x Ir
  - 1.0: neutral fully protected at Ir
  - OSN: Oversized neutral protection at 1.6 times the value of the phase pick-up. Used when there is a high level of 3rd order harmonics (or orders that are multiples of 3) that accumulate in the neutral and create a high current. In this case, the device must be limited to Ir = 0.63 x In for the maximum neutral protection setting of 1.6 x Ir.
- With 3-pole circuit breakers, the neutral can be protected by installing an external neutral sensor with the output (T1, T2) connected to the trip unit.

Zone selective interlocking (ZSI)

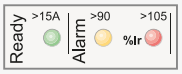
A ZSI terminal block may be used to interconnect a number of MicroLogic control units to provide zone selective interlocking for short-time (Isd) and ground-fault (Ig) protection, without a time delay. For ComPact NSX 100 to 250, the ZSI function is available only in relation to the upstream circuit 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

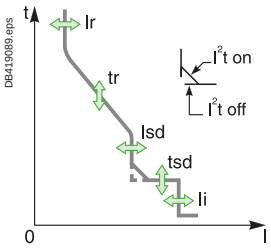
An SDx relay module installed inside the circuit breaker can be used to remotely access to the following information:

- 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.

Protection of distribution systems
ComPact NSX MicroLogic 5 / 6 A or E trip units

Protection MicroLogic 5 / 6 A or E trip units



Ratings (A)	In at 40 °C [1]	40 [2]	100	160	250	400	630
Circuit breaker	ComPact NSX100	◉	◉	-	-	-	-
	ComPact NSX160	◉	◉	◉	-	-	-
	ComPact NSX250	◉	◉	◉	◉	-	-
	ComPact NSX400	-	-	-	-	◉	-
	ComPact NSX630	-	-	-	-	◉	◉

L Long-time protection

Pick-up (A) tripping between 1.05 and 1.20 Ir	**Ir** = ...	dial setting	value depending on trip unit rating (In) and setting on dial							
		In = 40 A Io =	18	18	20	23	25	28	32	36	40
		In = 100 A Io =	40	45	50	55	63	70	80	90	100
		In = 160 A Io =	63	70	80	90	100	110	125	150	160
		In = 250 A Io =	100	110	125	140	160	175	200	225	250
		In = 400 A Io =	160	180	200	230	250	280	320	360	400
		In = 630 A Io =	250	280	320	350	400	450	500	570	630
		keypad setting	Fine adjustment in 1 A steps below maximum value set on dial							
Time delay (s) accuracy 0 to -20 %	**tr** = ...	keypad setting	0.5	1	2	4	8	16		
		1.5 x Ir	15	25	50	100	200	400		
		6 x Ir	0.5	1	2	4	8	16		
		7.2 x Ir	0.35	0.7	1.4	2.8	5.5	11		
Thermal memory			20 minutes before and after tripping							

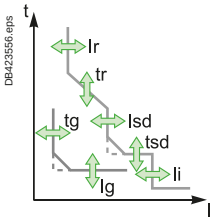
S Short-time protection with adjustable time delay

Pick-up (A) accuracy ±10 %	**Isd** = Ir x ...	dial setting for MicroLogic 5	1.5	2	3	4	5	6	7	8	10
			Fine adjustment in 0.5 x Ir steps using the keypad								
		keypad settings for MicroLogic 6	Adjustment in steps of 0.5 x Ir over the range 1.5 x Ir to 10 x Ir								
Time delay (s)	**tsd** = ...	keypad setting	I²Off	0	0.1	0.2	0.3	0.4			
			I²On	-	0.1	0.2	0.3	0.4			
		Non-tripping time (ms)		20	80	140	230	350			
		Maximum break time (ms)		80	140	200	320	500			

I Instantaneous protection

Pick-up (A) accuracy ±15 %	**Ii** = In x	keypad setting	Adjustment in steps of 0.5 x In over the range 1.5 x In to: 15 x In (40 to 160 A), 12 x In (250 to 400 A) or 11 x In (630 A)
		Non-tripping time	10 ms
		Maximum break time	50 ms

G Ground-fault protection - for MicroLogic 6 A or E



Pick-up (A) accuracy ±10 %	**Ig** = In x	dial setting									
		In = 40 A	0.4	0.4	0.5	0.6	0.7	0.8	0.9	1	Off
		In > 40 A	0.2	0.3	0.4	0.5	0.6	0.7	0.8	1	Off
			Fine adjustment in 0.05 A steps using the keypad								
Time delay (s)	**tg** = ...	keypad setting	I²Off	0	0.1	0.2	0.3	0.4			
			I²On	-	0.1	0.2	0.3	0.4			
		Non-tripping time (ms)		20	80	140	230	350			
		Maximum break time (ms)		80	140	200	320	500			
Test	Ig function			built-in							

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

B

Protection of distribution systems
ComPact NSXm MicroLogic Vigi 4.1 trip unit
with integrated earth leakage protection

ComPact NSXm circuit breakers up to 160 A can be ordered with Micologic Vigi 4.1 trip unit with performance levels E/B/F/N/H.
They provide:
■ standard protection of distribution cables
■ earth leakage protection
■ indication of:
□ overload alarming (via LEDs and via SDx module)
□ overload tripping (via the SDx module)
□ earth leakage alarming (via the SDx module)
□ earth leakage tripping (via front face screen and the SDx module).

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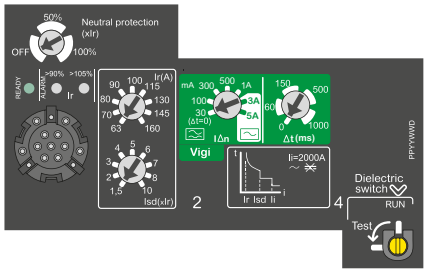

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ComPact NSXm MicroLogic Vgi 4.1.

MicroLogic Vigi 4.1

Circuit breakers equipped with MicroLogic Vigi 4.1 trip units can be used to protect distribution systems supplied by transformers.

Short-circuit and overload protection

Settings are made using the adjustment dials.

Overloads: Long time protection (Ir)

Inverse time protection against overloads with a wide range 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 selectivity 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 4-pole circuit breakers, neutral protection may be set using a three-position switch:
□ OFF: neutral unprotected
□ 50 % [1]: neutral protection at half the value of the phase pick-up, i.e. 0.5 x Ir
□ 100 %: neutral fully protected at Ir.

Earth leakage protection

Protection with an adjustable leakage level (IΔn) with an adjustable delay (Δt).

Compliance with standards

■ IEC 60947-2, annex B.
■ IEC 60755, class A, immunity to DC components up to 6 mA.
■ Operation down to -25 °C as per VDE 664.

Power supply

It is self-powered internally and therefore does not require any external source. It's still working even when supplied by only two phases.

Sensitivity IΔn (A)

■ Type A: 30mA - 100mA - 300mA - 500mA - 1A.
■ Type AC: 30mA - 100mA - 300mA - 1A - 3A - 5A.

Intentional delay Δt (ms)

0 - 60 [2] - 150 [2] - 500 [2] - 1000 [2].

Operated voltage

200...440 V AC - 50/60 Hz.

Operating safety

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

[1] On 100A and 160A circuit breakers only.
[2] If the sensitivity is set to 30 mA, there is no time delay, whatever the time-delay setting.

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

Protection of distribution systems
ComPact NSXm MicroLogic Vigi 4.1 trip unit
with integratedd earth leakage protection

Indications

Front indications

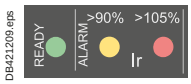
- Green “Ready” LED: flashes slowly when the circuit breaker is ready to trip in the event of an overload or short-circuit fault.
- Orange overload pre-alarm LED: steady on when I > 90 % Ir.
- Red overload LED: steady on when I > 105 % Ir.
- Screen that indicate an earth leakage fault trip - reset when product is powered.

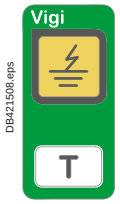
Alarming and fault differentiation

A side module SDx can be installed to provide alarming and fault differenciation:

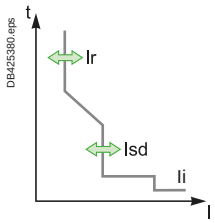
- overload alarm (I > 105 % Ir)
- overload trip indication
- earth leakage alarm (IΔn > 80 % threshold)
- earth leakage trip indication.

This module receives the signal from the MicroLogic electronic trip unit via an optical link and makes it available on the terminal block through NO/NC dry contacts.
The signal is cleared when the circuit breaker is restarted.
For description, see page C-11.

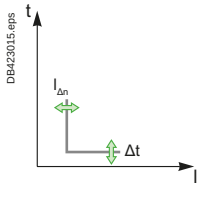




MicroLogic Vigi 4.1



Ratings (A)	In at 40 °C [1]		25	50	100	160					
Circuit breaker	ComPact NSXm		●	●	●	●					
L Long-time protection											
Pick-up (A)		Ir	value depending on trip unit rating (In) and setting on dial								
tripping between 1.05 and 1.20 Ir	In = 25 A	Ir =	10	11	12	14	16	18	20	22	25
	In = 50 A	Ir =	20	22	25	28	32	36	40	45	50
	In = 100 A	Ir =	40	45	50	56	63	70	80	90	100
	In = 160 A	Ir =	63	70	80	90	100	115	130	145	160
Time delay (s) accuracy 0 to -20%	**tr**		non-adjustable								
		1.5 x Ir	200								
		6 x Ir	8								
		7.2 x Ir	5								
Thermal memory			20 minutes before and after tripping								
S_0 Short-time protection with fixed time delay											
Pick-up (A) accuracy ±15 %	**Isd** = Ir x ...		1.5	2	3	4	5	6	7	8	10
Time delay (ms)	**tsd**		non-adjustable								
	Non-tripping time		20								
	Maximum break time		80								
I Instantaneous protection											
Pick-up (A) accuracy ±15 %	Ii non-adjustable		375	750	1500	2000					
	Non-tripping time		10 ms			5 ms					
	Maximum break time		50 ms								
R Earth leakage protection											
Sensitivity $I_{\Delta n}$ (A)	Adjustable	$I_{\Delta n}$ =	0.03	0.1	0.3	0.5	1	3	5		
	Type		A and AC					AC			
Time delay Δt (ms)	Adjustable	Δt =	0	60 [2]	150 [2]	500 [2]	1000 [2]				
	Maximum break time (ms)		< 40	< 140	< 300	< 800	< 1500				



[1] If the circuit breakers are used in high-temperature environments, the setting must take into account the thermal limitations of the circuit breaker.
[2] If the sensitivity is set to 30 mA, there is no time delay, whatever the time-delay setting.

Protection of distribution systems
ComPact NSX MicroLogic Vigi 4 trip unit
with integrated earth leakage protection

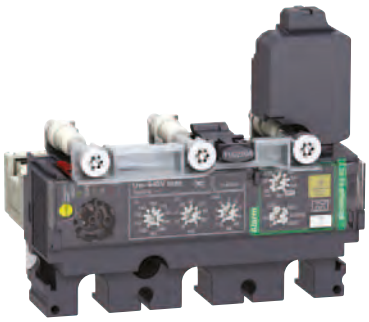
The ComPact NSX range is now complemented with a new type of MicroLogic trip unit including both circuit protection and earth leakage protection. It means that the earth leakage protection, previously located within the Vigi Add-on, will be integrated within the existing size of the MicroLogic trip unit.
MicroLogic Vigi 4 is compliant with IEC 60947-2 annex B.

PB119127_L39.eps

LV433803.eps

MicroLogic Vigi 4 (LS_0IR).

LV433887.eps



MicroLogic Vigi 4 AL (LS_0I + Earth Leakage Alarm).

MicroLogic Vigi 4

There are two versions of MicroLogic Vigi 4:
- distribution protection including Earth Leakage Protection (LS_0IR)
- distribution protection including Earth Leakage Alarm (LS_0I + Earth Leakage Alarm).

Protections

Settings are made using the rotary dial with fine adjustment capabilities.

Short circuit and overload protections

Overload: long-time protection (Ir)

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

Short-circuit: short-time protection with fixed time delay (Isd)

That protection is set with an adjustable pick-up Isd. The tripping takes place after a very short time used to allow selectivity with downstream devices.

Short circuit: non-adjustable instantaneous protection (with a fix pick-up)

Neutral protection

- On a 3-pole device, neutral protection is not possible
- On a 4-pole device, neutral protection may be set using the dedicated coding wheel to meet the following configurations: 4P 3D, 4P 3D + N/2 or 4P 4D (same as for MicroLogic 2).

Earth leakage protections

Adjustable leakage threshold (IΔn) and adjustable time delay threshold (Dt) by using the two dials on the green area of the trip unit.

Power supply

The trip unit is self supplied, and so does not need any external source. It works even when fed by 2 phases only.

Sensitivity IΔn (A)

- Type A: 30mA - 100mA - 300mA - 500mA - 1A - 3A - 5A (for the ratings 40 to 250A)
- Type A: 300mA - 500mA - 1A - 3A - 5A - 10A (for the ratings 400 to 570A).

Caution: "OFF" setting of IΔn is possible. It cancels the earth leakage protection, in that case, the circuit breaker with MicroLogic Vigi 4 behaves as a standard circuit breaker. That "OFF" position is located on the highest side of the coding wheel.

Intentional delay IΔt (s)

Case IΔn = 30mA: Δt 0 sec (whatever the setting)
Case IΔn > 30mA: Δt 0 – 60ms – 150ms – 500ms – 1sec (by setting)

Operated voltage

200 to 440 VAC (only) – 50/60 Hz

Operating safety

The earth leakage protection is a user safety device. It must be regularly tested using the test button (T) that simulates a real current leakage within the toroid. When IΔn is set on the OFF position, press the T will cancel any test.
As for standard circuit breaker, the circuit breaker with MicroLogic Vigi 4 can be reset after any fault by operating an OFF/ON procedure.
Specific for the circuit breaker with MicroLogic Vigi 4 Alarm (AL), after testing as well as after a real leakage fault, it can be reset by pressing more than 3 seconds the test button (T), to avoid switching OFF the device.

Protection of distribution systems
ComPact NSX MicroLogic Vigi 4 trip unit
with integrated earth leakage protection

Indications

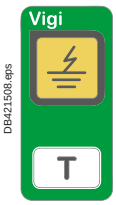
Front indications

- Green "Ready" LED: flashes slowly when the circuit breaker is ready to trip in case of a fault.
- Orange overload pre-alarm LED: steady ON when I > 90% Ir.
- Red overload LED: steady ON when I > 105% Ir.
- Yellow Screen: indicates an earth leakage fault (reset when operating OFF/ON for the "trip" or when pressing >3sec the T button for the Alarm).

Alarming and fault differentiation

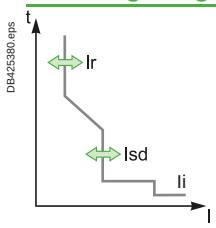
- An overload trip signal can be remotely available by installing an SDx relay module inside the circuit breaker on both "trip" and "alarm" versions.
- An earth leakage trip signal can be remotely available by installing an SDx module, only on the "trip" version.
- An earth leakage alarm signal (MicroLogic Vigi 4 AL) can be remotely available on the SDx, for the circuit breaker with MicroLogic Vigi 4 Alarm".

This module receives the signal from the MicroLogic trip unit via an optical link and makes it available on the terminal block. The signal is reset when the breaker is operated.

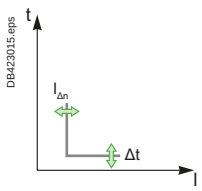


B

MicroLogic Vigi 4



Ratings (A)	In at 40 °C [1]		40	100	160	250	400	570			
Circuit breaker	ComPact NSX100		●	●							
	ComPact NSX160		●	●	●						
	ComPact NSX250		●	●	●	●					
	ComPact NSX400						●				
	ComPact NSX630						●	●			
L Long-time protection											
Pick-up (A)		Io	value depending on the rating (In) and the dial setting								
tripping between 1.05 and 1.20 Ir	In = 40 A	Io =	18	18	20	23	25	28	32	36	40
	In = 100 A	Io =	40	45	50	55	63	70	80	90	100
	In = 160 A	Io =	63	70	80	90	100	110	125	150	160
	In = 250 A	Io =	100	110	125	140	160	175	200	225	250
	In = 400 A	Io =	160	180	200	230	250	280	320	360	400
	In = 570 A	Io =	250	280	320	350	400	450	500	570	570
	Ir = Io x		9 fine adjustment settings from 0.9 to 1 (0.9 – 0.92 ... 0.98 - 1)								
Time delay (s) accuracy 0 to -20%	**tr**		non-adjustable								
	at	1.5 x Ir	tr = 400 s								
	at	6 x Ir	tr = 16 s								
	at	7.2 x Ir	tr = 11 s								
Thermal memory			20 minutes before and after tripping								
S_0 Short-time protection with fixed time delay											
Pick-up (A) accuracy ±10 %	**Isd** = Ir x ...		1.5	2	3	4	5	6	7	8	10
Time delay (ms)	**tsd**		non-adjustable								
	Non-tripping time		20								
	Maximum break time		80								
I Instantaneous protection											
Pick-up (A) accuracy ±15 %	Ii non-adjustable		600	1500	2400	3000	4800	6900			
	Non-tripping time		10 ms								
	Maximum break time		50 ms								



R Earth leakage protection / Earth leakage alarm											
Sensitivity (A)	Type A, adjustable (9 positions)										
	In = 40 A	IΔn =	0.03	0.03	0.1	0.3	0.5	1	3	5	OFF
	In = 100 A	IΔn =	0.03	0.03	0.1	0.3	0.5	1	3	5	OFF
	In = 160 A	IΔn =	0.03	0.03	0.1	0.3	0.5	1	3	5	OFF
	In = 250 A	IΔn =	0.03	0.03	0.1	0.3	0.5	1	3	5	OFF
	In = 400 A	IΔn =	0.3	0.3	0.5	1	3	5	10	10	OFF
	In = 570 A	IΔn =	0.3	0.3	0.5	1	3	5	10	10	OFF
Time delay Δt (ms)	Adjustable	Δt =	0	60 [2]	150 [2]	500 [2]	1000 [2]				
	Maximum break time (ms)		<40	<140	<300	<800	<1500	ms			

[1] For the use in high temperature environment, take into account the thermal limitation of the breaker.
[2] The time delay (Δt) is mandatory and forced to "Δt = 0" when the IΔn dial is set on 30mA (0.03). The time delay has no effect when the dial IΔn is set to the "OFF" position.

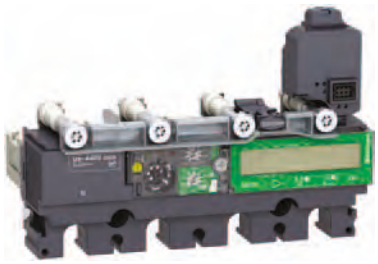
Protection of distribution systems

ComPact NSX MicroLogic Vigi 7 E trip unit with integrated earth leakage protection

The ComPact NSX range is now complemented with a new type of MicroLogic trip unit including circuit protection, metering and earth leakage protection. It means that the earth leakage protection, previously located within the Vigi Add-on, will be integrated within the existing size of the MicroLogic trip unit.
MicroLogic Vigi 7 E is compliant with IEC 60947-2 annex B.

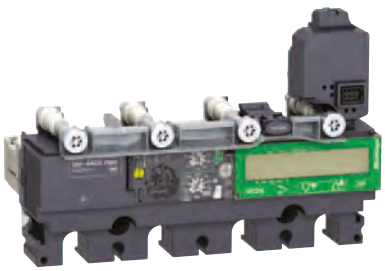
PB119128_L46.eps

LV433882.eps



MicroLogic Vigi 7 E (LSIR).

LV433898.eps



MicroLogic Vigi 7 E AL (LSI + Earth Leakage Alarm).

MicroLogic Vigi 7 E

There are two versions of MicroLogic Vigi 7 E:
- distribution protection including Earth Leakage Protection (LSIR)
- distribution protection including Earth Leakage Alarm (LSI + Earth Leakage Alarm).

Locking Protection - Parameter Settings

Settings are made using the rotary dial or/and the keypad. The protection parameter settings are locked when the transparent cover is closed and sealed to prevent access to the adjustment dials and the locking/unlocking microswitch. But you can display the various parameters using the keypad even when the cover is closed (and sealed).

Short circuit and overload protections

Overload: long time protection (Ir)

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

Short-circuit: short circuit protection (Isd)

That protection is with an adjustable pick-up Isd and an adjustable time delay tsd. It is possible to include a portion of an inverse time curve (I^2t On).

Short circuit: Instantaneous protection (Ii)

Instantaneous protection with an adjustable protection pick-up Ii.

Neutral protection

- On a 4-pole device, the neutral protection may be set using the dedicated coding wheel to meet the following configurations: 4P 3D, 4P 3D + N/2 or 4P 4D (same as for MicroLogic 5)
- OSN (oversized neutral protection) at 1.6 times the phase pick-up value; useful where there is an high level of 3rd order harmonics (or multiple of 3) that create an over-current within the neutral. In that case the device has to be limited to Ir = In x 0.63 (for each phase) to allow the neutral protection setting to 1.6 x Ir.

Earth leakage protections

Adjustable leakage threshold (IΔn) using the dial only (without any use of the keypad for fine-tuning) and an adjustable time delay threshold (Δt) using the keypad only.

Power supply

The MicroLogic trip unit is powered with its own current in order to guarantee the protection functions.
If there is no optional external 24 VDC power supply, the MicroLogic trip unit only works when the circuit breaker is closed. When the circuit breaker is open or the through current is low (15 to 50 A depending on the rating), the MicroLogic trip unit is no longer powered and its display switches off.
An external 24 VDC power supply for the MicroLogic trip unit is optional for:
- modifying the setting values when the circuit breaker is open
- displaying measurements when there is a low current through the circuit breaker (15 to 50 A depending on the rating) when the circuit breaker is closed
- continuing to display the reason for the trip and the breaking current when the circuit breaker is open.

Sensitivity IΔn (A)

- Type A: 30mA - 100mA - 300mA - 500mA - 1A – 3A - 5A (for the ratings 40 to 250A)
- Type A: 300mA - 500mA - 1A – 3A - 5A – 10A (for the ratings 400 to 570A)

Caution: "OFF" setting of IΔn is possible, it cancels the earth leakage protection, in that case, the circuit breaker with MicroLogic Vigi 4 behaves as a standard circuit breaker. "OFF" position is located on the highest side of the coding wheel.

Intentional delay IΔt (s)

- Case IΔn = 30mA: Δt 0 sec
- Case IΔn > 30mA: Δt 0 – 60ms – 150ms – 500ms – 1sec

Operated voltage

200 to 440 VAC (only) – 50/60 Hz

Operating safety

The earth leakage protection is a user safety device. It must be regularly tested using the test button (T) that simulates a real current leakage within the toroid. When IΔn is set on the OFF position, press the T will cancel any test. As for the standard circuit breaker, the circuit breaker with MicroLogic Vigi 7 E ("Trip" or "Alarm" version) can be reset after any fault by using the keypad.
The MicroLogic Vigi 7 E allows you to set-up a specific "(T) test without tripping" procedure using the keypad.

Display of the type of fault

On a trip, the root cause of the fault (phase and interrupted current) are displayed. An external power supply is needed to ensure this function.

Protection of distribution systems

ComPact NSX MicroLogic Vigi 7 E trip unit

with integrated earth leakage protection

Indications

Front indication

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

Written on keypad: earth leakage fault indication (reset using the keypad) for both "Trip" & "Alarm".

Alarming and fault differentiation

An SDx relay module can be installed inside the earth leakage circuit breaker to remotely access to the following data:

- Overload pre-Alarm
- Overload trip
- Earth leakage pre-alarm (useful for the "trip" version of the circuit breaker with MicroLogic Vigi 7 E only)
- Earth leakage trip (exist for the "trip" version of thecircuit breaker with MicroLogic Vigi 7 E only)
- Earth leakage Alarm without "trip" (circuit breaker with MicroLogic Vigi 7 E AL version only).

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 reset when the breaker is operated.

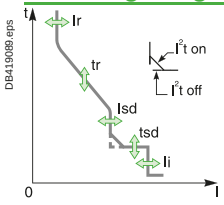
These outputs can be reprogrammed to be assigned to other types of tripping or alarm. The module is deeper described in the section dealing with accessories.

Protection of distribution systems

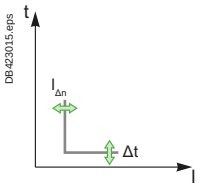
ComPact NSX MicroLogic Vigi 7 E trip unit

with integrated earth leakage protection

MicroLogic Vigi 7 E



Ratings (A)	In at 40 °C [1]		40 [2]	100	160	250	400	570
Circuit breaker	ComPact NSX100		◉	◉				
	ComPact NSX160		◉	◉	◉			
	ComPact NSX250		◉	◉	◉	◉		
	ComPact NSX400						◉	
	ComPact NSX630						◉	◉
L Long-time protection								
Pick-up (A)	Dial setting		value depending on the rating (In) and the dial setting					
	Ir							
tripping between 1.05 and 1.20 Ir	In = 40 A	Io =	18	18	20	23	25	28	32	36	40
	In = 100 A	Io =	40	45	50	55	63	70	80	90	100
	In = 160 A	Io =	63	70	80	90	100	110	125	150	160
	In = 250 A	Io =	100	110	125	140	160	175	200	225	250
	In = 400 A	Io =	160	180	200	230	250	280	320	360	400
	In = 570 A	Io =	250	280	320	350	400	450	500	570	570
	Keypad setting		fine adjustment in 1A step below the max value set on the dial								
Time delay (s) accuracy 0 to -20%	**tr**										
	Keypad setting		0.5		1	2	4	8	16		
	at	1.5 x Ir	15		25	50	100	200	400		
	at	6 x Ir	0.5		1	2	4	8	16		
	at	7.2 x Ir	0.35		0.7	1.4	2.8	5.5	11		
Thermal memory			20 minutes before and after tripping								
S Short-time protection with adjustable time delay											
Pick-up (A) accuracy ±10 %	**Isd** = Ir x ... keypad settings		Adjustment in steps of 0.5 x Ir over the range 1.5 x Ir to 10 x Ir								
Time delay (ms)	**tsd**		I²Of	0	0.1	0.2	0.3	0.4			
	Keypad		I²On	-	0.1	0.2	0.3	0.4			
	Non-tripping time (ms)			20	80	140	230	350			
	Maximum break time			80	140	200	320	500			
I Instantaneous protection											
Pick-up (A) accuracy ±15 %	**Ii** = In x		Adjustment in steps of 0.5 x In over the range 1.5 x In to:								
	Keypad settings		15 x In (40 to 160A), 12 x In (250 to 400A), or 12 x In (570A)								
	Non-tripping time		10 ms								
	Maximum break time		50 ms								
R Earth leakage protection / Earth leakage alarm											
Sensitivity (A)	Type A, adjustable (9 positions)										
	In = 40 A	IΔn =	0.03	0.03	0.1	0.3	0.5	1	3	5	OFF
	In = 100 A	IΔn =	0.03	0.03	0.1	0.3	0.5	1	3	5	OFF
	In = 160 A	IΔn =	0.03	0.03	0.1	0.3	0.5	1	3	5	OFF
	In = 250 A	IΔn =	0.03	0.03	0.1	0.3	0.5	1	3	5	OFF
	In = 400 A	IΔn =	0.3	0.3	0.5	1	3	5	10	10	OFF
	In = 570 A	IΔn =	0.3	0.3	0.5	1	3	5	10	10	OFF
Time delay Δt (ms)	Adjustable keypad	Δt =	0	60 [3]	150 [3]	500 [3]	1000 [3]				
	Maximum break time (ms)		<40	<140	<300	<800	<1500				



[1] For the use in high temperature environment, take into account the thermal limitation of the breaker.
[2] For the rating 40A, the N/2 adjustment is not possible
[3] The time delay (Δt) is mandatory and designed "Δt = 0" when the IΔn dial is set on 30mA (0.03). The time delay has no effect when the dial IΔn is set to the "OFF" position.

B

Protection of distribution systems
ComPact NSX Vigi add-on protection against insulation faults

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 add-on to the circuit breaker
- by using a Vigirex relay and separate toroids.

PB105113.eps

ComPact NSX Vigi add-on.

PB100436.eps

Earth-leakage relay.

PB119226.eps

Separate toroids.

Circuit breaker with Vigi add-on

- For general characteristics of circuit breakers, see pages A-6 and A-7.
- Vigi add-on. Earth-leakage protection is achieved by installing a Vigi add-on (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 30 A and time-delay settings (0 to 4.5 seconds).
- Closed toroids up to 630 A (30 to 300 mm in diameter), opened toroids up to 250 A (80 to 120 mm in diameter) or rectangular sensors up to 630 A.
- 50/60 Hz distribution systems.

Options
- 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.
- CISPR 11: Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement.
- UL1053 and CSA22.2 No. 144 for RH10, RH21 and RH99 relays at supply voltages up to and including 220/240 V.

ComPact NSX Vigi add-on

Addition of the Vigi add-on does not modify 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 and weights		NSX100/160/250	NSX400/630
Dimensions	3 poles	105 x 236 x 86	140 x 355 x 110
W x H x D (mm)	4 poles	140 x 236 x 86	185 x 355 x 110
Weight (kg)	3 poles	2.5	8.8
	4 poles	3.2	10.8

Compliance with standards
- IEC 60947-2, annex B.
- IEC 60755, Type A, immunity to DC components up to 6 mA.
- Operation down to -25 °C as per VDE 664.

Remote indications
Vigi add-on may be equipped with an auxiliary contact (SDV) to remotely signal tripping due to an earth fault.

Use of 4-pole Vigi add-on 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 add-on with connection of the neutral cable.

Power supply
Vigi add-on are self-powered 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.

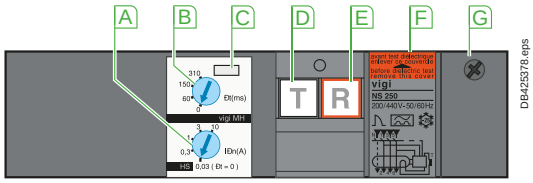
Vigi add-on selection

Type	Vigi ME	Vigi MH	Vigi MB
Number of poles	3, 4 [1]	3, 4 [1]	3, 4 [1]
NSX100	◉	◉	-
NXS160	◉	◉	-
NSX250	-	◉	-
NSX400	-	-	◉
NSX630	-	-	◉
Protection characteristics			
Sensitivity	fixed	adjustable	adjustable
IΔn (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	200...440	200... 440 - 440...550	200...440 - 440...550

[1] Vigi 3P add-on 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 add-on is a user safety device. It must be tested at regular intervals (every 6 months) via test button.



A Sensitivity setting
B Time-delay setting (for selective earth-leakage protection).
C Lead-seal fixture for controlled access to settings.
D Test button simulating an earth-fault for regular checks on the tripping function
E Reset button (reset required after earth-fault tripping).
F Rating plate
G Housing for SDV auxiliary contact.

Plug-in devices
The Vigi add-on can be installed on a plug-in base. Special accessories are required (see catalog number chapter).

Protection of distribution systems

ComPact NSX and NSXm add-on protection against insulation faults using a Vigirex relay

Detection

with associated toroid

Alarm

with the Vigirex relay

Protection

with the circuit breaker

Function

Vigirex relays measure the earth-leakage current in an electrical installation via their associated toroids.
Vigirex relays may be used for:
- residual-current protection (RH10, RH21, RH68, RH86, RH99)
- earth-leakage monitoring (RMH or RH99)
- residual-current protection and earth-leakage monitoring (RH197, RHUs and RHU).

Residual-current protection relay

Protection relays control the interruption of the supply of power to the monitored systems to protect:
- people against indirect contact and, in addition, against direct contact
- property against fire hazards
- motors.

A relay trips the associated circuit breaker when the set residual operating current IΔn is overrun.
Depending on the relay, the threshold IΔn can be fixed, user-selectable or adjustable and the overrun can be signalled by a digital display of the measured current or a LED.
The leakage current is displayed:
- for the RH197, on a bargraph made up of 4 LEDs indicating levels corresponding to 20, 30, 40 and 50 % of IΔn
- for the RHUs and RHU, by digital display of the value of the leakage current.

Circuit breaker tripping can be either instantaneous or delayed. On some relays, it is possible to adjust the time delay.
The protection relays store the residual-current fault in memory. Once the fault has been cleared and the output contact has been manually reset, the relay can be used again.

Earth-leakage monitoring relays

These relays may be used to monitor drops in electrical insulation due to ageing of cables or extensions in the installation.
Continuous measurement of leakage currents makes it possible to plan preventive maintenance on the faulty circuits. An increase in the leakage currents may lead to a complete shutdown of the installation.
The control signal is issued by the relay when the residual-current operating threshold is overrun.
Depending on the relay, the threshold can be adjustable or user-selectable and the overrun can be signalled via a LED, a bargraph or a digital display of the measured current.
The leakage current is displayed:
- for the RH197, on a bargraph made up of 4 LEDs indicating levels corresponding to 20, 30, 40 and 50 % of IΔn
- for the RMH, by digital display of the value of the leakage current.

The control signal can be either instantaneous or delayed. On some relays, it is possible to adjust the time delay.
Earth-leakage monitoring relays do not store the residual-current fault in memory and their output contact is automatically reset when the fault is cleared.

Use

Vigirex relays may be used for protection and maintenance at all levels in the installation. Depending on the relays, they may be used in TT, IT or TNS low-voltage AC installations for voltages up to 1000 V and frequencies 50/60 Hz.
Vigirex protection relays are suitable for use with all electrical switchgear devices available on the market.

Protection of distribution systems

ComPact NSX and NSXm add-on protection against insulation faults using a Vigirex relay

Developed to be suitable for all installation systems, the Vigirex range provides real simplicity of choice and assembly.

Overview of the Vigirex range

Protection relays

Device	 RH10M&P	 RH21M&P	 RH99M&P	 RH197M&P	 RHUs/RHU
Functions					
Protection	◉	◉	◉	◉	◉
Local indications	◉	◉	◉	◉	◉
Remote indications – hard-wired				◉	◉
Remote indications – via com Modbus SL					◉ except RHUs
Display of measurement				◉	◉

Monitoring relays

Centralised monitoring relay

Device	 RH99M&P	 RH197M&P	 RHUs/RHU	 RMH	 RM12T
Functions					
Protection		◉	◉		
Local indications	◉	◉	◉	◉	
Remote indications – hard-wired	◉	◉	◉	◉	
Remote indications – via communication			◉ except RHUs	◉	
Display of measurement		◉	◉	◉ 12 measurement channels	

Formats for all installation systems

Schneider MCB format devices in the Vigirex range can be mounted on a DIN rail (RH10, RH21, RH99 and RH197) or on a universal mounting plate using mounting lugs (RH10, RH21 and RH99). The 72 x 72 mm front-panel mount devices (RH10, RH21, RH99, RH197, RMH, RHUs and RHU) are mounted on panels, doors or front plates using clips.

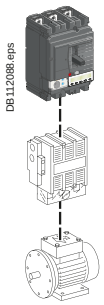
Installation system		Suitable format	
		Front-panel mount	**DIN rail**
Main LV switchboard		◉	
Power distribution switchboard	instrument zone	◉	
	modular-device zone		◉
Motor Control Centre (MCC)			◉ with clip-in toroid
Automatic control panel or machine panel			◉ with mounting lugs
Final distribution enclosures			◉

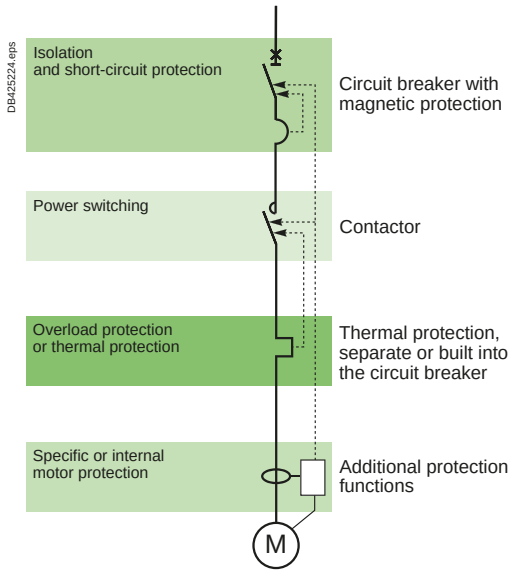
ComPact NSX motor protection
General information on motor feeders

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.





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

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. IEC 60947 defines the following contactor utilisation categories.

Contactor utilisation categories (AC current)

Contactor utilisation categories	Type of load	Control function	Typical applications
AC-1	Non-inductive (cos φ ≥ 0.8)	Energising	Heating, distribution
AC-2	Slip-ring motor (cos φ ≥ 0.65)	Starting Switching off motor during running Counter-current braking Inching	Wiring-drawing machine
AC-3	Squirrel-cage motor (cos φ = 0.45 for ≤ 100 A) (cos φ = 0.35 for > 100 A)	Starting Switching off motor during running	Compressors, elevators, pumps, mixers, escalators, fans, conveyer systems, air-conditioning
AC-4		Starting Switching off motor during running Regenerative braking Plugging Inching	Printing machines, wire-drawing machines

Utilisation category AC-3 - 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 AC-3 utilisation category, in which case they ensure type 2 coordination.

Utilisation category AC-4 - 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 AC-3.

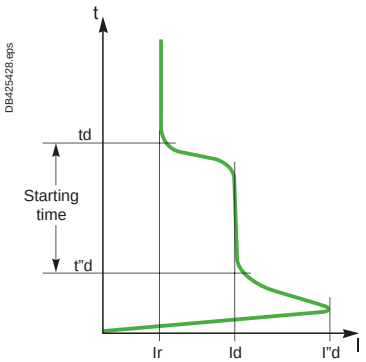
ComPact NSX motor protection
Motor-feeder characteristics and solutions

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 Ir.

Standardised values in kW

Rated operational power	Standardised values in kW currents Ie (A) for:			
	230 V	400 V	500 V	690 V
kW	A	A	A	A
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 I r [1]	1.2 Ir [1]	1.5 Ir [2]	7.2 I r [1]
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 > 2 h	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 operational power	Indicative values of the rated operational currents Ie (A) for						
	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 protection
Motor-feeder solutions

ComPact NSX motor circuit breakers are designed for motor-feeder solutions using:
■ three devices, including an MA or 1.3 M magnetic-only trip unit
■ two devices including a 2 M or 6 E-M electronic trip units.
They are designed for use with contactors in the AC-3 utilisation category (80 % of all cases) and they ensure type 2 coordination with the contactor.
For the AC-4 utilisation category, the difficult conditions generally make it necessary to oversize the protection circuit breaker with respect to the AC-3 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
□ 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 motor protection			3 devices		2 devices	
ComPact NSX circuit breaker			**NSX100/160/250**	**NSX400/630**	**NSX100 to 630**	
	Type 2 coordination with		Contactor + thermal relay		Contactor	
Trip unit	Type Technology		**MA** Magnetic	**MicroLogic 1.3 M** Electronic	**MicroLogic 2 M** Electronic	**MicroLogic 6 E-M** Electronic
						
Thermal relay	Separate		◉	◉		
	Built-in, class	5			◉	◉
		10			◉	◉
		20			◉	◉
		30				◉
Protection functions of ComPact NSX circuit breaker						
Short-circuits			◉	◉	◉	◉
Overloads					◉	◉
Insulation faults	Ground-fault					◉
Special motor functions	Phase unbalance				◉	◉
	Locked rotor					◉
	Under-load					◉
	Long start					◉
Built-in Power Meter functions						
	I, U, energy					◉
Operating assistance						
	Counters (cycles, trips, alarms, hours)					◉
	Contact-wear indicator					◉
	Load profile and thermal image					◉

> Discover our specific Motor Protection Offer:
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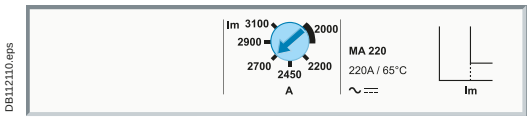
ComPact NSX motor protection
MA instantaneous trip units

MA magnetic trip units are used in 3 devices 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 V.



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.

Protection

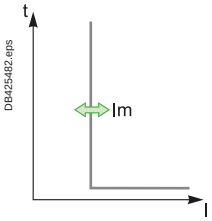
Magnetic protection (Im)

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).

Magnetic trip units MA 2.5 to 220



Ratings (A)	In at 65 °C [1]	2.5	6.3	12.5	25	50	100 [1]	150	220
Circuit breaker	ComPact NSX100	◉	◉	◉	◉	◉	◉	-	-
	ComPact NSX160	-	-	-	◉	◉	◉	◉	-
	ComPact NSX250	-	-	-	-	-	◉	◉	◉
Instantaneous magnetic protection									
Pick-up (A) accuracy ±20 %	**Im** = In x ...	Adjustable from 6 to 14 x In (settings 6, 7, 8, 9, 10, 11, 12, 13, 14)						Adjustable from 9 to 14 x In (settings 9, 10, 11, 12, 13, 14)	
Time delay (ms)	tm	fixed							

[1] MA100 3P adjustable from 6 to 14 x In.
MA100 4P adjustable from 9 to 14 x In.

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

ComPact NSX motor protection
MicroLogic 1.3 M instantaneous trip units

MicroLogic 1.3 M trip units are used in 3 devices motor-feeder solutions on ComPact NSX400/630 circuit breakers with performance levels B/F/H/N/S/L.
They provide short-circuit protection for motors up to 250 kW at 400 V.
They also provide the benefits of electronic technology:
- accurate settings
- tests
- "Ready" LED.

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)

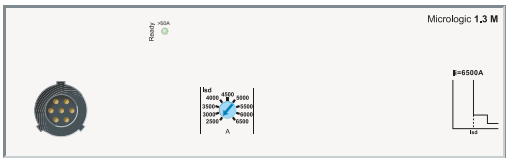
Protection with an adjustable pick-up Isd. There is a very short delay to let through motor starting currents.
- Isd is set in amperes from 5 to 13 x In, as follows:
  - from 1600 to 4160 A for the 320 A rating
  - from 2500 to 6500 A for the 500 A rating.

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

Instantaneous protection with non-adjustable pick-up Ii.

Protection version

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



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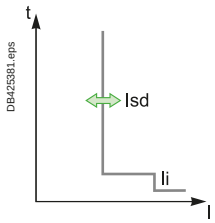
Indications

Front indications
- Green “Ready” LED: flashes slowly when the circuit breaker is ready to trip in the event of a fault.

MicroLogic 1.3 M



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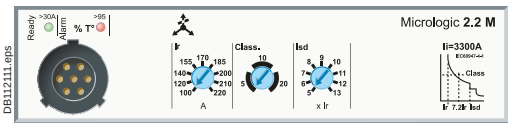
Ratings (A)	In at 65 °C [1]	320	500
Circuit breaker	ComPact NSX400	◉	-
	ComPact NSX630	◉	◉
S Short-time protection			
Pick-up (A) accuracy ±15 %	**Isd**	Adjustable directly in amps	
		9 settings: 1600, 1920, 2440, 2560, 2880, 3200, 3520, 3840, 4160 A	9 settings: 2500, 3000, 3500, 4000, 4500, 5000, 5500, 6000, 6500 A
Time delay (ms)	**tsd**	Non-adjustable	
	Non-tripping time Maximum break time	10 60	
I Instantaneous protection			
Pick-up (A) accuracy ±15 %	**Ii** non-adjustable	4800	6500
	Non-tripping time Maximum break time	0 30 ms	

[1] Motor standards require operation at 65 °C. Circuit-breaker ratings are derated to take this requirement into account (see pages E-14 to E-17).

ComPact NSX 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 devices 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.



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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 (Ii)
Instantaneous protection with non-adjustable pick-up **Ii**.

Phase unbalance or phase loss (Iunbal) ( )
This function opens the circuit breaker if a phase unbalance occurs:
- that is greater than the 30 % fixed pick-up **Iunbal**
- following the non-adjustable time delay **tunbal** equal to:
  - 0.7 s during starting
  - 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.

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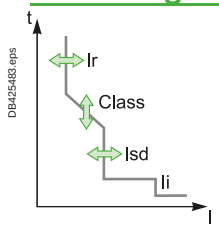
SDTAM remote indication relay module with its terminal block.

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

ComPact NSX motor protection
MicroLogic 2.2 / 2.3 M electronic trip units

MicroLogic 2.2 / 2.3 M



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	-	-	-	-	-	◉	◉

L Overloads (or thermal protection): Long-time protection and trip class

Pick-up (A) tripping between 1.05 and 1.20 Ir	**Ir**		value depending on trip unit rating (In) and setting on dial								
	In = 25 A	Ir =	12	14	16	18	20	22	23	24	25
	In = 50 A	Ir =	25	30	32	36	40	42	45	47	50
	In = 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
	In = 220 A	Ir =	100	120	140	155	170	185	200	210	220
	In = 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 60947-4-1			5	10	20						
Time delay (s) depending on selected trip class	**tr**	1.5 x Ir	120	240	480	for warm motor					
		6 x Ir	6.5	13.5	26	for cold motor					
		7.2 x Ir	5	10	20	for cold motor					
Thermal memory			20 minutes before and after tripping								
Cooling fan			non-adjustable - motor self-cooled								

S_0 Short-circuits: Short-time protection with fixed time delay

Pick-up (A) accuracy ±15 %	**Isd** = Ir x ...	5	6	7	8	9	10	11	12	13
Time delay (ms)	**tsd**	non-adjustable								
	Non-tripping time	10								
	Maximum break time	60								

I Short-circuits: Non-adjustable instantaneous protection

Pick-up (A) accuracy ±15 %	Ii non-adjustable	425	750	1500	2250	3300	4800	6500
Time delay (ms)	Non-tripping time	0						
	Maximum break time	30						

Phase unbalance or phase loss

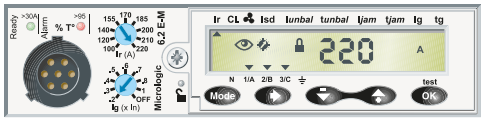
Pick-up (A) accuracy ±20 %	Iunbal in % average current [2]	> 30 %
Time delay (s)	non-adjustable	0.7 s during starting 4 s during normal operation

[1] Motor standards require operation at 65 °C. Circuit-breaker ratings are derated to take this requirement into account (see pages E-14 to E-17).
[2] The unbalance measurement takes into account the most unbalanced phase with respect to the average current.

ComPact NSX motor protection
MicroLogic 6 E-M electronic trip units

MicroLogic 6.E-M is used in 2 devices 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.



B

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 (Iunbal)

This function opens the circuit breaker if a phase unbalance occurs:
- that is greater than the **Iunbal** 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 B-37), the function is disabled.
During normal operation, it causes tripping:
- above the **Ijam** 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 (Iund)

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 B-37), the function is always enabled.
During normal operation, it causes tripping:
- below the **Iund** 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 (Ilong)

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 **Ilong** pick-up that can be fine-adjusted from 1 to 8 x Ir
- in conjunction with the **tlong** time delay that can be adjusted from 1 to 200 seconds (see "long starts" page B-37).

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

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

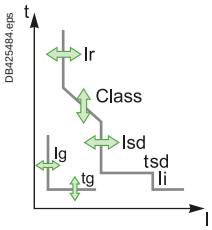
Front indications

- 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 C-31 for SDTAM and for SDx.

MicroLogic 6.2 / 6.3 E-M



Ratings (A)	In at 65 °C [1]	25	50	80	150	220	320	500
Circuit breaker	ComPact NSX100	◉	◉	◉	-	-	-	-
	ComPact NSX160	◉	◉	◉	◉	-	-	-
	ComPact NSX250	◉	◉	◉	◉	◉	-	-
	ComPact NSX400	-	-	-	-	-	◉	-
	ComPact NSX630	-	-	-	-	-	◉	◉

L Overloads: Long-time protection

Pick-up (A)	**Ir**	Dial setting		Value depending on trip-unit rating (In) and setting on dial							
Tripping between 1.05 and 1.20 Ir		In = 25 A	Ir =	12	14	16	18	20	22	23	24	25
		In = 50 A	Ir =	25	30	32	36	40	42	45	47	50
		In = 80 A	Ir =	35	42	47	52	57	60	65	72	80
		In = 150 A	Ir =	70	80	90	100	110	120	130	140	150
		In = 220 A	Ir =	100	120	140	155	170	185	200	210	220
		In = 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
		Keypad setting		Fine adjustments in 1 A steps below maximum value defined by dial setting								
Trip class as per IEC 60947-4-1				5	10	20	30					
Time delay (s)	**tr**		1.5 x Ir	120	240	480	720	for warm motor				
depending on selected trip class			6 x Ir	6.5	13.5	26	38	for cold motor				
			7.2 x Ir	5	10	20	30	for cold motor				
Thermal memory				20 minutes before and after tripping								
Cooling fan				Settings for self-cooled or fan-cooled motors								

S_n Short-circuits: Short-time protection with fixed time delay

Pick-up (A) accuracy ±15 %	**Isd** = Ir x ...		5	6	7	8	9	10	11	12	13
			Fine adjustment In 0.5 x Ir steps using the keypad								
Time delay	**tsd**		non-adjustable								
	Non-tripping time		10 ms								
	Maximum break time		60 ms								

I Short-circuits: Non-adjustable instantaneous protection

Pick-up (A) accuracy ±15 %	**Ii** non-adjustable	425	750	1200	2250	3300	4800	6500	
	Non-tripping time	0 ms							
	Maximum break time	30 ms							

G Ground faults

Pick-up (A) accuracy ±10 %	**Ig** = In x ...		Dial setting								
		In = 25 A	Ig =	0.6	0.6	0.6	0.6	0.7	0.8	0.9	1	Off
		In = 50 A	Ig =	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	Off
		In > 50 A	Ig =	0.2	0.3	0.4	0.5	0.6	0.7	0.8	1	Off
				fine adjustments in 0.05 x In steps								
Time delay (ms)	**tg**			0	0.1	0.2	0.3	0.4				
	Non-tripping time			20	80	140	230	350				
	Maximum break time			80	140	200	320	500				

[1] Motor standards require operation at 65 °C. Circuit-breaker ratings are derated to take this requirement into account (see pages E-14 to E-17).

[2] The unbalance measurement takes into account the most unbalanced phase with respect to the average current.

ComPact NSX motor protection
MicroLogic 6 E-M electronic trip units

MicroLogic 6.2 / 6.3 E-M

Phase unbalance or phase loss		
Pick-up (A) accuracy ±20 %	**Iunbal** = in % average current [2]	adjustable from 10 to 40 %, default setting = 30 % fine adjustments in 1 % steps using the keypad activated during motor starting
Time delay (s)	**tunbal**	0.7 s during starting 1 to 10 seconds during normal operation, default setting = 4 seconds fine adjustments in 1 s steps using the keypad
Locked rotor		
Pick-up (A) accuracy ±10 %	**Ijam** = Ir x ...	1 x 8 Ir with Off position, default setting = Off fine adjustments in 0.1 x Ir steps using the keypad disabled during motor starting
Time delay (s)	**tjam** =	1 to 30 seconds fine adjustments in 1 s steps using the keypad, default setting = 5 s
Under-load (under-current)		
Pick-up (A) accuracy ±10 %	**Iund** = Ir x ...	0.3 x 0.9 Ir with Off position, default setting = Off Fine adjustments in Ir x 0.01 steps using the EcoStruxure Power Commission software activated during motor starting
Time delay (s)	**tund** =	1 to 200 seconds fine adjustments in 1 s steps using the EcoStruxure Power Commission software, default setting = 10 s
Long starts		
Pick-up (A) accuracy ±10 %	**Ilong** = Ir x ...	1 x 8 Ir with Off position, default setting = Off Fine adjustments in Ir x 0.1 steps using the EcoStruxure Power Commission software activated during motor starting
Time delay (s)	**tlong** =	1 to 200 seconds fine adjustments in 1 s steps using the EcoStruxure Power Commission software, default setting = 10 s

[1] Motor standards require operation at 65 °C. Circuit-breaker ratings are derated to take this requirement into account (see pages E-14 to E-17).
[2] The unbalance measurement takes into account the most unbalanced phase with respect to the average current.

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.

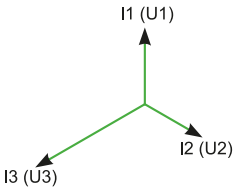
Phase loss
Phase loss is a special case of phase unbalance.
- During normal operation, it produces the effects mentioned above and tripping must occur after four seconds.
- During starting, the absence of a phase may cause motor reversing, i.e. it is the load that determines the direction of rotation. 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 Ir) 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.



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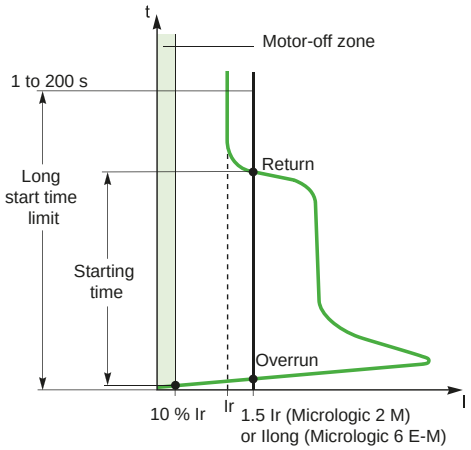
Unbalance of phase currents and voltages.



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Motor starting and long starts.

ComPact NSX measurement
MicroLogic 5 / 6 / 7 E electronic trip units

ComPact NSX with its embedded current sensors handled by a microprocessor that operates independently of protection functions and MicroLogic 5 / 6 / 7 E is a PMD-DD Power Meter Device complying with IEC/EN 61557-12, Class 0.5 for voltage, Class 1 for current and Class 2 for active power and energy measurements.

Measures and electrical parameters calculated by the MicroLogic 5 / 6 / 7 E trip units

Based on the measure of line currents, neutral current, phase to phase voltages and phase to neutral voltages, the MicroLogic 5 / 6 / 7 E trip units calculate and display all the parameters required to monitor any AC electrical power supply including power quality, power management and energy efficiency:

- RMS values of currents and voltages,
- Active, reactive and apparent powers, active, reactive and apparent energies,
- Power factor,
- Frequency,
- Unbalance on voltage and THD of voltages and currents,
- Demand and maximum demand values.

The maximum and minimum values are stored in the MicroLogic 5 / 6 / 7 E trip units non volatile memory. They are resetable from the embedded display, FDM display or a PC running EcoStruxure Power Commission software.

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.

Electrical values can be displayed on the embedded HMI, a PC running EcoStruxure Power Commission software and on the FDM display unit.
They are refreshed every second.
The display on the embedded HMI is accessed by means of a contextual menu allowing to navigate easily through the electrical values. Alternatively a Quickview option allows to display the main basic values.

Optional external 24 Vdc supply module is required to process and display the measurements including energy counters for currents below 20 % of the rated current.

The phase to neutral voltages are available for 4 poles circuit breakers and 3 poles circuit breakers as well providing the connection of the MicroLogic 5 / 6 E to the neutral (ENVT). To guarantee the accuracy for the active power measurement this connection is mandatory.
Neutral-Phase measurement is only possible on the 4-pole MicroLogic Vigi 7 E (not on the 3-pole).
No External Neutral connection on the MicroLogic Vigi 7 E.
Please refer to the user manual for more details concerning the wiring and the configuration of MicroLogic 5 / 6 / 7 E.

B

MicroLogic 5 / 6 / 7 E for energy management functions

Active Power and Energy metering in ComPact NSX with MicroLogic 5 / 6 / 7 E has been designed and tested to provide accuracy: **Class 2 according to IEC/EN 61557-12**. This standard specifies requirements for combined performance of measuring and monitoring devices that measure and monitor the electrical parameters within electrical distribution systems. It covers both devices with external sensors such as current and/or voltage transformers like stand alone power meter (PMD-S) and devices with embedded sensors (PMD-D) like circuit breakers.

In addition a list of available performance class for all relevant measurement functions is specified in IEC/EN 61557-12, in opposition to most other standards such as IEC 62053-2x series that are dealing only with active and reactive energy.

ComPact NSX equipped with MicroLogic 5 / 6 / 7 E and its own embedded sensors is a Class 2 full chain measurement PMD-DD device for active power and energy metering according to IEC/EN 61557-12.

PMD-DD offer the benefit of avoiding uncertainty and variation due to external sensors and wiring.

IEC/EN 61557-12 standard defines three levels of uncertainty (intrinsic uncertainty, operating uncertainty, overall system uncertainty) that need to be checked to ensure accuracy class.
The uncertainty is the estimated amount or percentage by which a measured value may differ from the true value. According to IEC/EN 61557-12, the total uncertainty of a measurement, in general, depends on the instrument, the environment, and other elements to be considered.

Note: Requirements for Class 2 active power and energy in IEC/EN 61557-12 regarding limits of uncertainty due to variation of the current for different power factor, and limits of uncertainty due to influence quantities such as temperature are equivalent to IEC 62053-2x standards.

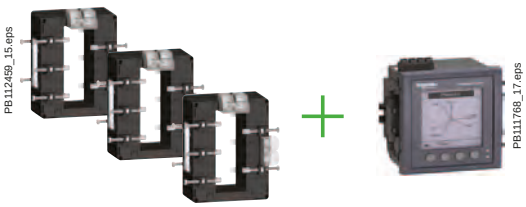
PMD-D - Embedded sensors

Intrinsic uncertainty	Operating uncertainty + measurement uncertainty according to IEC 61000-4-30	Overall system uncertainty : No additional error for PMD-D
Uncertainty under reference conditions	+ Variations due to influence quantities	0

PMD-S - External sensors

Intrinsic uncertainty	Operating uncertainty + measurement uncertainty according to IEC 61000-4-30	Overall system uncertainty
Uncertainty under reference conditions	+ Variations due to influence quantities	+ Uncertainty and variations due to external sensors accuracy and to resistance of wires

PMD-D - Embedded sensors



PMD-S - External sensors

ComPact NSX measurement
MicroLogic 5 / 6 / 7 E electronic trip units

Compliance with ISO 50001: Reliability and repeatability over time of energy measurement

Scope and main requirements of ISO 50001:

ISO 50001 specifies requirements for systems and organization dedicated to energy management.
This international standard defines rules and gives recommendations to achieve continual improvement of energy performance, including energy efficiency, energy use and consumption, measurements, documentation and reporting. Energy performance shall be monitored and significant deviations shall be investigated. It implies that the accuracy of the instruments used for this purpose remains stable throughout their entire operating life which ensures the repeatability of the measurements (ISO 50001, clause 4.6 and 4.6.1 Checking, monitoring, measurement and analysis).

In ComPact NSX with MicroLogic 5 / 6 / 7 E, the metering and protection functions are designed to perform accurate and repeatable measurements during MicroLogic E life time, provided it's used in the specified environmental conditions as defined in ComPact NSX User Guide. Current sensors and MicroLogic E are calibrated during circuit breaker manufacturing and are not supposed to be re-calibrated during this life time. In general, electronic instrument measuring electric parameters don't request any specific maintenance provided they are working within environmental specifications. Accuracy can be reduced in case of operation under exceptional conditions, lightning strikes, high temperature, high degree of humidity, this is why a periodic verification is recommended (please refer to the annex I of the AFNOR Document FD X30-147: Metrological maintenance recommendations, applicable to electrical and fluidic measurements).

IEC 60364-8-1 Clause 8.3.1.1 Requirement on accuracy and measuring range

Scope and main requirements of IEC 60364-8-1:

IEC 60364-8-1 provides requirements and recommendations for the design, erection and verification of low voltage electrical installations including local production and storage of energy for optimizing the overall efficient use of electricity. It introduces recommendations for the design of an electrical installation within the framework of an energy efficiency management approach in order to get low electrical energy consumption and acceptable energy availability. It also specifies the accuracies of the measuring instruments involved in the functions of energy management such as:

- Energy usage analysis and optimization
- Contract optimization
- Cost allocation
- Efficiency assessment
- Energy usage trends assessment.

ComPact NSX with MicroLogic 5 / 6 / 7 E complies with the requirements of IEC 60364-8-1 dedicated to the optimization of energy efficiency. It provides a range of measurements with accuracies required for complex energy efficiency approaches.

The table below from IEC 60364-8-1:2014 Clause 8.3.1.1 "Requirement on accuracy and measuring range" specifies the accuracies required for the measurements dedicated to cost management

	Incomer	ComPact NSX main applications		Final distribution board
		Main LV switchboard	Intermediate distribution boards	
Measurement objectives for cost management	■ Revenue metering ■ Bill checking ■ Energy usage analysis and optimization ■ Contract optimization ■ Regulatory compliance	■ Cost allocation ■ Energy usage analysis and optimization ■ Efficiency assessment ■ Contract optimization ■ Regulatory compliance	■ Cost allocation ■ Energy usage analysis and optimization ■ Efficiency assessment ■ Contract optimization ■ Regulatory compliance	■ Energy usage analysis and optimization ■ Energy usage trends assessment
Overall system accuracy of active energy measurement	In general, excellent accuracy, e.g. class 0.2 to class 1	In general, good accuracy, e.g. class 0.5 to class 2	In general, medium accuracy, e.g. class 1 to class 3	In general, reliable indication should be more important than accuracy

ComPact NSX measurement
MicroLogic 5 / 6 / 7 E electronic trip units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PB119233.eps


PB111601-21_r.eps

MicroLogic 5 / 6 / 7 integrated Power Meter functions			Type		Display	
			A	E	MicroLogic LCD	FDM display
Display of protection settings						
Pick-ups (A) and delays	Settings MicroLogic 5 / 6	Ir, tr, Isd, tsd, Ii, Ig, tg	●	●	●	-
	Settings MicroLogic Vigi 7 E [4]	Ir, tr, Isd, tsd, Ii,IΔn, Δt, IΔn % pre-alarm		●	●	
Measurements						
Instantaneous rms measurements						
Currents (A)	Phases and neutral	I1, I2, I3, IN	●	●	●	●
	Average of phases	Iavg = (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)	●	●	●	●
	Earth leakage (MicroLogic Vigi 7 E)	% IΔn (pick-up setting)	-	●		
	Highest Earth Leakage current	IΔn max	-	●	-	-
	Current unbalance between phases	% Iavg	-	●	-	●
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	-	●	●	● [3]
Frequency (Hz)	Power system	f	-	●	-	●
Power	Active (kW)	P, total / per phase	- / -	● / ●	● / -	● / ●
	Reactive (kVAR)	Q, total / per phase	- / -	● / ●	● / -	● / ●
	Apparent (kVA)	S, total / per phase	- / -	● / ●	● / -	● / ●
	Power factor and cos φ (fundamental)	PF and cos φ, total and per phase	-	●	-	●
Maximeters / minimeters						
	Associated with instantaneous rms measurements	Reset via MicroLogic or FDM display unit	●	●	-	●
Energy metering						
Energy	Active (kWh), reactive (kvarh), apparent (kVAh)	Total since last reset	-	●	●	●
		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 (kvarh), apparent (kVA)	Present value on the selected window	-	●	-	●
		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 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	-	●	-	●

[1] Absolute mode: E absolute = E out + E in; Signed mode: E signed = E out - E in.
[2] Available via the communication system only.
[3] FDM121 only.
[4] Two last IΔN and Δt values are available as well as date of setting.

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 %.

ComPact NSX diagnostics & maintenance
MicroLogic 5 / 6 / 7 A or E electonic trip units


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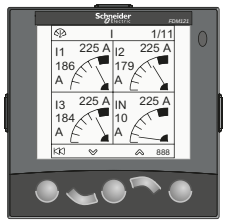
MicroLogic built-in LCD display.

DB432516.eps

FDM121 display: navigation.



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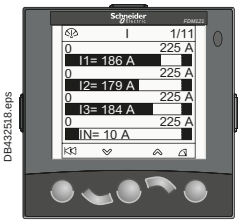
FDM121 display: current



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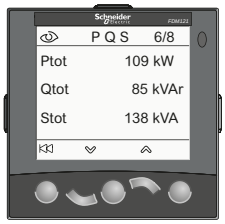
FDM121 display: voltage



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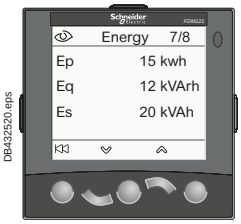
FDM121 display: power.



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FDM121 display: consumption

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

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)
- □ MicroLogic Vigi 7 E: overload (Ir) and earth leakage fault (IΔn)
- □ 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 FDM 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 FDM 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, IΔn: 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 or 7 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.

ComPact NSX diagnostics & maintenance

MicroLogic 5 / 6 / 7 A or E electronic trip units

MicroLogic 5 / 6 / 7 operating assistance functions			Type		Display	
			A	E	MicroLogic LCD	FDM display
Operating assistance						
Personalised alarms						
Settings	Up to 10 alarms assigned to all A and E measurements [2]		●	●	-	-
	Phase lead/lag, four quadrants, phase sequence, display priority selection [2]		-	●	-	-
Display	Alarms / tripping / test (Earth Leakage)		●	●	- / ● / ●	● / ● / ●
Remote indications	Activation of two dedicated contacts on SDx module		●	●	-	-
Time-stamped histories (ms)						
Trips (last 17)	Cause of tripping	Ir, Isd, Ii (MicroLogic 5, 6)	●	●	-	●
		Ig (MicroLogic 6)	●	●	-	●
		Ir, Isd, Ii, IΔn (MicroLogic Vigi 7 E)	-	●	-	●
		Phase fault	●	●	-	●
		Interrupted current value	●	●	-	●
Alarms (last 10)			●	●	-	●
Test Earth Leakage (last 10)	MicroLogic Vigi 7 E		-	●	-	●
Operating events (last 10)	Event types	Modification of protection setting by dial	-	●	-	●
		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 event tables						
Protection settings	Setting modified (value displayed)	Ir, tr, Isd, tsd, Ii, Ig, tg [2]	●	●	-	-
		Ir, tr, Isd, tsd, I, IΔn, Δt (MicroLogic Vigi 7 E) [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 indicators						
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	●	●	-	●

[1] The BSCM module is required for these functions.
[2] Available via the communication system only.

Additional technical characteristics

Contact wear

Each time ComPact NSX opens, the MicroLogic 5 / 6 / 7 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 / 7 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 In):

- 0 to 49 % In
- 50 to 79 % In
- 80 to 89 % In
- ≥ 90 % In. This information can be used to optimise use of the protected equipment or to plan ahead for extensions.

ComPact NSX diagnostics & maintenance
MicroLogic 5 / 6 / 7 A or E electronic trip units

Electrical power supply availability and reliability are the main critical issues affecting profitability and competitiveness. Outage management focuses on preventing, detecting, locating and clearing of faults.

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MicroLogic built-in LCD display.

The MicroLogic 5 / 6 / 7 A or E control units perform in real time a high level of diagnostics on ComPact NSX circuit breakers. They generate and store appropriate warnings, alarms and messages to help the users with maintenance and power restoration.
This function complies with the following end user values:
- Prevent interruption of the power supply, to ensure continuity of operation, preserve the asset from any damage and supports the safety of persons,
- Reduce downtime resulting from an unexpected failure in the electrical distribution system, to be able to restart as quickly as possible after a trip,
- To keep the devices in good condition of operation.

Prevention of power supply interruptions

Prevention of power supply interruptions is achieved by generation of warnings to the users, preventive operations of maintenance, and anticipation of device replacement.

By means of dedicated features, MicroLogic 5 / 6 / 7 A or E monitors the health of the circuit breaker and generates appropriate information to help the users in scheduling periodic checks and, if needed, anticipated replacement of devices.

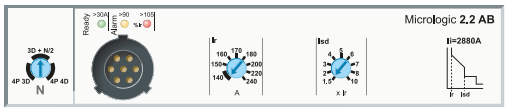
ComPact NSX special applications
Protection of public distribution systems with MicroLogic 2-AB

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 NSX circuit breakers equipped with MicroLogic AB trip units are installed as incoming devices for consumer installations connected to the public LV distribution system.
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 selectivity 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 selectivity.

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.



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ComPact NSX with MicroLogic 2 AB.

B

ComPact NSX special applications
Protection of public distribution systems with MicroLogic 2-AB

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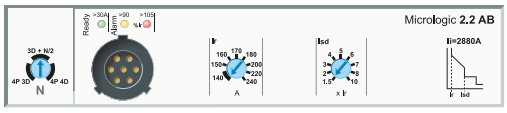

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Protection

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

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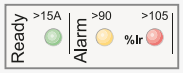

- Green “Ready” LED: flashes slowly when the circuit breaker is ready to trip in the event of a fault.
- Orange overload pre-alarm LED: steady on when I > 90 % Ir.
- Red overload LED: steady on when I > 105 % Ir.

Remote indications
An SDx relay module installed inside the circuit breaker can be used to remote the 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 C-31.

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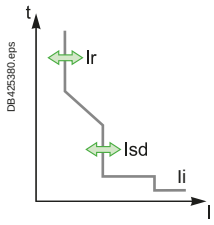
SDx remote indication relay module with its terminal block.

ComPact NSX special applications

Protection of public distribution systems with MicroLogic 2-AB

MicroLogic 2.2 / 2.3 AB



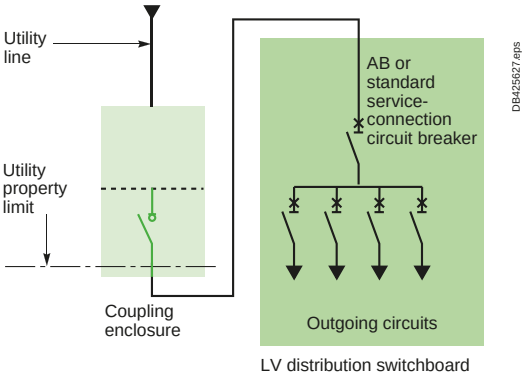
Ratings (A)	In at 40 °C [1]		100	160	240	400
Circuit breaker	ComPact NSX100		◉	-	-	-
	ComPact NSX160		◉	◉	-	-
	ComPact NSX250		◉	◉	◉	-
	ComPact NSX400		-	-	-	◉
	ComPact NSX630		-	-	-	◉
L Long-time protection						
Pick-up (A) tripping between 1.05 and 1.20 Ir	**Ir**		value depending on trip unit rating (In) and setting on dial			
	In = 100 A	Ir =	40	40	50	60	70	80	90	100
	In = 160 A	Ir =	90	100	110	120	130	140	150	160
	In = 240 A	Ir =	140	150	160	170	180	200	220	240
	In = 400 A	Ir =	260	280	300	320	340	360	380	400
Time delay (s)	**tr**		non-adjustable							
		1.5 Ir	15							
		6 Ir	0.5							
		7.2 Ir	0.35							
Thermal memory			20 minutes before and after tripping							
S_0 Short-time protection with fixed time delay										
Pick-up (A) accuracy ±10 %	**Isd** = Ir x ...		1.5	2	3	4	5	6	7	8	10
Time delay (ms)	**tsd**		non-adjustable: 20							
	Non-tripping time		20							
	Maximum break time		80							
I Non-adjustable instantaneous protection										
Pick-up (A) accuracy ±15 %	**Ii** non-adjustable		1500		1600		2880		4800	
Time delay (ms)	Non-tripping time		10							
	Maximum break time		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.

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.



Consumer connection diagram.

ComPact NSX special applications

ComPact NSX MicroLogic Vigi 4-AB trip unit with embedded earth leakage protection

The ComPact NSX range for public distribution is now complemented with a new type of MicroLogic AB trip unit including both circuit protection and earth leakage protection. It means that the earth leakage protection, previously located within the Vigi Add-on, will be embedded within the existing size of the MicroLogic AB trip unit.

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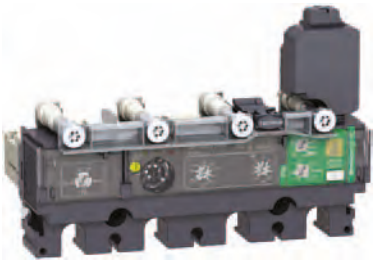


MicroLogic Vigi 4.2-AB trip unit.

MicroLogic Vigi 4-AB

ComPact ELCB [1] equipped with that "new" earth leakage trip unit MicroLogic AB are installed as an incoming device for installation connected with the public LV distribution system. With respect to the utility requirement, it ensures the same functions as the standard circuit breaker: limitation of consumption, selectivity upstream and downstream, combination with ComPact INV to ensure the visible break or positive contact indication.

Short circuit and overload protections

Settings are made using the rotary dial with fine adjustment capabilities and lead-seal fixture.

Overload: long-time protection (Ir)

Inverse time protection against overload with an adjustable current pick-up Ir set using a dial and a very short non adjustable time delay tr (15 seconds at 1.5 Ir).

Short-circuit: short-time protection with fixed time delay (Isd)

That protection is set 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 circuit: non-adjustable instantaneous protection (with a fix pick-up)

Neutral protection

Available on four-pole ComPact NSX MicroLogic Vigi 4-AB only, the neutral protection may be set using the dedicated coding wheel to meet the following configurations: 4P 3D, 4P 3D + N/2 or 4P 4D. (same as for the MicroLogic 2-AB)

Earth leakage protections

Adjustable leakage threshold (IΔn) and adjustable time threshold (Δt) by using the two dials on the green area of the trip unit.
The ComPact NSX MicroLogic Vigi 4-AB, embedding a MicroLogic AB can only be "Trip" type, the "Alarm" version (as for MicroLogic Vigi 4 and 7 E) doesn't exist.

Power supply

The trip unit is self supplied, and so does not need any external source. It works even when fed by 2 phases only!

Sensitivity IΔn (A)

- Type A: 30mA - 100mA - 300mA - 500mA - 1A – 3A - 5A (for the ratings 100 to 240A)
- Type A: 300mA - 500mA - 1A – 3A - 5A – 10A (for the rating 400A)

Caution: "OFF" setting of IΔn is possible, it cancels the earth leakage protection, in that case, the ComPact NSX MicroLogic Vigi 4-AB behaves as an standard circuit breaker. "OFF" position is located on the highest side of the coding wheel.

Intentional delay Δt (s)

Case IΔn = 30mA: 0 sec (whatever the setting)
Case IΔn > 30mA: 0 – 60ms – 150ms – 500ms – 1sec (by setting)

Operated voltage

200 to 440 VAC (only) – 50/60 Hz

Operating safety

The earth leakage protection is a user safety device. It must be regularly tested using the test button (T) that simulates a real current leakage within the toroid.
When IΔn is set on the OFF position, press the T will cancel any test.
As for standard circuit breaker, the circuit breaker with MicroLogic Vigi 4-AB can be reset after any fault by operating an OFF/ON procedure.

ComPact NSX special applications

ComPact NSX MicroLogic Vigi 4-AB trip unit with embedded earth leakage protection

Indications

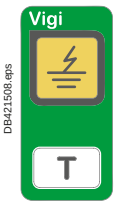
Front indications

- Green "Ready" LED: flashes slowly when the circuit breaker is ready to trip in case of a fault.
- Orange overload pre-alarm LED: steady ON when I > 90% Ir.
- Red overload LED: steady ON when I > 105% Ir.
- Yellow Screen: indicates an earth leakage fault (reset when the device is operated OFF/ON).

Alarming and fault differentiation

- An overload trip signal can be remotely available by installing an SDx relay module inside the circuit breaker.
- An earth leakage pre-alarm can be remotely available by installing an SDx module, only on the ComPact NSX MicroLogic Vigi 4-AB.

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 reset when the breaker is operated.



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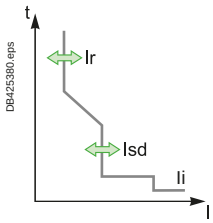
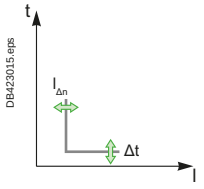
MicroLogic Vigi 4-AB (earth leakage "Trip" version only)



Ratings (A)	In at 40 °C [1]		100	160	240	400					
Circuit breaker	ComPact NSX100		●								
	ComPact NSX160		●	●							
	ComPact NSX250		●	●	●						
	ComPact NSX400					●					
	ComPact NSX630					●					
L Long-time protection											
Pick-up (A)	Ir		value depending on the rating (In) and the dial setting (9 positions)								
tripping between 1.05 and 1.20 Ir	In = 100 A	Io =	40	40	40	50	60	70	80	90	100
	In = 160 A	Io =	90	90	100	110	120	130	140	150	160
	In = 240 A	Io =	140	140	150	160	170	180	200	220	240
	In = 400 A	Io =	260	260	280	300	320	340	360	380	400
Time delay (s) accuracy 0 to -20%	**tr**		non-adjustable								
	at	1.5 x Ir	tr = 15 s								
	at	6 x Ir	tr = 0.5 s								
	at	7.2 x Ir	tr = 0.35 s								
Thermal memory			20 minutes before and after tripping								
S_0 Short-time protection with fixed time delay											
Pick-up (A) accuracy ±10 %	**Isd** = Ir x ...		1.5	2	3	4	5	6	7	8	10
Time delay (ms)	**tsd**		non-adjustable								
	Non-tripping time		20								
	Maximum break time		80								
I Instantaneous protection											
Pick-up (A) accuracy ±15 %	Ii non-adjustable		1500	1600	2880	4800					
	Non-tripping time		10 ms								
	Maximum break time		50 ms								
R Earth leakage protection											
Sensitivity (A)	Type A, adjustable (9 positions)										
	In = 100 A	IΔn =	0.03	0.03	0.1	0.3	0.5	1	3	5	OFF
	In = 160 A	IΔn =	0.03	0.03	0.1	0.3	0.5	1	3	5	OFF
	In = 240 A	IΔn =	0.03	0.03	0.1	0.3	0.5	1	3	5	OFF
	In = 400 A	IΔn =	0.3	0.3	0.5	1	3	5	10	10	OFF
Time delay Δt (ms)	Adjustable	Δt =	0	60 [2]	150 [2]	500 [2]	1000 [2]				
	Maximum break time (ms)		<40	<140	<300	<800	<1500				



[1] For the use in high temperature environment, take into account the thermal limitation of the breaker.
[2] The time delay (Δt) is mandatory and designed "Δt = 0" when the IΔn dial is set on 30mA (0.03). The time delay has no effect when the dial IΔn is set to the "OFF" position.

ComPact NSX 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 B-6).

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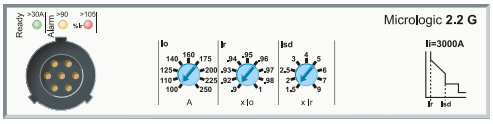

Circuit breakers equipped with MicroLogic G trip units protect systems supplied by generators (lower short-circuit currents than with transformers) and distribution systems with long cable lengths (fault currents limited by the resistance of the cable).

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 Ir).

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 (Ii)
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

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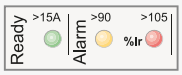

- Green “Ready” LED: flashes slowly when the circuit breaker is ready to trip in the event of a fault.
- Orange overload pre-alarm LED: steady on when I > 90 % Ir.
- Red overload LED: steady on when I > 105 % Ir.

Remote indications
An SDx relay module installed inside the circuit breaker can be used to remote the 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.

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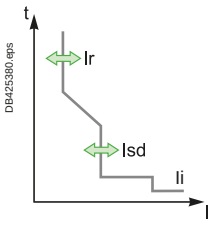
SDx remote indication relay module with its terminal block.

ComPact NSX special applications
Generator protection with MicroLogic 2.2 G

MicroLogic 2.2 G



Ratings (A)	In at 40 °C [1]		40	100	160	250
Circuit breaker	ComPact NSX100		◉	◉	-	-
	ComPact NSX160		◉	◉	◉	-
	ComPact NSX250		◉	◉	◉	◉
L Long-time protection						
Pick-up (A) tripping between 1.05 and 1.20 Ir		**Io**	value depending on trip unit rating (In) and setting on dial			
	In = 40 A	Io =	18	18	20	23	25	28	32	36	40
	In = 100 A	Io =	40	45	50	55	63	70	80	90	100
	In = 160 A	Io =	63	70	80	90	100	110	125	150	160
	In = 250 A (NSX250)	Io =	100	110	125	140	150	176	200	225	250
		Ir = Io x ...	9 fine-adjustment settings from 0.9 to 1 for each Io value			
Time delay (s) accuracy 0 to -20 %		**tr**	non-adjustable			
		1.5 x Ir	15			
		6 x Ir	0.5			
		7.2 x Ir	0.35			
Thermal memory			20 minutes before and after tripping			
S_0 Short-time protection with fixed time delay						
Pick-up (A) accuracy ±10 %	**Isd** = Ir x ...		1.5	2	2.5	3	4	5	6	7	8	9
Time delay (ms)		**tsd**	non-adjustable			
		Non-tripping time	140			
		Maximum break time	200			
I Non-adjustable instantaneous protection						
Pick-up (A) accuracy ±15 %	Ii non-adjustable		600	1500	2400	3000
		Non-tripping time	15 ms			
		Maximum break time	50 ms			

[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.

B

ComPact NSX 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.

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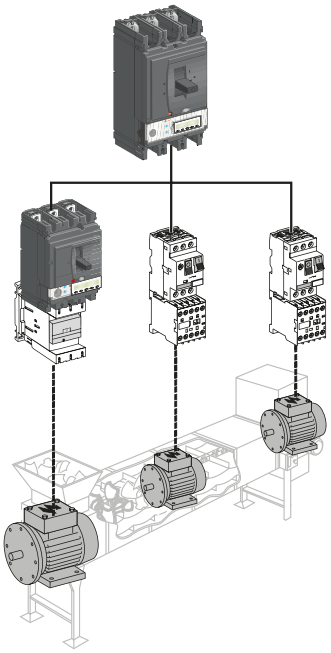

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Industrial control panels

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.).

B

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	TMD, MicroLogic 2, 5 and 6	General Use Motor Disconnecting Means
	NA, MA, MicroLogic 1.3 M, 2.2 M, 2.3 M, MicroLogic 6.2 E-M and 6.3 E-M	Manual Motor Controller Across the Line Starter Motor Disconnecting Means

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

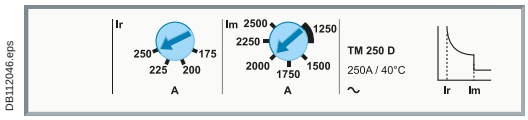
V AC ratings		115	230	460	575
TMD MicroLogic 2, 5 and 6	NA, MA MicroLogic 1.3 M, 2.2 M, 2.3 M MicroLogic 6.2 E-M and 6.3 E-M				
25	25	3	7.5	15	20
50	50	7.5	15	30	40
100	100	15	30	75	100
160	150	25	50	100	150
250	220	40	75	150	200
400	320	-	125	250	300
550	500	-	150	350	500

The deratings indicated on pages E-14 to E-17 apply to TMD, MicroLogic 2, 5 and 6 trip units, rated at 40 °C.

ComPact NSX special applications

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.



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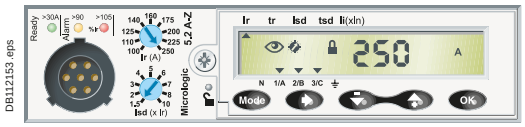

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16 Hz 2/3 networks

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 voltage		TMD and MicroLogic 5 A-Z trip units			
	Performance	**B**	**F**	**N**	**H**
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 B-6). 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 at 40 °C		**16**	**25**	**32**	**40**	**50**	**63**	**80**	**100**	**125**	**160**	**200 250**
Pick-up (A) **Im** accur. ±20%		Fixed										Adjustable
NSX100	50Hz	190	300	400	500	500	500	640	800			
	16Hz 2/3	**170**	**270**	**360**	**450**	**450**	**450**	**580**	**720**			
NSX160/250	50Hz	190	300	400	500	500	500	640	800	1250	1250	5 to 10 In
	16 Hz 2/3	**170**	**270**	**360**	**450**	**450**	**450**	**580**	**720**	**1100**	**1100**	**4.5 to 9 In**

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 B-12). They also offer a current-measurement function for this specific frequency.

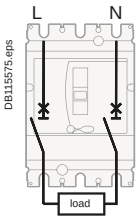
Trip-unit selection

Rating	**16**	**63**	**100**	**160**	**250**	**400**	**630**
ComPact							
NSX100	TM-D						
NSX160		TM-D					
NSX250			TM-D				
NSX100 to 250			MicroLogic 5.2 A -Z				
NSX400/630					MicroLogic 5.3 A-Z		

Wiring for NSX100 to 630 A

Phase and isolated neutral interrupted- 250 / 500 V

B and F (3P 2D version)



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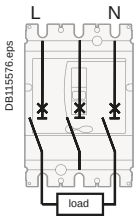
N and H (3P 3D version)



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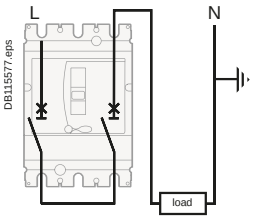
2 poles in series - Earthed neutral - 250 / 500 V

B and F (3P 2D version)



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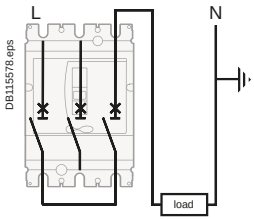
N and H (3P 3D version)



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Remark. For an operating voltage > 250 V, the installation must be designed to eliminate all risk of double earth faults.

ComPact NSXm special applications
Protection of 400 Hz systems

ComPact NSXm circuit breakers may be used on 400 Hz systems.

Breaking capacity in 400 Hz, 440 V Systems

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

Circuit breaker	Max. Breaking Capacity at 400 Hz
NSXm	10 kA

Thermal-Magnetic Trip Units

Thermal-Magnetic trip units require the current rating (In) to be derated and the magnetic trip setting (Im) to be increased.

Current Rating (In) and Magnetic Trip Setting (Im) Rerating

Circuit breaker	Maximum setting Coefficient	Max Ir setting at 400 Hz	Magnetic Im coefficient at 400 Hz
NSXm	0.9	144	1.6

Shunt Trip (MX) or Undervoltage Trip (MN) Voltage Release at 400 Hz and 440V

Undervoltage releases (MN) rated 24 V AC/DC, 48 V AC/DC, or 110/130 V AC/DC are 400 Hz compliant with their nominal voltages. For voltages greater than 110/130 V AC/DC, please contact Schneider Electric for additional information. Shunt Trips (MX), please contact Schneider Electric.

ComPact NSXm TM-D.

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B

ComPact NSX special applications
Protection of 400 Hz systems

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

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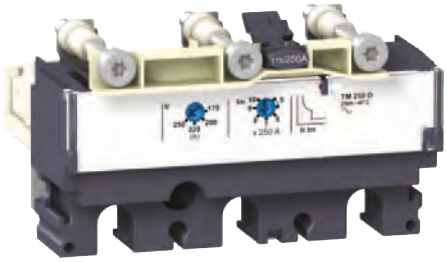

MicroLogic TM-D trip unit.

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 range is 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

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 breaker	Trip unit	In (A) 50Hz	Thermal at 40°C		Im (A) 50Hz	Magnetic	
			K1	400 Hz		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	1040
	TM100D	100	0.9	90	800	1.6	1280
NSX160	TM80D	80	0.9	72	650	1.6	1040
	TM100D	100	0.9	90	800	1.6	1280
	TM125D	125	0.9	112.5	1250	1.6	2000
	TM160D	160	0.9	144	1250	1.6	2000
NSX250	TM100D	100	0.9	90	800	1.6	1280
	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.

Protection

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 B-10 or page B-12)
- 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	200
NSX400	0.8	320
NSX630	0.63	400

Example
An NSX250N, equipped with a MicroLogic 2.2, Ir = 250 A at 50 Hz, must be limited to use at Ir = 250 x 0.9 = 225 A.
Its short-time pick-up with fixed time delay is adjustable from 1.5 to 10 Ir (337.5 to 2250 A).
The instantaneous pick-up remains at 3000 A.

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MicroLogic 5 E trip unit.

OF auxiliary contacts in 400 Hz networks

Electrical characteristics of auxiliary contacts

Contacts		Standard		Low level	
Utilisation cat. (IEC 60947-5-1)		AC12	AC15	AC12	AC15
Operational current (A)	24 V	6	6	5	3
	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


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OF auxiliary contact.


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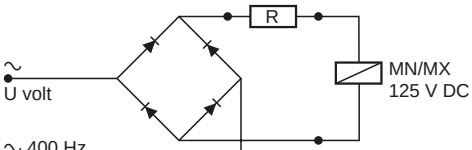
MX or MN voltage release.

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 General Instrument W06 or Semikron SKB at 1.2/1.3	4.2 kΩ-5 W
380/420 V	Semikron SKB at 1.2/1.3	10.7 kΩ-10 W



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Wiring diagram.

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 C-31).


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SDx remote indication relay module with its terminal block.

Customize your circuit breaker with accessories

ComPact NSXm accessories and auxiliaries

ComPact NSX accessories and auxiliaries

C

Other chapters

ComPact NSXm accessories and auxiliaries

Overview

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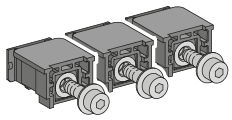
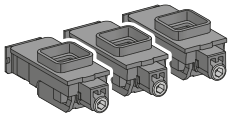
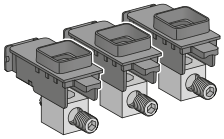
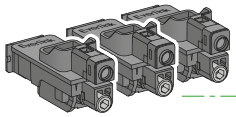
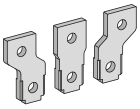

Compression lug / busbar connector

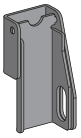

EverLink™ without control wire terminal connector

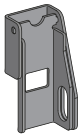

Torque limiting breakaway bit

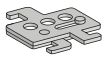

Al mechanical lug

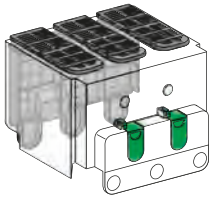

EverLink™ with control wire terminal connector

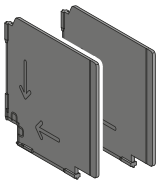

Terminal spreaders

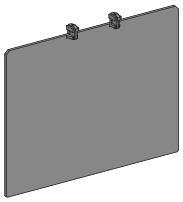

Fixed toggle padlocking device (OFF only)


Fixed toggle padlocking device (OFF and ON)

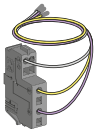

Removable toggle padlocking device (OFF only)

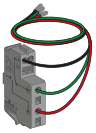

Long terminal shield

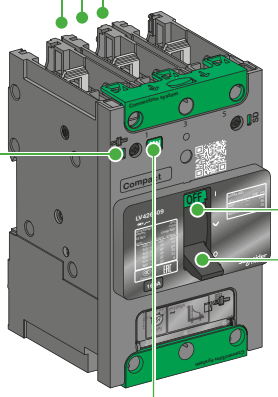

Interphase barriers

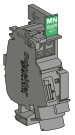

Rear insulation screen

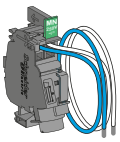

OF or SD auxiliary contact standard

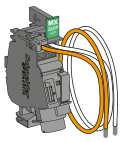

OF auxiliary contact pre-wired

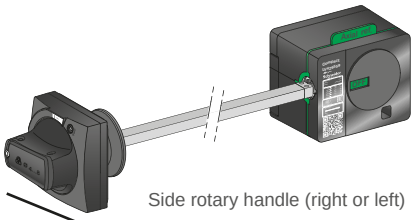

SD auxiliary contact pre-wired

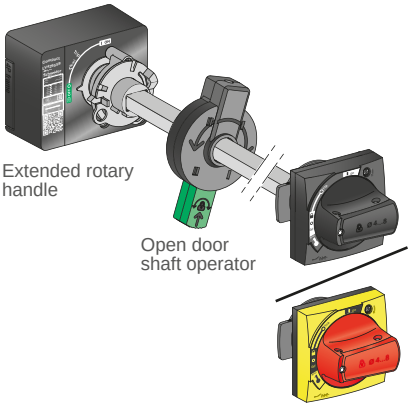



MN or MX voltage releases standard

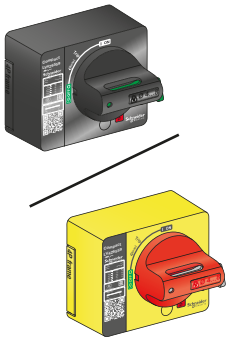

MN voltage releases pre-wired


MX voltage releases pre-wired


Side rotary handle (right or left)


Extended rotary handle

Open door shaft operator


Direct mounted rotary handle

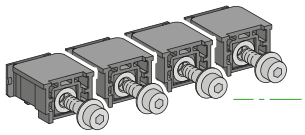
C

Customize your circuit breaker with accessories

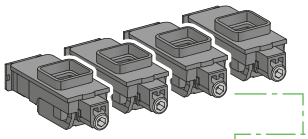
ComPact NSXm accessories and auxiliaries

Overview

DB430557.eps

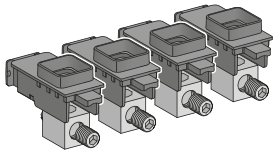


Compression lug / busbar connector

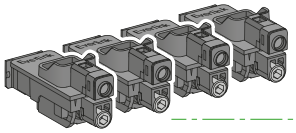


EverLink™ without control wire terminal connector

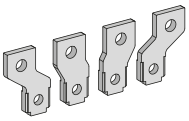
Torque limiting breakaway bit



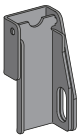
Al mechanical lug



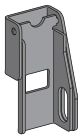
EverLink™ with control wire terminal connector



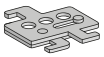
Terminal spreaders



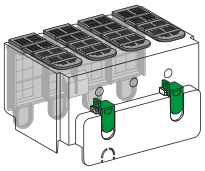
Fixed toggle padlocking device (OFF only)



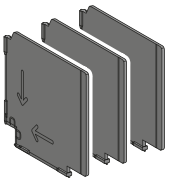
Fixed toggle padlocking device (OFF and ON)



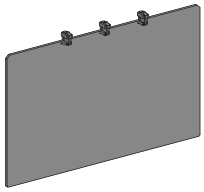
Removable toggle padlocking device (OFF only)



Long terminal shield

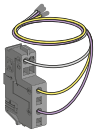


Interphase barriers

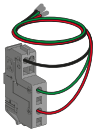


Rear insulation screen

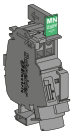
OF or SD auxiliary contact standard



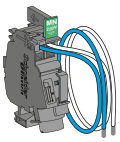
OF auxiliary contact pre-wired



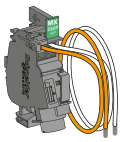
SD auxiliary contact pre-wired



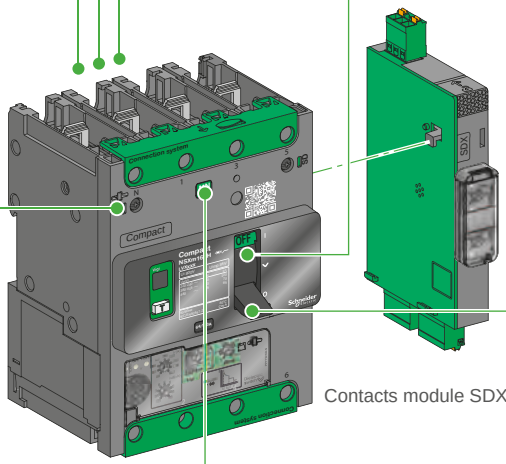
MN or MX voltage releases standard



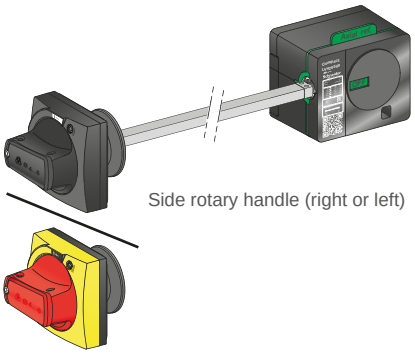
MN voltage releases pre-wired



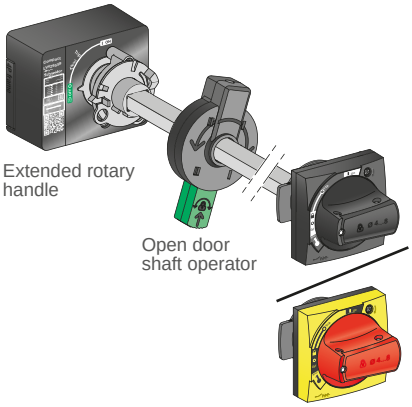
MX voltage releases pre-wired



Contacts module SDX

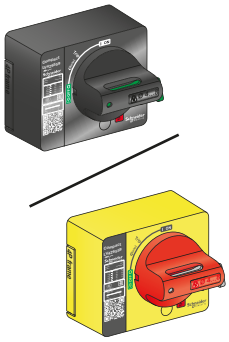


Side rotary handle (right or left)



Extended rotary handle

Open door shaft operator

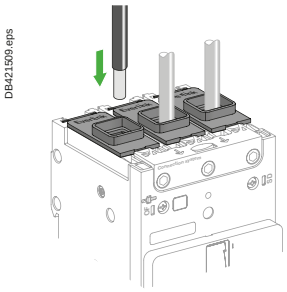


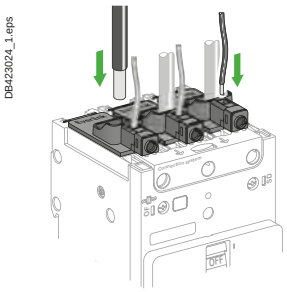
Direct mounted rotary handle

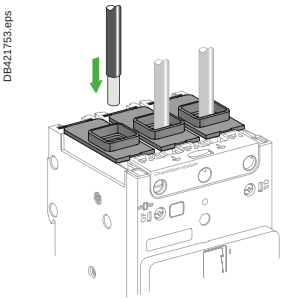
C

ComPact NSXm accessories and auxiliaries
Power connection of fixed devices

Fixed circuit breakers are designed for standard front connection using cables. Bars or cables with lugs connectors are also available.







Power connection

Circuit breakers are delivered with EverLink™ lug connectors for bare cables. They may be delivered with connectors for bars or cables with compression lugs. The connectors can be removed for the installation of one of the 4 kinds of connectors available (EverLink™ lug with control wire terminal, EverLink™ lug, compression lugs / busbar, aluminium mechanical lug).
For connection of large cables, a number of solutions with spreaders may be used for both cables with lugs or bars.

Bare cables

Standard terminal: EverLink™ lug connector
This type of connection uses the EverLink™ system with creep [1] compensation (Schneider Electric patent).
This technique makes it possible to achieve accurate and durable tightening torque, in order to avoid cable creep.
When ordered as spare part, EverLink™ connectors have control wire terminal in order to make some measurment connection (limited to 10 A).

EverLink™ lugs for use with Al or Cu wire		
Wire range		
Solid/stranded	Flexible	Torque
Power connection 15-160 A (Cu), 15-100 A (Al)		
2.5 - 10 mm²	2.5 - 10 mm²	5 N.m ±0.5
16 - 95 mm²	16 - 70 mm²	9 N.m ±0.9
Control wire terminal up to 10 A (Cu)		
1.5 - 6 mm²	0.5 - 6 mm²	1 N.m ±0.1

Aluminium mechanical connectors up to 125 A
The standard EverLink lugs can be removed for the installation of mechanical lugs. Lugs suitable for copper and aluminum conductors are made of tin-plated aluminum. The mechanical lugs are fastened to the terminals with lug mounting screws, inserted from the bottom of the circuit breaker. The lug cover is held in place with built-in snap features. They are sold as field installable kits.

Aluminium mechanical connectors up to 125 A		
Power connection		
Ampere rating	Wire range	
	Solid/stranded	Torque
15-125 A (Cu)	2.5 - 6 mm²	4 N.m ±0.4
15-125 A (Al)	10 - 70 mm²	5.6 N.m ±0.6

[1] Creep: normal crushing phenomenon of conductors, that is accentuated over time.

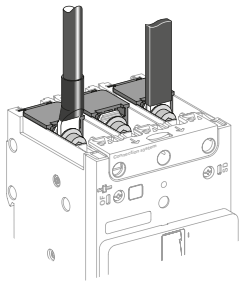
Bars or cables with lugs

Compression lug / busbar connectors

The ComPact NSXm circuit breakers may be equipped with captive nuts and M6 screws connectors. These are readily field-installable, simply by removing the EverLink lug and replacing with the appropriate terminal nut.
They are also available factory installed. These terminals may be used for:

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

DB421507.eps



Compression lug / busbar connectors, 15-160 A	
Power connection	Torque
⩽ 10 mm²	5 N.m ±0.5
⩾ 16 mm²	9 N.m ±0.9

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

Crimp lugs large size cables

There are two models, for aluminium and for 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.

Crimp lugs for use with ComPact NSXm					
Copper cables	size	rigid	70 mm²	95 mm²	120 mm²
		flexible	50 mm²	70 mm²	95 mm²
	crimping		hexagonal barrels or punching		
Aluminium cables	size	rigid		95 mm²	120 mm²
	crimping		hexagonal barrels		

Bars

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

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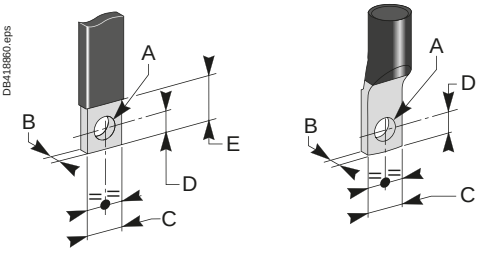
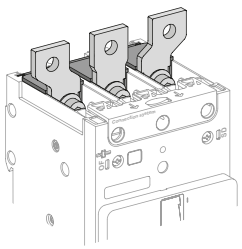


Bar and lugs dimensions					
Dimensions	A	B	C	D	E
mm	6.4	⩽ 8	⩽ 20	7	⩾ 17

Spreaders

Spreaders may be used to increase the pitch from 27 mm to 35 mm. Bars or cable lugs can be attached to the ends.
They are provided with M8 screws for power connection and interphase barriers (not compatible with long terminal shield). Rear insulation screens may have to be used too depending on the distance between the live uninsulated parts and the grounded metallic back pan.

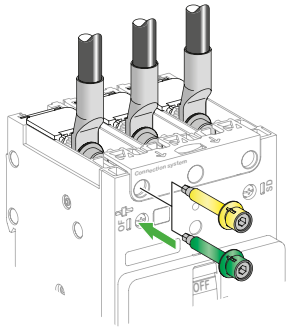
DB421755.eps



Torque limiting breakaway bits

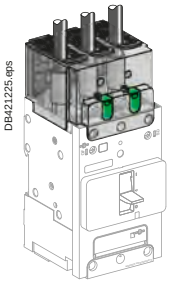
Torque limiting breakaway bits may be used, particularly in the field, to tighten at the right torque EverLink™, compression lug or busbar power connections.

DB423025.eps

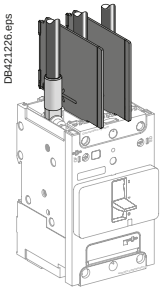


Throwaway tips			
Circuit breaker application			Qty per kit
Ampere rating	Torque		
16-160 A	5 N.m		6 or 8
16-160 A	9 N.m		6 or 8

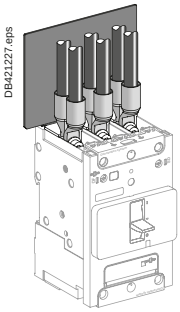
ComPact NSXm accessories and auxiliaries
Insulation of live parts



Long terminal shields.



Interphase barriers.



Rear insulating screens.

Long terminal shields IP40

ComPact NSXm 3P or 4P can be equiped with long terminal shields. They can be mounted upstream and downstream and are used for protection against direct contact with power circuits. They provide IP40 degree of protection and IK07 mechanical impact protection. Moreover long terminal shields can be mounted after product installation on plate or DIN rail, and can be removed and put in place even if there are auxiliary wires.
They are used for connection with cables or insulated bars.
They are comprised of two parts assembled with 2 locks and/or captive screws, forming an IP40 cover.
- The top part is transparent in order to be able to see the connection through it and 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.

Interphase barriers

Safety accessories for maximum insulation at the power-connection points:
- they clip easily onto the circuit breaker
- not compatible with long terminal shield
- 2 ways mounting: short / long insulation.

Rear insulating screens

Safety accessories providing insulation at the rear of the device.
Their use may be mandatory if no long terminal shield depending of the distance between bare conductors and backplate.
The screen dimensions are shown below.

Circuit breaker		NSXm
3P	W x H x thickness (mm)	110 x 84 x 1
4P	W x H x thickness (mm)	145 x 84 x 1

Standard

All ComPact NSXm circuit breakers and switch-disconnectors have slots for the electrical auxiliaries listed below:

- ■ 2 indication contacts (see page C-9) :
- □ 1 ON/OFF (OF)
- □ 1 trip indication (SD)
- ■ either 1 MN undervoltage release or 1 MX shunt trip (see page C-10).

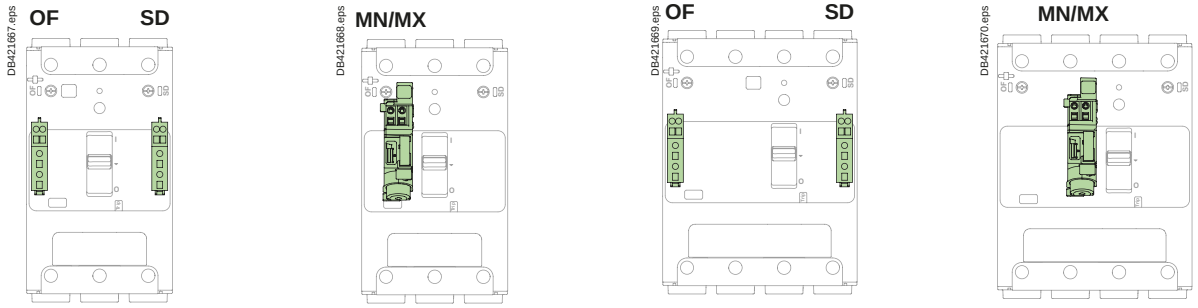
Remote indications

Circuit breakers with MicroLogic Vigi 4.1 may be equipped with an alarming / fault trip indication module to prevent to trip or to identify the type of fault (see page C-11).

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

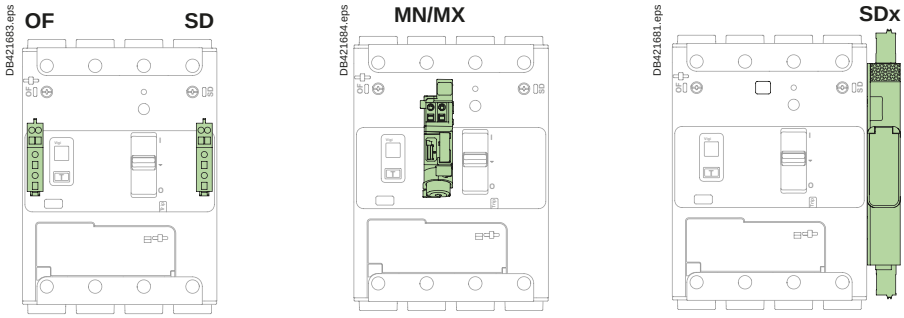
The following drawing indicates auxiliary possibilities depending on the type of device.

Thermal magnetic circuit breaker (TM-D), switch (NA)



3 poles device **4 poles device**

Earth leakage circuit breaker (MicroLogic Vigi 4.1)



3/4 poles device in 4 poles footprint

ComPact NSXm accessories and auxiliaries

Connection of auxiliaries

Wiring

Electrical accessories are fitted with numbered spring terminal blocks for wires.
The maximum wire size is 1.5 mm^2 for auxiliary switches (OF or SD), shunt trip MX or undervoltage release MN.

Electrical accessory wire routing can be exited out any of the four corners of the breaker, under the accessory cover even when using long terminal shield

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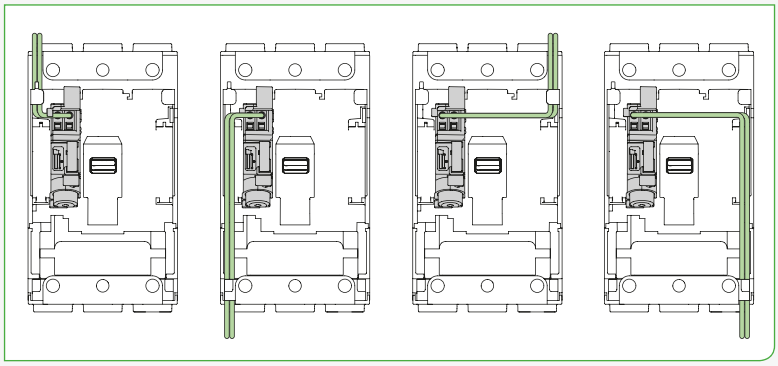

Auxiliary and alarm indication contacts

Indication contacts provide remote information of the circuit breaker status and can thus be used for indications, electrical locking, relays, etc.
They are common point changeover type contacts, with a normaly open (NO) contact and a normaly closed (NC) contact.

Open/Closed - Auxiliary switches (OF)

- Indicates the position of the circuit breaker contacts.

Trip indication - Alarm switch (SD)

- Indicates that the circuit breaker has tripped due to:
  - an electrical fault (overload, short circuit)
  - the operation of a shunt trip
  - undervoltage release
  - the “push-to-trip” button.
- Resets when the circuit breaker is reset.

Installation and connection

- The auxiliary switch (OF) and alarm switch (SD) indication contacts snap into cavities behind the front accessory cover of the circuit breaker and their presence is visible on the front face through green flags.
- One model serves for all indication functions depending on where it is fitted in the circuit breaker.
- Each NO and NC spring terminal may be connected by one 0.5...1.5 mm² flexible copper wire and by two for the common point.

Electrical characteristics of auxiliary contacts

Characteristics						
Rated thermal current (A)		5				
Minimum load		2 mA at 17 V DC				
Utilization cat. (IEC 60947-5-1)		AC12	AC15	DC12	DC13	DC14
Operational current (A)	24 V AC/DC	5	5	5	2.5	1
	48 V AC/DC	5	5	2.5	1.2	0.2
	110...127 V AC / 110 V DC	5	4	0.6	0.35	0.05
	220/240 V AC	5	3	-	-	-
	250 V DC	-	-	0.3	0.05	0.03
	380/440 V AC	5	2.5	-	-	-
	660/690 V AC	5	0.1	-	-	-

Standards

- Auxiliary indicator contacts comply with IEC 60947-5-1.
- Auxiliary contacts have also been tested according IEC 60 947-5-4.

Auxiliary Switch (OF) / Alarm Switch (SD).

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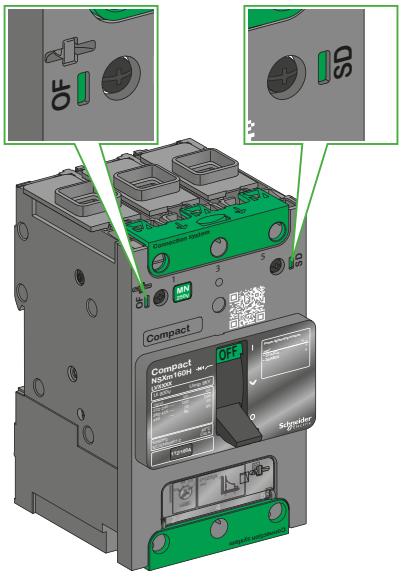

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C

ComPact NSXm accessories and auxiliaries
Voltage release

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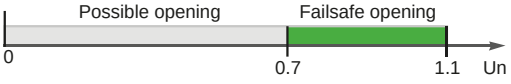
MX or MN voltage release.



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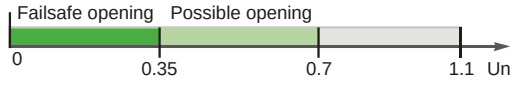
Opening conditions of the MX release.



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Opening conditions of the MN release.

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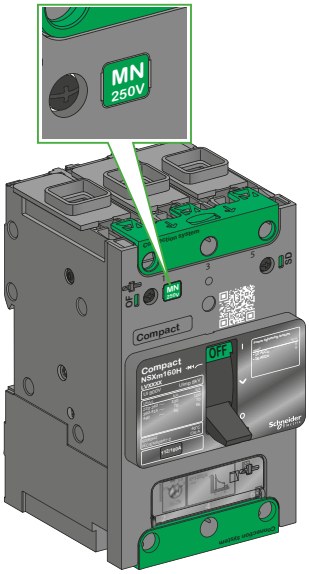
Closing conditions of the MN release.



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Operating voltages for MN/MX.

Shunt trip (MX) and undervoltage release (MN)

A voltage release can be used to trip the circuit breaker using a control signal. They serve primarily for remote, emergency-off commands. It is advised to test the system every six months.

Shunt trip (MX)

- Trips the circuit breaker when the control voltage rises above 70 % of its rated voltage (Un).
- Impulse type ≥ 20 ms or maintained control signals.
- Shunt trip 110...130 V AC is suitable for ground-fault protection when combined with a Class I ground-fault sensing element.
- Continuous duty rated coil [1].

Undervoltage release (MN)

- Trips the circuit breaker when the control voltage drops below 35 % of its rated voltage.
- Between 35 % and 70 % of the rated voltage opening is possible but not guaranteed.
- Above 70 % of the rated voltage, opening does not take place.
- Continuous duty rated coil.
- Circuit breaker closing is possible only if the voltage exceeds 85 % of the rated voltage. If an undervoltage condition exists, operation of the closing mechanism of the circuit breaker will not permit the main contacts to touch, even momentarily. This is commonly called “Kiss Free”.

Time-delay unit for an undervoltage release (MN)

- A time delay unit eliminates the risk of nuisance tripping due to a transient voltage dip lasting less than 200 ms for fixed delay units and up to 3 seconds for adjustable units. For shorter micro-outages, a system of capacitors provides temporary supply to the MN at U > 0.7 Un to ensure non tripping.

The correspondence between MN and time-delay units is shown below.

Power supply	Corresponding MN
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

Installation and connection

- Accessories snap into cavities under the front accessory cover of the circuit breaker. The presence and characteristics of the voltage release is visible from the front face through a window
- Terminals are spring type in order to insure a fast and reliable connection
- Each terminal may be connected by one 0.5...1.5 mm² flexible copper wire.

Operation

- The circuit breaker must be reset locally after being tripped by shunt trip (MX) or undervoltage release (MN)
- Tripping by the shunt trip or undervoltage release has priority over manual closing; in the presence of a standing trip order such an action does not result in any closing, even temporarily, of the main contacts
- Endurance: 50 % of the rated mechanical endurance of the circuit breaker.

Standard

- MN/MX voltage releases comply with IEC 60947-2.

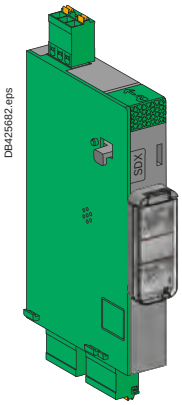
[1] Except for MX 24 V AC/DC (in case of continuous activation, may generate some minor perturbation in sensitive environment).

SDx module for ComPact NSXm MicroLogic Vigi 4.1

The SDx module provides alarming and fault differentiation for the ComPact NSXm with MicroLogic Vigi 4.1.
This module has 2 NO/NC outputs dry contacts. Each can be assigned with one of the following status:

- overload alarm (SDT105): current is higher than 105 % of the setting current (Ir)
- overload trip indication (SDT): cricuit breaker has tripped due to an overload fault
- earth leakage alarm (SDV80): leakage current is higher than 80 % of the earth leakage trip threshold (IΔn)
- earth leakage trip indication (SDV): cricuit breaker has tripped due to an earth leakage current.

Outputs are automatically reseted either when alarm disapear or when the circuit breaker is restarted.



SDx relay module with its terminal block.

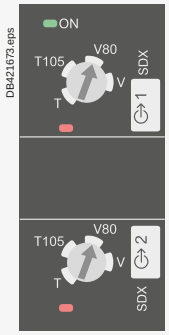
Output characteristics

- 2 NO/NC dry contacts
- 24...250 V AC/DC
- 2 mA...5 A max
- AC15 (230 V max - 400 VA)
- DC13 (24 V - 50 W)

Power characteristics

- 24...240 V AC/DC

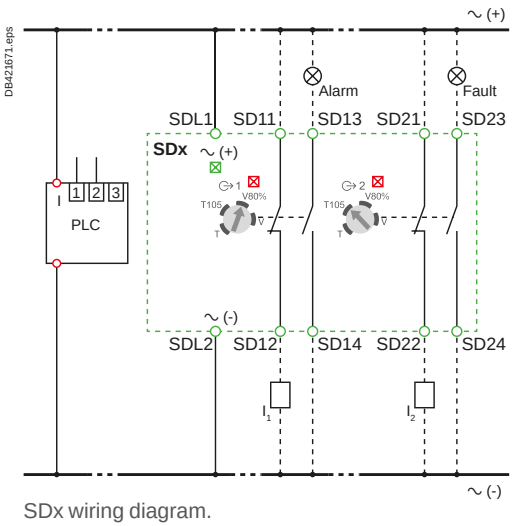
Front face indication



- green led "On": flashes slowly when the module is powered
- 2 red led for output status indication
- 2 setting dials

Installation and connection

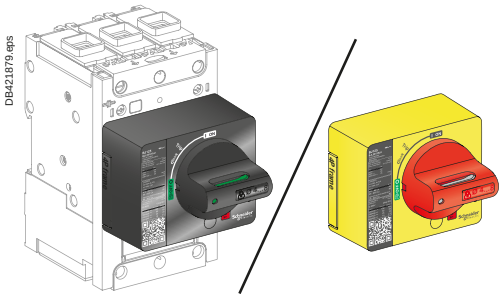
The SDx module is cliped on the right side on the circuit breaker.
Each removable spring terminal can be connected by one 0.5... 1.5 mm² copper wire.



SDx wiring diagram.

C

ComPact NSXm accessories and auxiliaries
Rotary handles



Directly mounted rotary handle.

Direct rotary handles

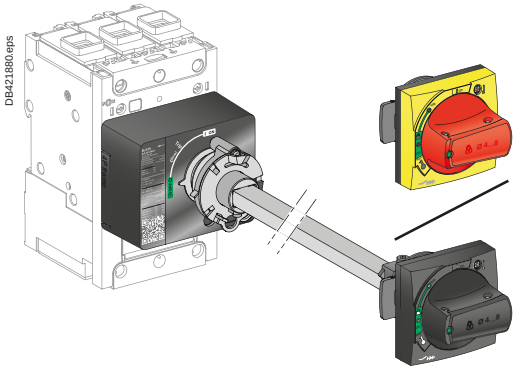
Installation
The direct mounted rotary handle has to be mounted by 3 screws on the front accessory cover.

Operation
The direct rotary handle maintains:
- suitability for isolation
- indication of the three positions OFF (**O**), ON (**I**) and tripped (**Trip**)
- access to the “push-to-trip” button
- visibility and access to the trip unit.

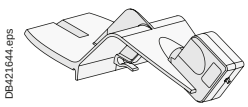
Device padlocking
The circuit breaker may be locked in the OFF position by using one to three padlocks (not supplied) or in ON position after customer modification of the rotary handle before installation, padlock shackle Ø4-8 mm. Locking in the ON position does not prevent the circuit breaker from tripping if a fault occurs. In this case, the handle remains in the ON position after the circuit breaker trips. Unlocking is required for the handle to go to the tripped then the OFF position.

Variations: door locking
Door locking built-in functionality can be activated by the customer to prevent opening the door when the circuit breaker is ON or in trip position. For exceptional situations, door locking can be temporarily disabled with a tool by qualified personel to open the door when the circuit breaker is closed.

Models
- Standard with black handle.
- VDE type with red handle and yellow bezel for machine tool control.



Door-mounted rotary handle.



Laser Square tool.

Extended rotary handles

Installation
The door-mounted (extended) rotary handle is made up of:
- a unit that has to be screwed on the front accessory cover of the circuit breaker
- an assembly (handle mechanism and front plate) on the door that is always secured in the same position, whether the circuit breaker is installed vertically or horizontally
- an adjustable extension shaft.

The handle mechanism is fixed with a nut (Ø22 mm) to make assembly easier. The Laser Square tool (GVAPL01) can be used to accurately align the hole on the door with the circuit breaker.

Operation when door is closed
The door mounted handle makes it possible to operate a circuit breaker installed in an enclosure from the front. The door mounted operating handle maintains:
- suitability for isolation
- indication of the three positions OFF (**O**), ON (**I**) and tripped (**Trip**)
- visibility and access to trip unit when the door is open
- degree of protection of the handle on the door: IP54 or IP65 as per 60520.

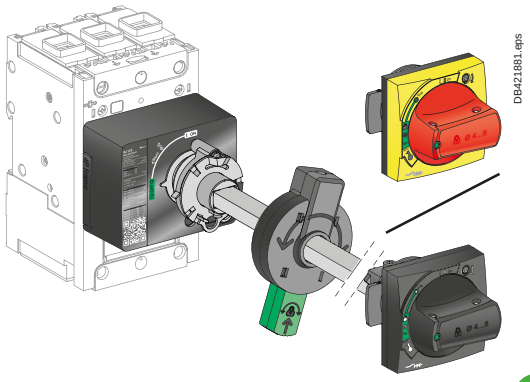
Mechanical door locking when device closed
A standard feature of the extended rotary handle is a locking function, built into the shaft, that disables door opening when the circuit breaker is in the ON or tripped positions.
Door locking can be temporarily disabled with a tool by qualified personnel to open the door without opening the circuit breaker. This operation is not possible if the handle is locked by a padlock.

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 Ø4-8 mm, padlocks are not supplied
- for the black handle, with a voluntary modification of the door handle (to be done by the customer during installation), in the ON and OFF positions. Locking in the ON position does not prevent the circuit breaker from tripping if a fault occurs. In this case, the handle remains in the ON position after the circuit breaker trips. Unlocking is required for the handle to go to the tripped then the OFF position.

Operation when door is opened
An open door shaft operator can be used to operate the circuit breaker when door is opened. This accessory complies with UL 508A.
The indication of the three positions OFF (**O**), ON (**I**) and tripped (**Trip**) is visible on the circuit breaker.
The circuit breaker itself may be locked in OFF position when the door is opened by 1 padlock / lockout hasp, shackle Ø4-8 mm.

Shaft length
The shaft length is the distance between the back of the circuit breaker and the door:
- minimum shaft length is 200 mm
- maximum shaft length is 600 mm
- shaft length must be adjusted.

Models
- Standard with black handle (IP54).
- VDE type with red handle and yellow bezel for machine tool control (IP54).
- IP65 with red handle and yellow bezel.



Door-mounted rotary handle with open door shaft operator.

Side rotary handles (left or right)

Installation
The side-mounted rotary handle is made up of:
- a unit that has to be screwed on the front accessory cover of the circuit breaker
- an assembly (handle and front plate) on the side (left or right) of the enclosure
- an adjustable extension shaft.

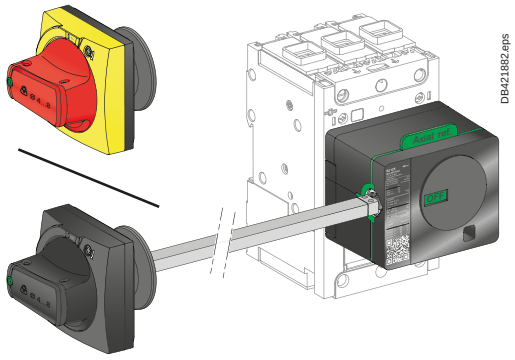
The handle mechanism is fixed with a nut (Ø22 mm) to make assembly easier.

Operation
The side mounted rotary handle makes it possible to operate circuit breakers installed in enclosure from the side. The side mounted rotary handle maintains:
- suitability for isolation
- indication of the three positions OFF (**O**), ON (**I**) and tripped (**Trip**). Moreover, the position is visible on the circuit breaker itself.
- visibility and access to trip unit when the door is open
- degree of protection of the handle on the side: IP54 or IP65 as per 60520.

Device padlocking
The circuit breaker may be locked in the OFF position, or, for the black rotary handle only, in ON position after voluntary modification of the side handle (to be done by the customer during installation), by using one to three padlocks, padlock shackle Ø4-8 mm ; padlocks are not supplied.
Locking in the ON position does not prevent free circuit breaker from 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.

Shaft length
The shaft length is the distance between the side of the circuit breaker and the side of the enclosure:
- minimum shaft length is 45 mm
- maximum shaft length is 480 mm
- shaft length must be adjusted.

Models
- Standard with black handle (IP54).
- VDE type with red handle and yellow bezel for machine tool control (IP54).
- IP65 with red handle and yellow bezel (by ordering a standard one and an IP65 universal handle).



Side mounted rotary handle.

ComPact NSXm accessories and auxiliaries

Locks and sealing accessories

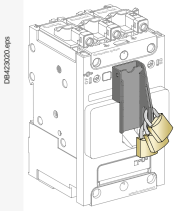
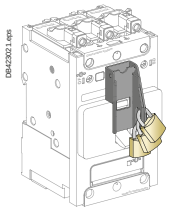
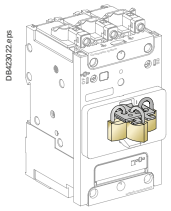
Locks

Padlocking systems can receive up to three padlocks with diameters of 5-8 mm ; padlocks not supplied. Locking in the OFF position guarantees isolation as per IEC 60947-2.

Control device	Function	Means	Required accessories
Toggle	Lock in OFF position	Padlock	Removable device
	Lock in OFF or ON position	Padlock	Fixed device
	Lock in OFF position	Padlock	Fixed device
Direct rotary handle	Lock in ■ OFF position ■ OFF or ON position [1]	Padlock	-
Extended/side rotary handle	Lock in ■ OFF position ■ OFF or ON position [2] with door opening prevented	Padlock	-

[1] Following a simple modification of the mechanism.
[2] Following a simple modification of the mechanism - black handle only.

Handle padlocking device [1]

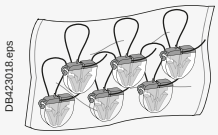
Fixed (OFF only)	Fixed (OFF or ON)	Removable (OFF only)
		

[1] Rotary handle has integrated padlocking capability.

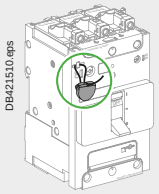
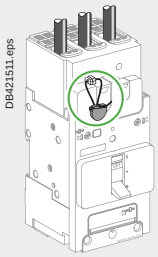
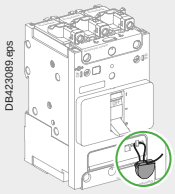
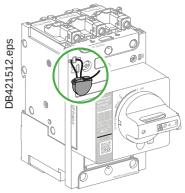
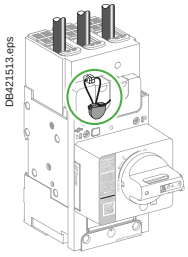
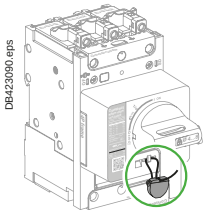
Sealing accessories

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.

Types of seals and corresponding functions



LV429335: Bag of sealing accessories.

Protected operations			
Control type	■ Front removal ■ Access to auxiliaries.	■ Access to power connections	■ Access to settings and test connector
Toggle			
Rotary handle			

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ComPact NSX accessories and auxiliaries
Overview fixed version

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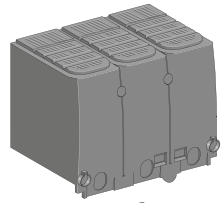
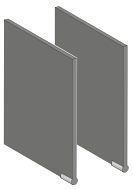
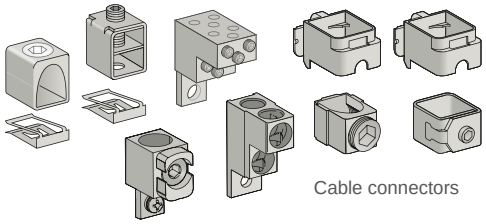


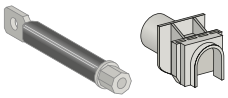
Sealable terminal shields



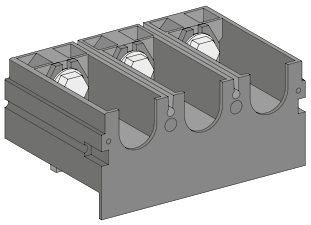
Interphase barriers



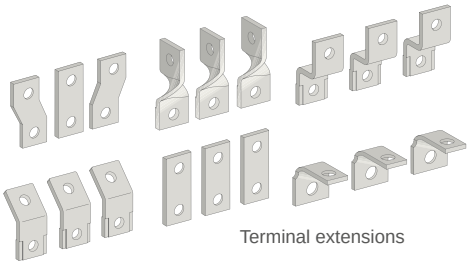
Cable connectors



Rear connectors

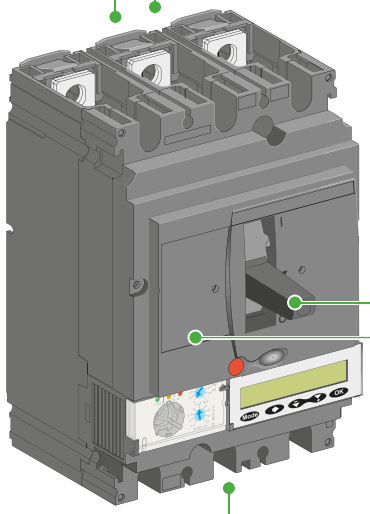


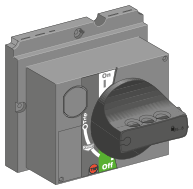
One-piece spreader



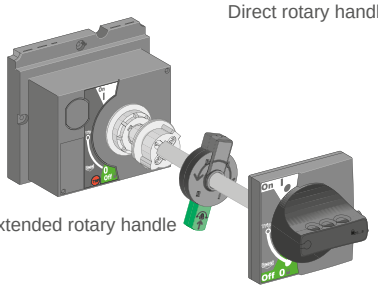
Terminal extensions

C

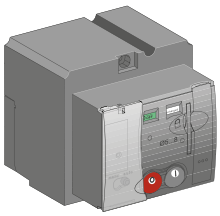




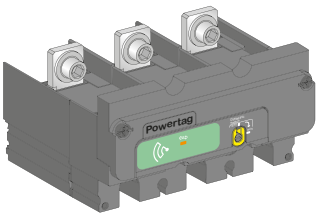
Direct rotary handle



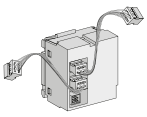
Extended rotary handle



Motor mechanism



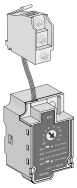
PowerTag NSX



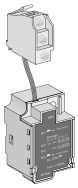
BSCM module

Indication contact

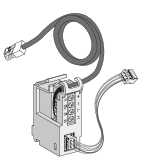
Voltage release



SDTAM module



SDx module



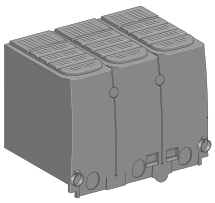
NSX cord

Customize your circuit breaker with accessories

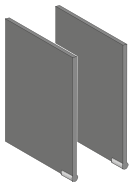
ComPact NSX accessories and auxiliaries

Overview plug-in and withdrawable versions

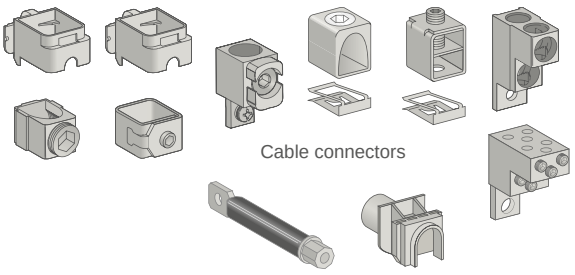
DB432572.eps



Sealable long terminal shields for plug-in base

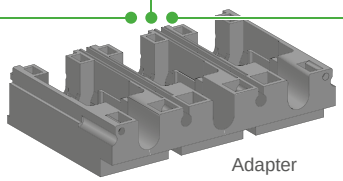


Interphase barriers

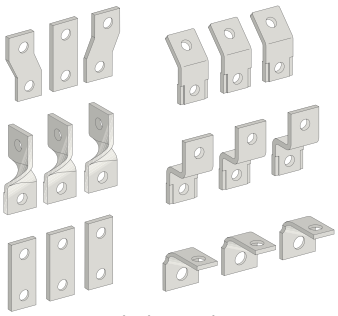


Cable connectors

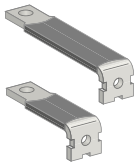
Rear connectors



Adapter

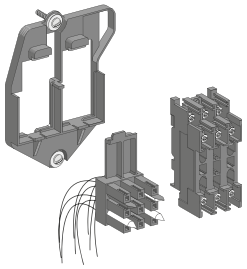


Terminal extensions

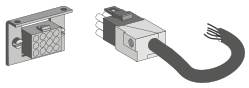


Rear connectors

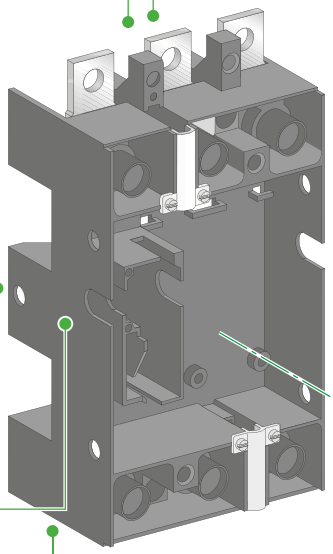
Lugs

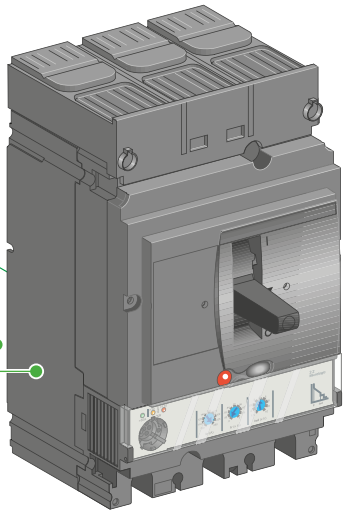


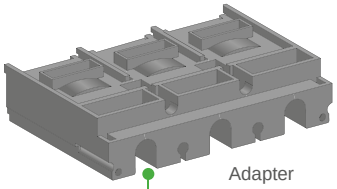
Automatic withdrawable auxiliary connector



Manual auxiliary connector

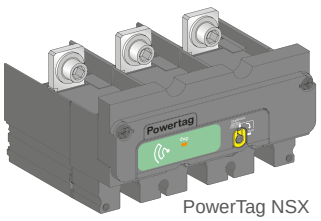




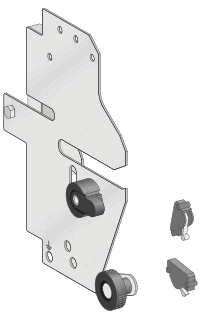


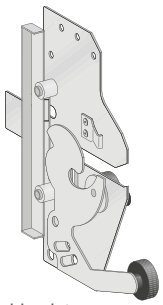
Adapter

[1]

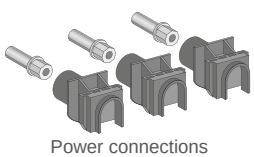


PowerTag NSX

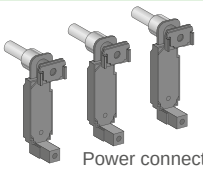




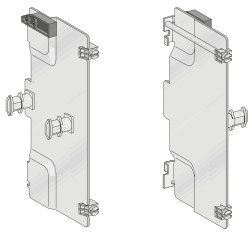
Chassis side plate



Power connections



Power connections for Vigi add-on



Circuit breaker side plate

[1] For PowerLogic PowerTag NSX 630 A, add a 4 mm intercalary under the module when plate mounted (see page C-43).

C

ComPact NSX accessories and auxiliaries
Device installation

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
  - circuit breaker removed, base equipped with shutters = IP4.

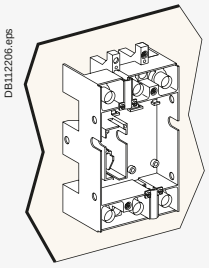
Parts of a plug-in configuration

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.

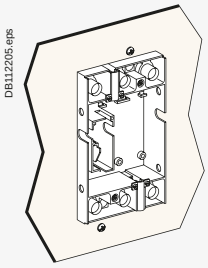
Accessories

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

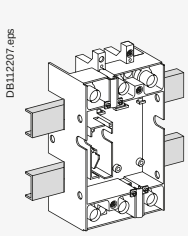
Mounting



Mounting on a backplate.



Mounting through a front panel.



Mounting on rails.

Withdrawable 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

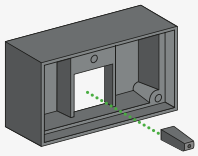
A withdrawable configuration requires two side plates installed on the base and two sides plates mounted on the circuit breaker. Similar to the plug-in version, a safety trip causes automatic tripping if the device is ON, before engaging or withdrawing it, and enables device operation in the disconnected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

Accessories

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

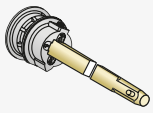
- auxiliary contacts for installation on the fixed part, indicating the "connected" and "disconnected" positions
- locking by 1 to 3 padlocks (shackle diameter 5 to 8 mm), to:
  - prevent insertion for connection
  - lock the circuit breaker in connected or disconnected position
- toggle collar for circuit 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.

DB425377.eps



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

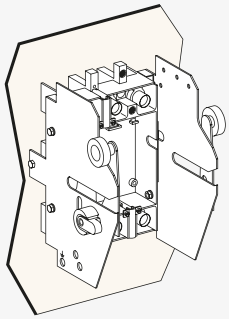
DB112219.eps



Telescopic shaft.

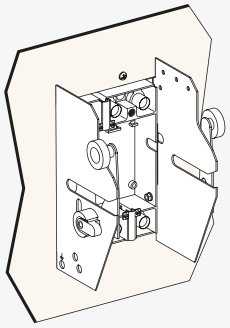
Mounting

DB112220.eps



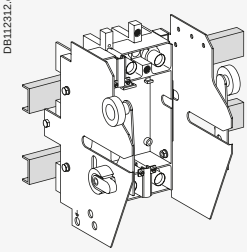
Mounting on a backplate.

DB112221.eps



Mounting through a front panel.

DB112312.eps

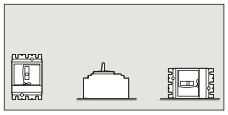


Mounting on rails.

PB105122.eps

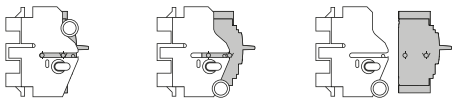
Withdrawable ComPact NSX250.

DB112209.eps



Installation positions.

DB112210.eps

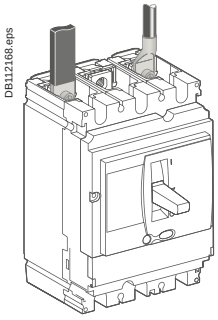


Connected. Disconnected. Removed.

C

ComPact NSX accessories and auxiliaries
Connection of fixed devices

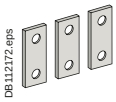
Fixed circuit breakers are designed for standard front connection using bars or cables with lugs.
Cable connectors are available for bare cables. Rear connection is also possible.



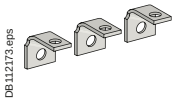
Insulated bar.

Small lug for copper cables.

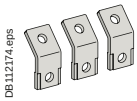
Small lug for Al cables.



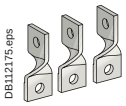
Straight terminal extensions.



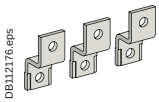
Right-angle terminal extensions.



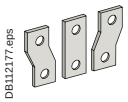
45° terminal extensions.



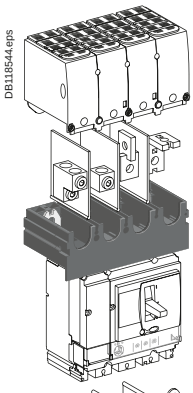
Edgewise terminal extensions.

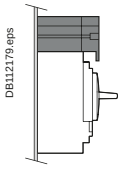


Double-L terminal extensions.

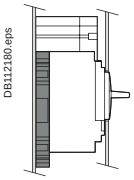


Spreaders.





Mounting at the back of a switchboard.



Mounting behind the front panel with a raiser.

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).

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

Maximum size of bars

ComPact NSX circuit 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 10

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 circuit 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	NSX400 to 630
Without spreaders	35	45
With spreaders	45	52.5 or 70
With one-piece spreader	45	-

ComPact NSX accessories and auxiliaries
Connection of fixed devices

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 35 mm² each.

Linergy DX and Linergy DP distribution block for ComPact NSX100 to 630
Linergy DX and Linergy DP 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 mm² or 16 mm², 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 mm²	◉			
Aluminium connectors	25 to 95 mm²	◉	◉		
	120 to 185 mm²	◉	◉		
	120 to 240 mm²	◉	◉		
	2 cables 50 to 120 mm²	◉	◉		
	2 cables 35 to 240 mm²			◉	◉
	35 to 300 mm²			◉	◉
Distribution connectors	6 cables 35 mm²	◉	◉		
Linergy DX and Linergy DP distribution blocks	6 or 9 cables 10/16 mm²	◉	◉		

Rear connection

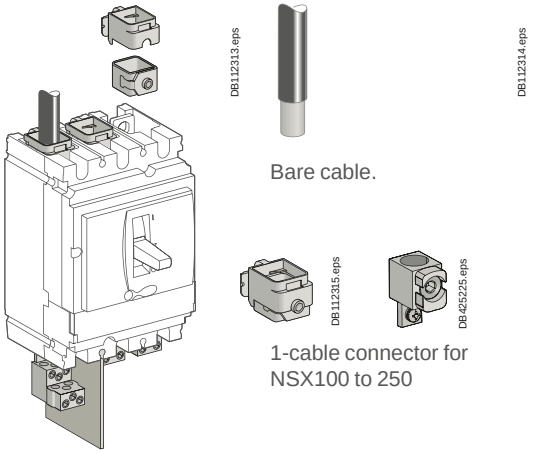
Device mounting on a backplate with suitable holes enables rear connection.

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.

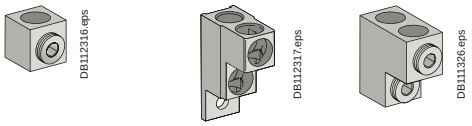
Bare cables

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



Bare cable.

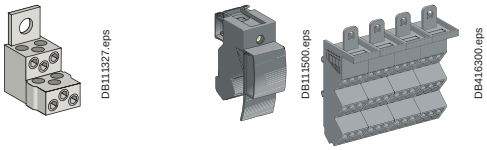
1-cable connector for NSX100 to 250



1-cable connector NSX400/630.

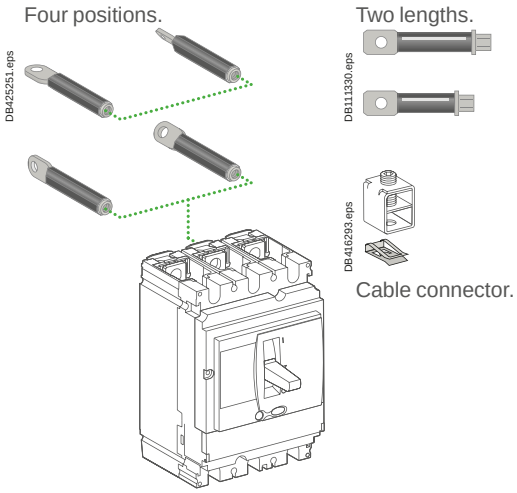
2-cable connector for NSX100 to 250

2-cable connector for NSX400/630.



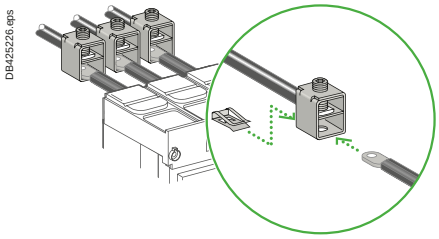
Distribution connector for NSX100 to 250.

Linergy DX 100/160 A and Linergy DP 250 A distribution blocks.



Cable connector.

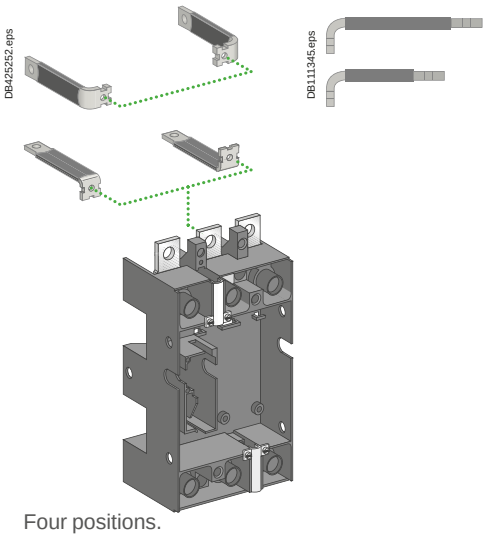
Rear connection.



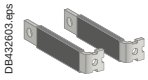
Connection of bare cables to NSX100 to 250 by clips.

ComPact NSX accessories and auxiliaries
Connection of withdrawable and plug-in devices

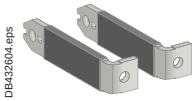
Connection is identical for both withdrawable and plug-in versions. The same accessories as for fixed devices may be used.



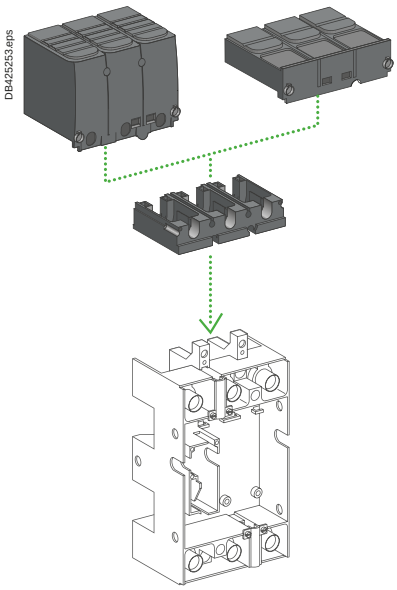
Four positions.



Terminal extensions for ComPact NSX100/160/250.

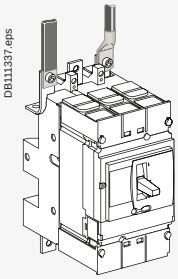


Terminal extensions for ComPact NSX400/630.

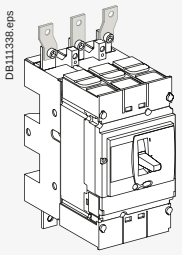


Bars or cables with lugs

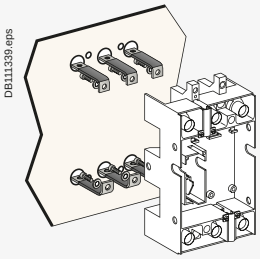
The plug-in base is equipped with terminals which, depending on their orientation, serve for front and rear connection.
For rear connection of a base mounted on a backplate, the terminals must be replaced by insulated, long right-angle terminal extensions.
For ComPact NSX630 devices, connection most often requires the 52.5 or 70 mm pitch spreaders.



Front connection.



Front connection with spreaders.

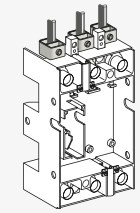


Rear connection of a base mounted on a backplate.

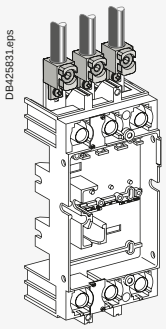
Connection accessories
All accessories for fixed devices (bars, lugs, terminal extensions and spreaders) may be used with the plug-in base.

Bare cables

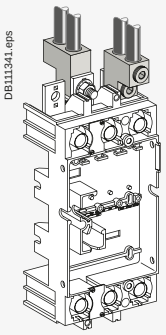
All terminals may be equipped with bare-cable connectors. See the "Connection of fixed devices" section.



With a 100 to 250 A base.



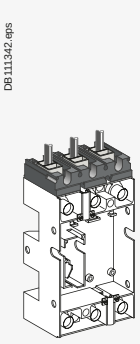
With 240 mm^2 cable connector for NSX100 to 250.



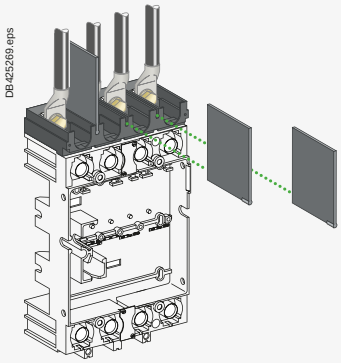
With a 400/630 A base.

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.

ComPact NSX accessories and auxiliaries
Insulation of live parts

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
- short terminal shields ⩾ 500 V
- 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.

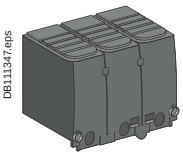
Long terminal shields may be mounted upstream and downstream of:
- fixed devices
- the base of plug-in and withdrawable versions, thus completing the insulation provided by the mandatory short terminal shields on the device
- the one-piece spreader for NSX100 to 250
- the 52.5 mm spreaders for NSX400/630.

Terminal shields and pitch

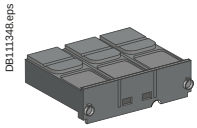
Combination possibilities are shown below.

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

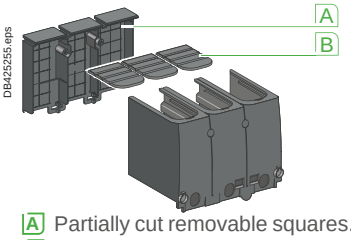
Terminal shields are identical for fixed and plug-in/withdrawable versions and cover all applications up to 1000 V.
They exist for the 100 to 250 A and 400/630 A ratings, in long and short versions.



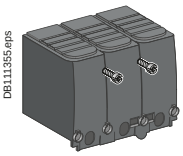
Long terminal shields.



Short terminal shields.



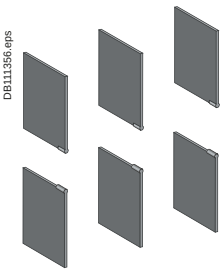
A Partially cut removable squares.
B Grids with break marks.



Assembled with captive screws.

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.

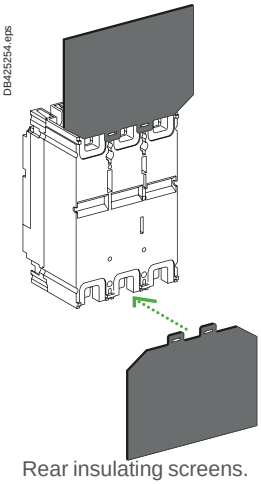


Interphase barriers.

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.

Circuit 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



Rear insulating screens.

C

ComPact NSX accessories and auxiliaries
Selection of auxiliaries

Standard

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

5 indication contacts (see page C-30)
- 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 add-on.

1 remote-tripping release (see page C-33)
- 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:

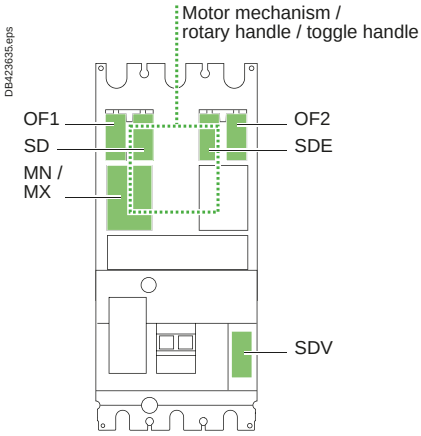
1 indication module with two outputs (see page C-31)
- either an SDx module with MicroLogic 2.2 / 4.2 / 5.2 A or E / 6.2 A or E or 7 E
- or an SDTAM module with MicroLogic 2.2 M or 6-2 E-M (motor protection).

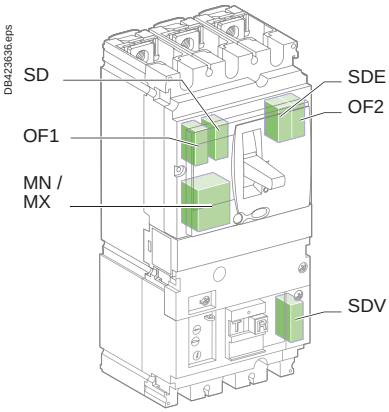
This module occupies the slots of one OF contact and an MN/MX release.

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

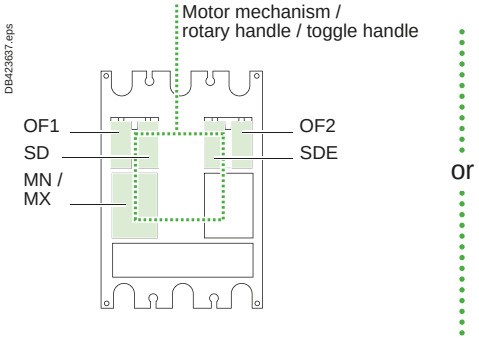
Standard



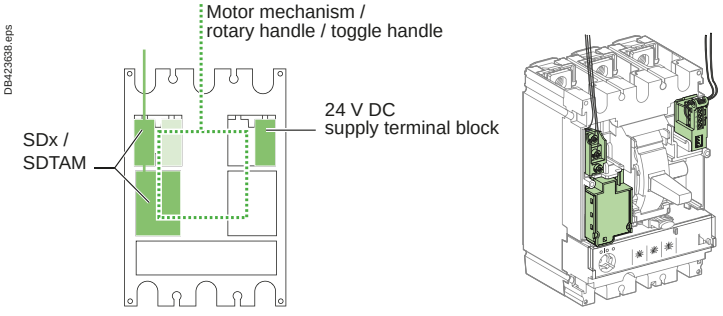


MicroLogic 2 / 4 / 5 / 6 / 7

Standard



Remote indications via SDx or SDTAM



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 / 7 display when the device is OFF or under low-load conditions.

Communication

Communication requires specific auxiliaries.

Communication of status indications

- 1 BSCM module.
- 1 NSX cord (internal terminal block) for both communication and 24 V DC supply to the BSCM. The insulated NSX cord is mandatory for system voltages greater than 480 V AC.

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 / 7, 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 / 7, the system consists of:

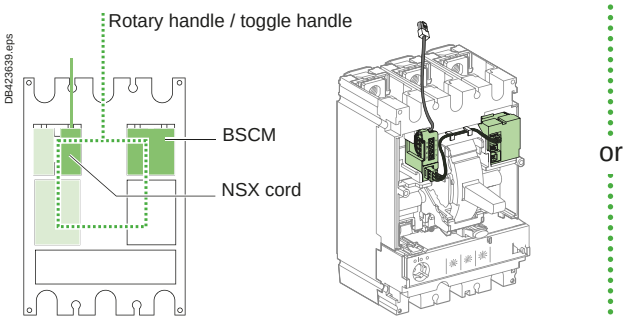
- 1 BSCM module
- 1 NSX cord (internal terminal block) for both communication and 24 V DC supply to the BSCM and the MicroLogic
- 1 communicating motor mechanism connected to the BSCM.

Installation of SDx or SDTAM is compatible with communication.

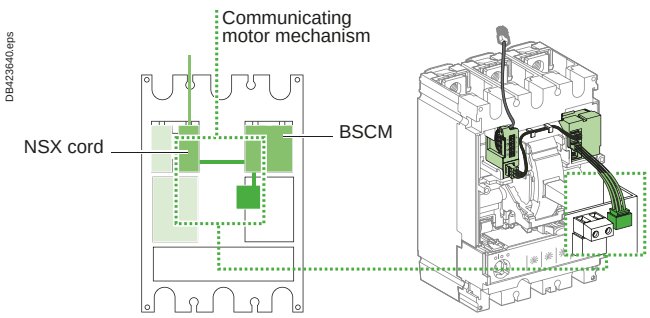
The following table indicates auxiliary possibilities depending on the type of trip unit.

NA, TMD, TMG, MA, MicroLogic 2 / 4

Communication of status indications

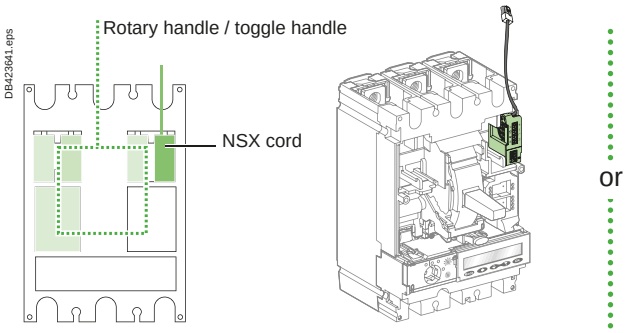


Communication of status indications and controls

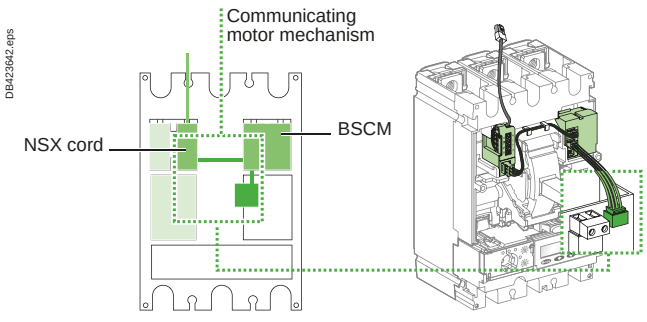


MicroLogic 5 / 6 / 7

Communication of measurements with or without FDM121 display



Communication of status indications, controls and measurements with or without FDM121 display



ComPact NSX accessories and auxiliaries
Selection of auxiliaries

Standard

All ComPact NSX400/630 circuit breakers and switch-disconnectors have slots for the electrical auxiliaries listed below.

7 indication contacts (see page C-30)
- 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 add-on.

1 remote-tripping release (see page C-33)
- 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:

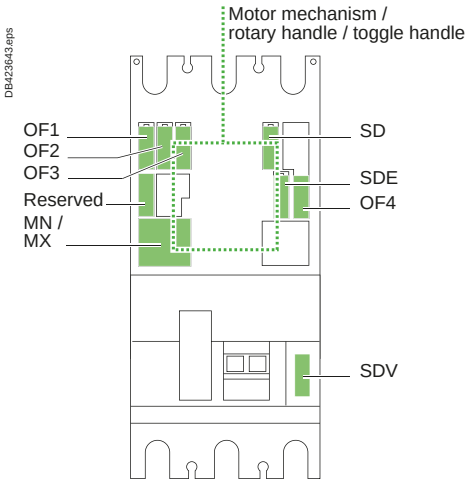
1 indication module with two outputs (see page C-31)
- either an SDx module with MicroLogic 2.3 / 4.3 / 5.3 A or E / 6.3 A or E or 7 E
- or an SDTAM module with MicroLogic 2.3 M or 6-3 E-M (motor protection).

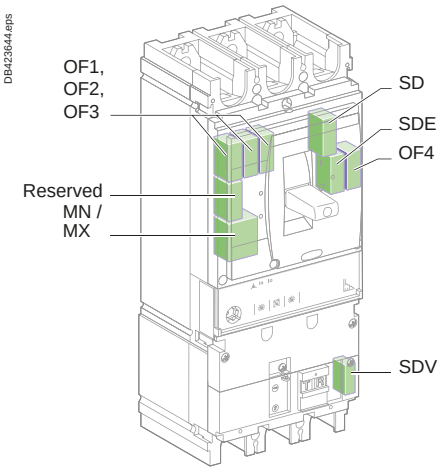
This module occupies the slots of an MN/MX release.

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

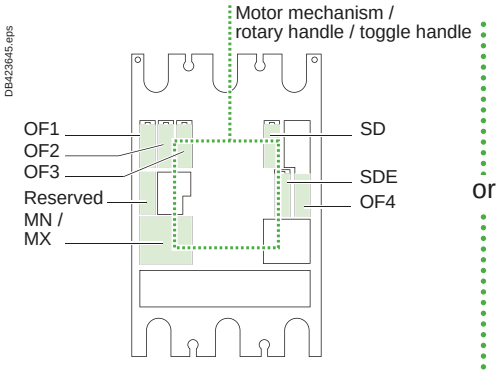
Standard

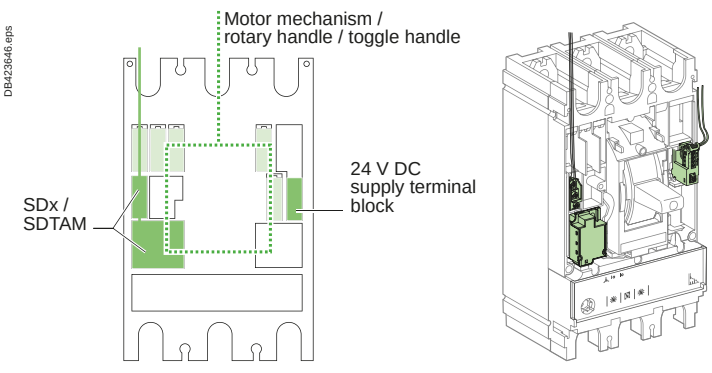




MicroLogic 2 / 4 / 5 / 6 / 7

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 / 7 display when the device is OFF or under low-load conditions.

Communication

Communication requires specific auxiliaries.

Communication of status indications

- 1 BSCM module
- 1 NSX cord (internal terminal block) for both communication and 24 V DC supply to the BSCM.The insulated NSX cord is mandatory for system voltages greater than 480 V AC.
-

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 / 7, 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 / 7, the system consists of:

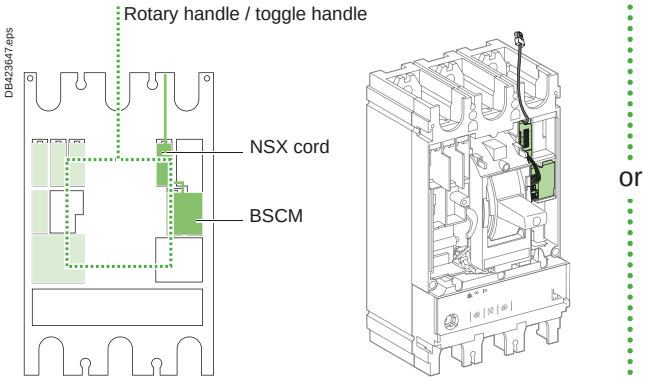
- 1 BSCM module
- 1 NSX cord (internal terminal block) for both communication and 24 V DC supply to the BSCM and the MicroLogic
- 1 communicating motor mechanism connected to the BSCM.

Installation of SDx or SDTAM is compatible with communication.

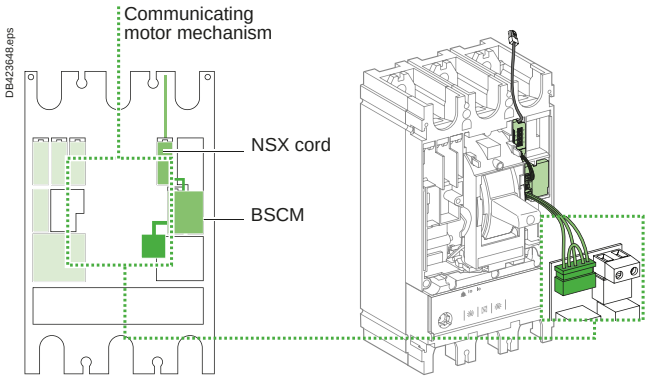
The following table indicates auxiliary possibilities depending on the type of trip unit.

NA, MicroLogic 1.3 M, MicroLogic 2 / 4

Communication of status indications

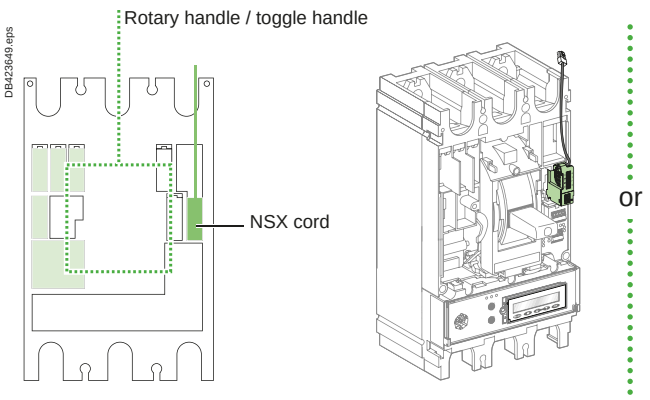


Communication of status indications and controls

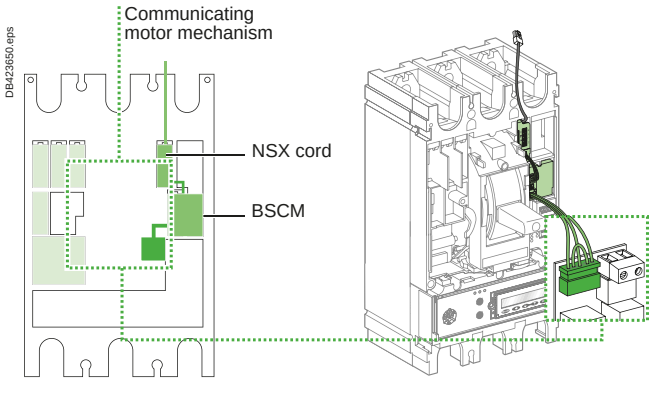


MicroLogic 5 / 6 / 7

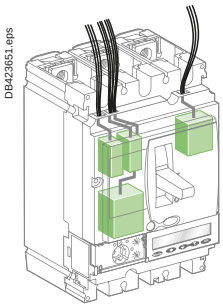
Communication of status indications



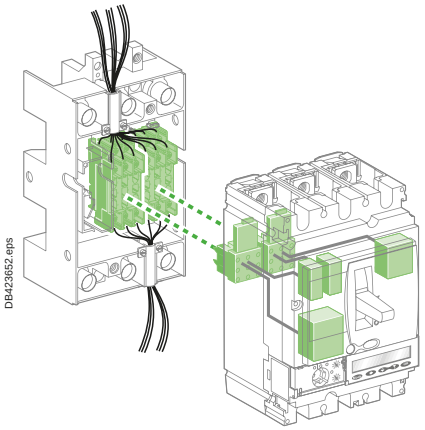
Communication of status indications, controls and measurements with or without FDM121 display



ComPact NSX accessories and auxiliaries
Connection of electrical auxiliaries



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

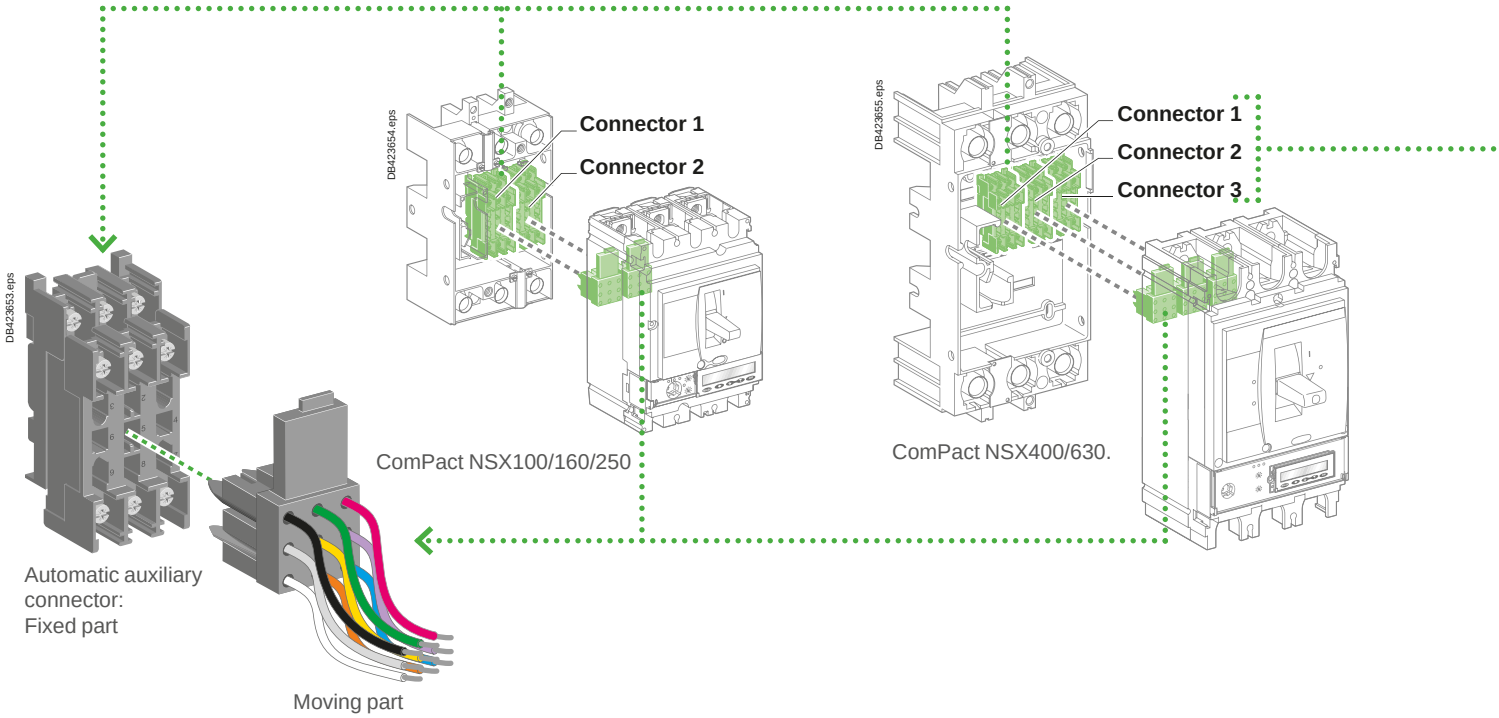
Auxiliary circuits exit the circuit breaker via one to three automatic auxiliary connectors (nine wires each). These are made up of:

- a moving part, connected to the circuit breaker via a support (one support per circuit breaker)
- a fixed part, mounted on the plug-in base, equipped with connectors for bare cables up to 2.5 mm².

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.



ComPact NSX100/160/250

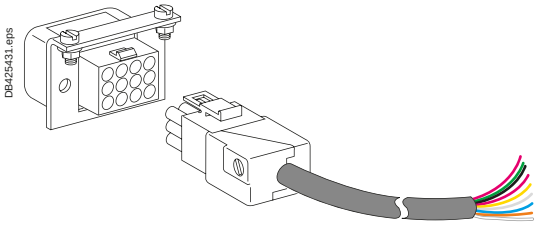
ComPact NSX400/630.

Automatic auxiliary connector: Fixed part

Moving part

ComPact NSX accessories and auxiliaries

Connection of electrical auxiliaries

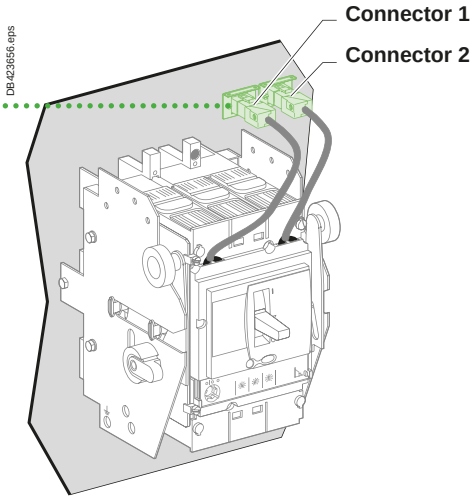


Nine-wire manual auxiliary connector.

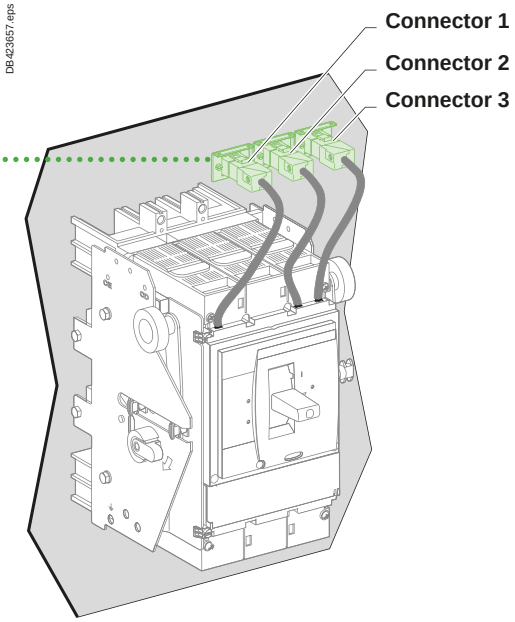
Withdrawable ComPact NSX

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.



ComPact NSX100/160/250.



ComPact NSX400/630.

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		Connector 2	Connector 3
	OF1 MN/MX SD	or 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	◉		◉	◉

[1] Only for NSX100 to 250.
MT: motor mechanism.
MTc: communicating motor mechanism.

ComPact NSX 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 standards.

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 add-on 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 add-on 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			Standard				Low level			
Types of contacts			All				OF, SD, SDE, SDV			
Rated thermal current (A)			6				5			
Minimum load			100 mA at 24 V DC				1 mA at 4 V DC			
Utilisation cat. (IEC 60947-5-1)			AC12	AC15	DC12	DC14	AC12	AC15	DC12	DC14
Operational current (A)	24 V	AC/DC	6	6	6	1	5	3	5	1
	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 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 / 7, is assigned to:
- MicroLogic 5: overload (Ir)
- MicroLogic 6: overload (Ir) and ground fault (Ig)
- MicroLogic Vigi 7E: overload (Ir) and earth leakage fault (IΔn).

These two outputs automatically reset when the device is closed (turned ON).
For MicroLogic 5 / 6 / 7, 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 M, 2.3 M and 6.2 E-M, 6.3 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.

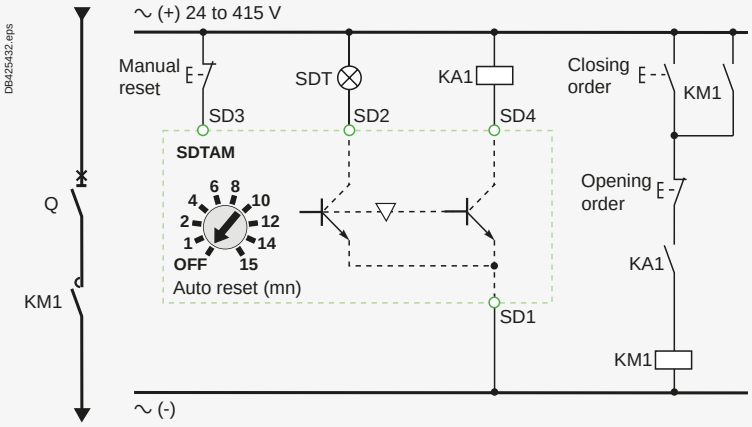
SDx and SDTAM are relay modules with two static outputs. They send different signals depending on the type of fault. They may not be used together.

PB103377-20.eps

SDx relay module with its terminal block.

PB103376-20.eps

SDTAM relay module with its terminal block.



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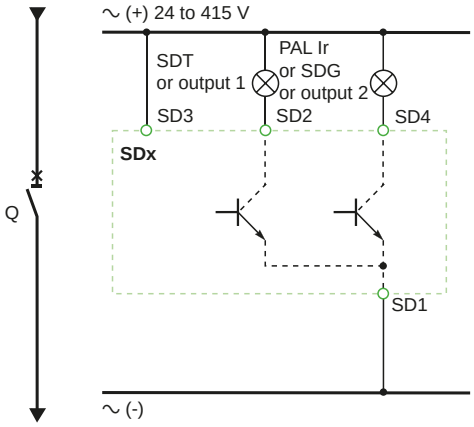
SDTAM wiring diagram with contactor control.



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SDx wiring diagram.

ComPact NSX accessories and auxiliaries
Motor mechanism


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ComPact NSX250 with motor mechanism.

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.

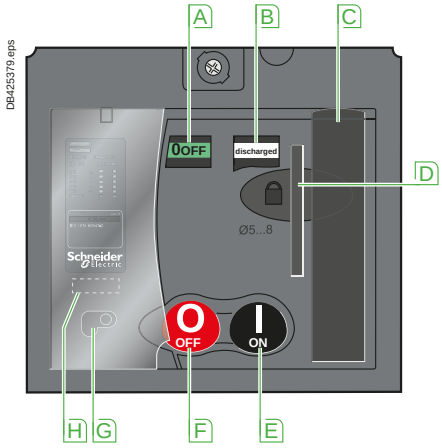
Installation and connections

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.



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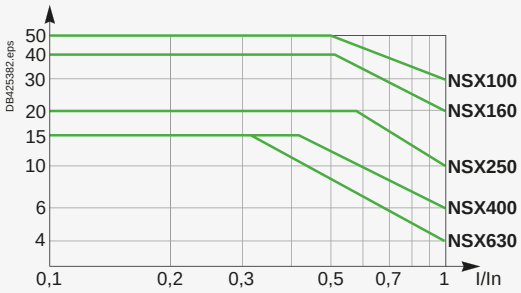
- A Position indicator (positive contact indication)
- B Spring status indicator (charged, discharged)
- C Manual spring-charging lever
- D Keylock device (optional)
  Locking device (OFF position), using 1 to 3 padlocks, shackle diameter 5 to 8 mm, not supplied
- E I (ON) pushbutton
- F O (OFF) pushbutton
- G Manual/auto mode selection switch. The position of this switch can be indicated remotely.
- H Operation counter (ComPact NSX400/630)

Characteristics

Motor mechanism			MT100 to MT630
Response time (ms)	opening		< 700
	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



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Circuit breaker + motor-mechanism module, in thousands of operations, at 440 V.

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 ⩽ 0.35 x 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 ⩾ 0.85 x Un. Below this threshold, closing is not guaranteed.

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 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. 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 (⩾ 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 ⩾ 0.7 x Un.

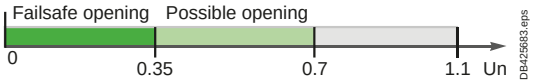
Characteristics

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 mm² to integrated terminal blocks.

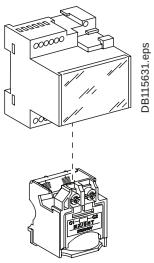
MX or MN voltage release.



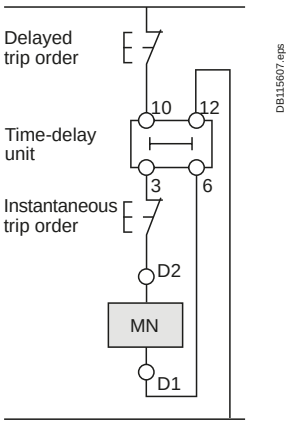
Opening conditions of the MN release.

Closing conditions of the MN release.

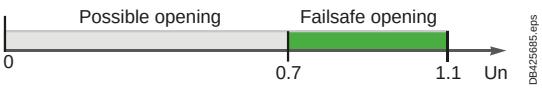
MN voltage release.



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 %.

ComPact NSX accessories and auxiliaries
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.

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ComPact NSX with a rotary handle.

PB103607-50.eps

ComPact NSX with an MCC rotary handle.

PB103608-50.eps

ComPact NSX with a CNOMO machine-tool rotary handle.

PB105117.eps

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:
  - 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.
- 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.)

Operation when door is opened
An open door shaft operator can be used to operate the circuit breaker when door is opened. This accessory complies with UL508.

The indication of the three positions OFF (**O**), ON (**I**) and tripped (**Trip**) is visible on the circuit breaker.

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.

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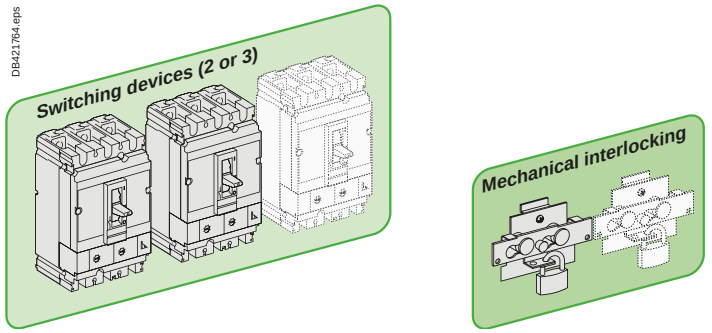
ComPact NSX accessories and auxiliaries
Manual and Automatic Transfer Switch

Schneider Electric offers source change-over systems based on ComPact and MasterPact devices.
They are made of up to 3 circuit breakers or switch-disconnetors linked by an electrical interlocking system that may have different configurations. Moreover, a mechanical interlocking system must be added to protect against electrical malfunctions or incorrect manual operations. In addition, a controller can be used for automatically control the source transfer.
The following pages present the different solutions for mechanical and electrical interlocking and associated controllers.

M

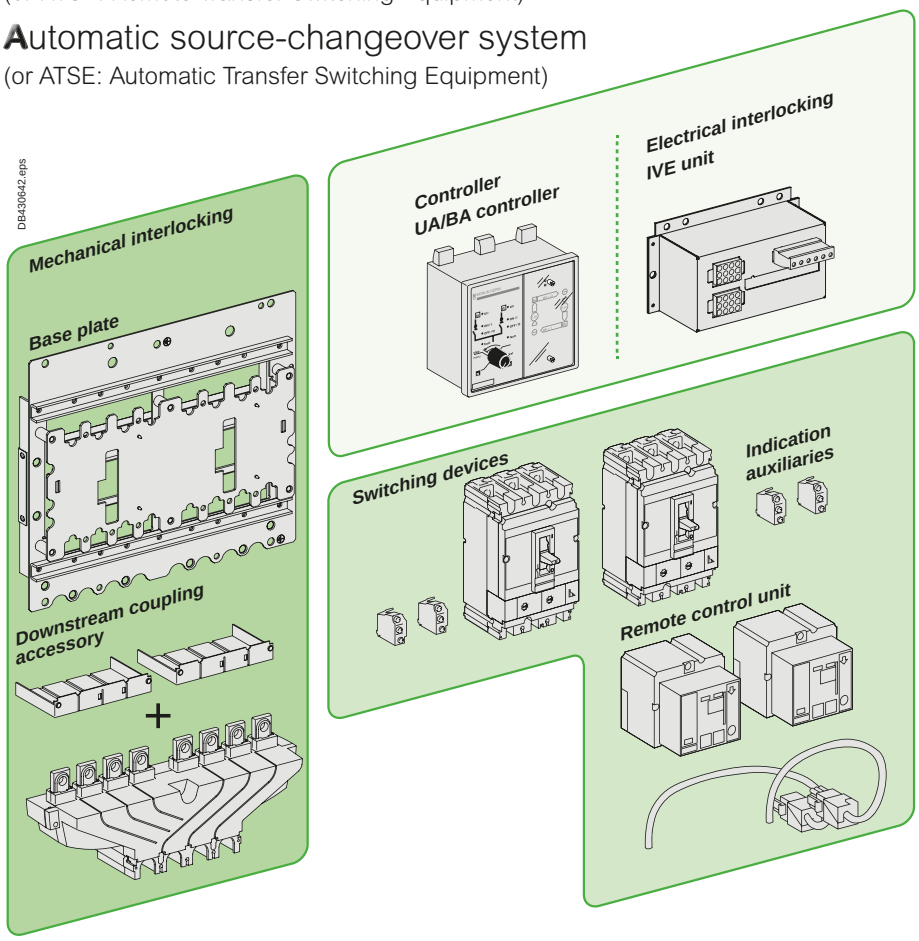
Manual source-changeover system
(or MTSE: Manual Transfer Switching Equipment)



R/A

Remote-operated source-changeover system
(or RTSE: Remote Transfer Switching Equipment)

Automatic source-changeover system
(or ATSE: Automatic Transfer Switching Equipment)



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 Ø5 to 8 mm).
This system can be expanded to more than three devices.
There are two interlocking-system models:
- one for ComPact INS/INV
- one for ComPact NSX100 to NSX250
- one for ComPact NSX400 to NSX630.

Combinations of Normal and Replacement devices

All toggle-controlled fixed or plug-in ComPact NSX100 to NSX630 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.

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Interlocking of two or three toggle-controlled devices.

Interlocking of two devices by 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 Ø5 to 8 mm).
There are two interlocking-system models:
- one for ComPact INS/INV
- one for ComPact NSX100 to NSX250
- one for ComPact NSX400 to NSX630.

Combinations of Normal and Replacement devices

All rotary-handle fixed or plug-in ComPact NSX100 to NSX630 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.

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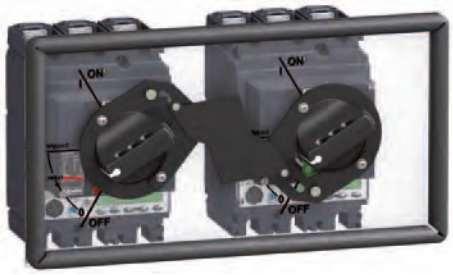

Interlocking of two devices by rotary handles.

Interlocking of two devices by 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 NSX630 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 to NSX250 with an NSX400 to NSX630.

Connection to the downstream installation can be made easier using a coupling accessory.

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Interlocking on a base plate.

Interlocking of devices by 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 NSX630 switch-disconnector and circuit breaker.

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 NSX630 circuit breakers and switch-disconnectors can be interlocked between each other or with any other device equipped with the same type of keylock.

> Transferpact
(source-changeover systems)
LVPED216028EN

ComPact NSX accessories and auxiliaries
Mechanical and electrical interlocking for source-changeover systems


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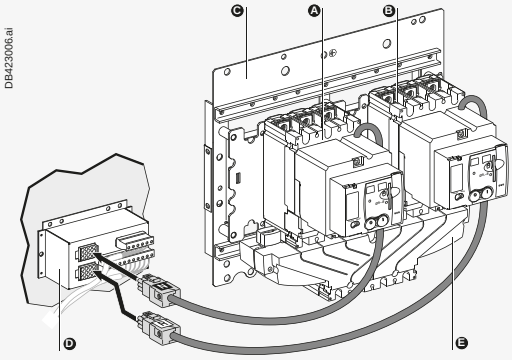
Remote-operated source-changeover system.

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.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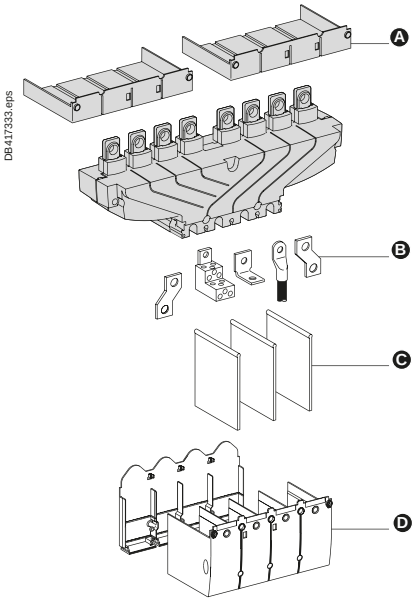
- **A** Circuit breaker QS1 equipped with a motor mechanism and auxiliary contacts, connected to the N source
- **B** Circuit breaker QS2 equipped with a motor mechanism and auxiliary contacts, connected to the R source
- **C** Base plate with mechanical interlocking
- **D** Electrical interlocking unit IVE
- **E** Coupling accessory (downstream connection)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- **A** Short terminal shields
- **B** Terminals
- **C** Interphase barriers
- **D** Long terminal shields

Downstream coupling accessory

This accessory simplifies connection to bars and cables with lugs.
It may be used to couple two circuit breakers of the same size.
Pitch between outgoing terminals:
- ComPact NSX100 to NSX250: 35 mm
- ComPact NSX400 to NSX630: 45 mm.

For ComPact NSX circuit breakers, the downstream coupling accessory can be used only with **fixed versions**.

Connection and insulation accessories

The coupling accessory can be fitted with the same connection and insulation accessories as the circuit breakers.

Possible uses	Downstream coupling	
	Possible mounting	Outgoing pitch (mm)
Remote-operated source-changeover systems		
NSX100 to NSX250	◉	35
NSX400 to NSX630	◉	45

ComPact NSX accessories and auxiliaries

Automatic source-changeover systems with controller

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.
These controllers can be used on source-changeover systems comprising 2 circuit breakers.
For source-changeover systems comprising 3 circuit breakers, the automatic control diagram must be prepared by the installer as a complement to diagrams provided in the “electrical diagrams” section of the catalog source-changeover systems.

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BA controller.

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UA controller.

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TransferPact ACP control plate.

Functions of the BA and UA controllers

Controller		BA	UA
Compatible circuit breakers		ComPact NSX100 to 630 circuit breakers	
4-position switch			
Automatic operation		●	●
Forced operation on Normal source		●	●
Forced operation on Replacement source		●	●
Stop (both Normal and Replacement sources OFF)		●	●
Automatic operation			
Monitoring of the Normal source and automatic transfer from one source to the other		●	●
Engine generator set start-up control			●
Delayed shutdown (adjustable) of engine generator set			●
Load shedding and reconnection of non-priority loads			●
Transfer to Replacement source if one of the Normal source phases is absent			●
Test			
By opening the P25M circuit breaker upstream of the controller		●	
By pressing the test button on the front of the controller			●
Indications			
Circuit-breaker status indication on the front of the controller: ON, OFF, fault trip		●	●
Automatic-mode indication contact		●	●
Other functions			
Selection of type of Normal source (single-phase or three-phase)			●
Voluntary transfer to Replacement source		●	●
Forced operation on Normal source if Replacement source is not operational			●
Additional test contact (not part of controller) Transfer to Replacement source only if contact closed (e.g. for a UR frequency check)		●	●
Setting of maximum start-up time for the Replacement-source			●
Power supply			
Control voltages [1]	220 to 240 V 50/60 Hz	●	●
	380 to 415 V 50/60 Hz	●	●
	440 V 60 Hz	●	●
Operating thresholds			
Undervoltage	0.35 Un ⩽ voltage ⩽ 0.7 Un	●	●
Phase failure	0.5 Un ⩽ voltage ⩽ 0.7 Un		●
Voltage presence	voltage ⩾ 0.85 Un	●	●

Characteristics of output contacts (dry, volt-free contacts)							
Rated thermal current (A)		8					
Minimum load		10 mA at 12 V					
		AC				DC	
Utilisation category (IEC 60947-5-1)		AC12	AC13	AC14	AC15	DC12	DC13
Operational current (A)	24 V	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	-	-	-	-	-	-

[1] 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.

C

ComPact NSX accessories and auxiliaries

Additional measurement module: PowerLogic PowerTag NSX

PowerTag NSX is a ComPact NSX wireless-communication modules for 3P and 3P+N electrical networks, mounted directly on the bottom side of the circuit breaker or the Vigi add-on. PowerTag NSX provides capability to measure energy, monitor voltage loss, and trigger alarms. It then delivers useful data for monitoring and diagnosis of the associated circuit breaker to a concentrator.
In combination with PowerTag Acti9, you can take advantage of a full wireless class 1 solution to monitor energy and to be aware in case of voltage loss or alarming at any level of a distribution panel, being able to take immediately the right actions in case of electrical issue. In addition to monitoring and alarming, PowerTag solution provides a complete knowledge of real time electrical values with a rich and accurate data transfer every 5 seconds.
PowerTag energy sensors can be quickly and easily installed in new or existing panels at any time. Compared to traditional metering solutions, installation time and commissioning are much shorter with no wiring, hence an error proof high density solution and a built-in class 1 accuracy.

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PowerLogic PowerTag NSX.

Functions

PowerTag NSX energy sensor measures the following values in accordance with the IEC 61557-12 standard:
- ■ Energy (4 quadrants):
  - □ Active energy (kWh): total and partial, delivered and received.
  - □ Active energy per phase (kWh): total.
  - □ Reactive energy (VARh): partial, delivered and received.
- ■ Power:
  - □ Active power (W): total and per phase
  - □ Reactive power (VAR): total
  - □ Apparent power (VA): total.
- ■ Voltages (V): phase-to-phase (U12, U23, U31) and phase-to-neutral (V1N, V2N, V3N)
- ■ Currents (A): per phase (I1, I2, I3)
- ■ Frequency
- ■ Power factor
- ■ Voltage loss alarm:
  - □ PowerTag energy sensor sends a "voltage loss" alarm and the current-per-phase value before being de-energized,
  - □ At "voltage loss", PowerTag adds an overload alarm if the current is higher than the rated current of the associated protective device.

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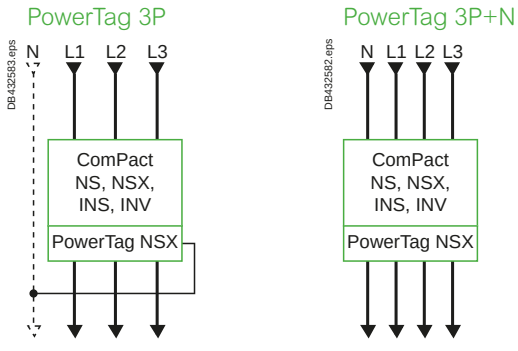
Installation

The module is self-powered and is installed for fixed devices directly on the bottom side of the circuit breaker or Vigi add-on terminals. For plug-in devices, it has to be installed on the base itself.
PowerTag NSX 3P has to be used with 3P devices, and an external neutral voltage tap is provided in case of the installation has a neutral to provide phase-to-neutral voltages, active energy per phase and power per phase. PowerTag 3P+N has to be used with 4P devices.



PowerTag NSX modules are compatible with ComPact NSX100/160/250, ComPact NSX400/630, ComPact INS250-100A to 250A, ComPact INS320/400/500/630, ComPact INV100/160/200/250, ComPact INV320/400/500/630, ComPact NS100/160/250 and ComPact NS400/630.
In case of retrofit, following points have to been checked:
- ■ Clearance to be able to add PowerTag module (see dimensions in chapter E) and to respect bending radius of cables
- ■ Condition of power connectors: to be replaced if damaged
- ■ Tightening torques depending of the connector used

ComPact NSX accessories and auxiliaries

Additional measurement module: PowerLogic PowerTag NSX

Integration in concentrator

PowerTag Link concentrate wirelessly data from PowerTag and make them available over Ethernet:

For Commercial & Building applications

PowerTag Link (Monitoring)	PowerTag Link HD (Monitoring)	Smartlink SI B (Monitoring & Control)
		
A9XMWD20	**A9XMWD100**	**A9XMZA08**

For Small Business applications

PowerTag Link C (Monitoring)

A9XELC10

Concentrator embedded web pages allow:

- to do commissioning
- to display measured values
- to set and display alarms and pre-alarms.

PowerTag NSX is also compatible with Wiser Energy (Residential).
Refer to the concentrator catalogs for more information.

Commissioning

Commissioning can be done very easily:

- for PowerTag Link C: with a smartphone
- for PowerTag Link, PowerTag Link HD and Smartlink SI B: with embedded webpages or with EcoStruxure Power Commission which provides a test report for system integration with all the Modbus registers, including bits and descriptions associated.

ComPact NSX accessories and auxiliaries

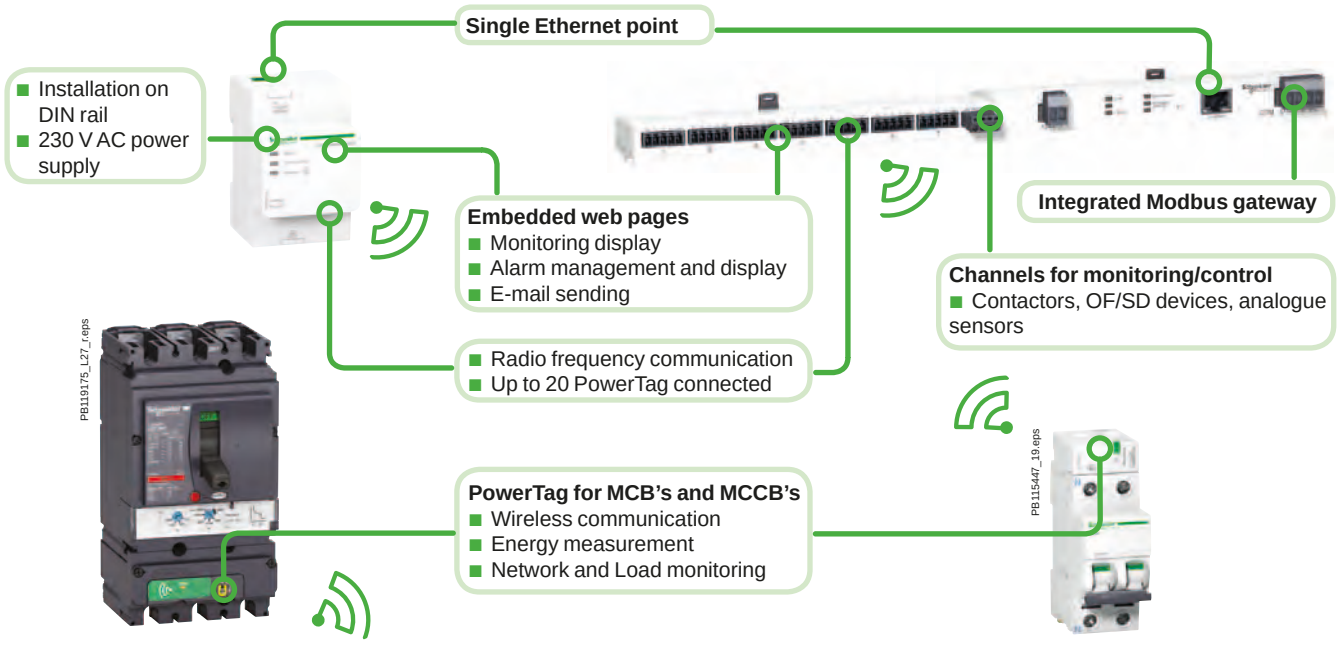
Additional measurement module: PowerLogic PowerTag NSX

Metering and monitoring

PowerTag Link / PowerTag Link HD (Ethernet)

Metering, monitoring and control

Smartlink SI B (Ethernet)



C

Technical characteristics

Main characteristics			
Rated voltage	Un	Phase-to-neutral	230 VAC ± 20 %
		Phase-to-phase	400 VAC ± 20 %
Frequency			50/60 Hz
Operating current	In		250 A / 630 A
Maximum operating current			1.2 x In
Saturation current			2 x In
Maximum consumption			3.7 VA
Starting current	Ist		160 mA / 400 mA
Base current	Ib		40 A / 100 A
Additional characteristics			
Operating temperature			-25 °C to +70 °C
Storage temperature			-50 °C to +85 °C
Overvoltage category		As per IEC 61010-1	Cat. IV
Measuring category		As per IEC 61010-2-30	Cat. III
Pollution degree			3
Altitude			Up to 2000 m without derating [1]
Degree of protection device			IP20
			IK07
Radio-frequency communication			
ISM band 2.4 GHz			2.4 GHz to 2.4835 GHz
Channels		As per IEEE 802.15.4	11 to 26
Isotropic Radiated Power		Equivalent (EIRP)	0 dBm
Maximum transmission time			< 5 ms
Channel occupancy		For 1 device	messages sent every 5 seconds

Characteristics of measuring functions				
Function	**Symbol**	**Performance as per IEC 61557-12**		**Measuring range (250 A / 630 A)**
		Class	**Measuring range (250 A / 630 A)**	
Active power (per phase, total)	P	1	4 to 250 A / 10 to 630 A	88 W to 416 kW / 221 W to 1048 kW
Total reactive power	Q_A	2		88 VAR to 416 kVAR / 221 VAR to 1048 kVAR
Total apparent power	S_A	2		88 VA to 416 kVA / 221 VA to 1048 kVA
Active Energy (per phase, total, partial)	E_a	1		0 to 281.10⁹ kWh
Total reactive Energy	E_{rA}	2		0 to 281.10⁹ kVARh
Frequency	f	1	45 to 55 Hz	45 to 65 Hz
Phase current	I	1	8 to 250 A / 20 to 630 A	160 mA to 500 A / 400 mA to 1260 A
Voltages (Line to Line)	U	0.5	Un ± 20 %	320 to 480 VAC
Power factor (arithmetic)	PF_A	1	From 0.5 inductive to 0.8 capacitive	-1 to 1

[1] Above 2000 m, please consult us.

ComPact NSX accessories and auxiliaries

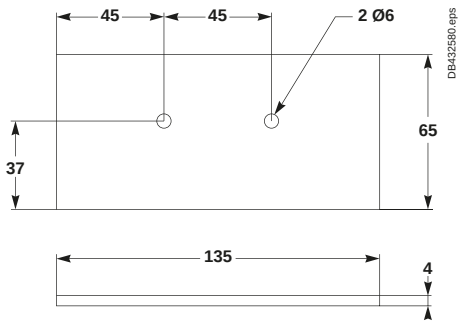
Additional measurement module: PowerLogic PowerTag NSX



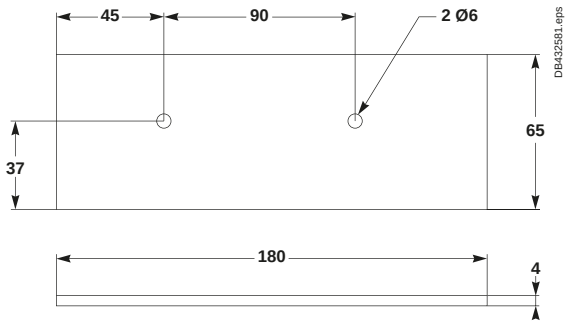

Products (AC network)		Mounting position	250 3P	250 3P+N	630 3P	630 3P+N
ComPact						
Circuit breakers						
NSX100/160/250 B/F/N/H/S/L/R Fixed	3P	Bottom	☑	-	-	-
	4P	Bottom	-	☑	-	-
NSX400/630 F/N/H/S/L/R Fixed	3P	Bottom	-	-	☑	-
	4P	Bottom	-	-	-	☑
NSX100/160/250 B/F/N/H/S/L/R Plug-In (mounted on the base)	3P	Top / Bottom	☑	-	-	-
	4P	Top / Bottom	-	☑ [1]	-	-
NSX400/630 F/N/H/S/L/R Plug-In (mounted on the base)	3P	Top / Bottom	-	-	☑ [2]	-
	4P	Top / Bottom	-	-	-	☑ [1] [2]
NS100/160/250 N/SX/H/L Fixed	3P	Bottom	☑	-	-	-
	4P	Bottom	-	☑	-	-
NS400/630 N/H/L Fixed	3P	Bottom	-	-	☑	-
	4P	Bottom	-	-	-	☑
NS100/160/250 N/SX/H/L Plug-in (mounted on the base)	3P	Top / Bottom	☑	-	-	-
	4P	Top / Bottom	-	☑ [1]	-	-
NS400/630 N/H/L Plug-in (mounted on the base)	3P	Top / Bottom	-	-	☑ [2]	-
	4P	Top / Bottom	-	-	-	☑ [1] [2]
Circuit breakers equipped with Vigi block						
NSX100/160/250 B/F/N/H/S/L/R Fixed	3P	Bottom	☑	-	-	-
	4P	Bottom	-	☑	-	-
NSX400/630 F/N/H/S/L/R Fixed	3P	Bottom	-	-	☑	-
	4P	Bottom	-	-	-	☑
NSX100/160/250 B/F/N/H/S/L/R Plug-In (mounted on the base)	3P	Top	☑	-	-	-
NSX400/630 F/N/H/S/L/R Plug-In (mounted on the base)	3P	Top	-	-	☑ [2]	-
Switches						
INS250/INV - 100/160/200/250	3P	Bottom	-	☑	-	-
	4P	Top / Bottom	-	☑ [1]	-	-
INS/INV - 320/400/500/630	3P	Bottom	-	-	-	☑
	4P	Top / Bottom	-	-	-	☑ [1]

[1] neutral on the right when mounted on top side

[2] when plate mounted, need to add an intercalary wedging plate under the PowerTag module with following dimensions:



3P



3P + N

ComPact NSX accessories and auxiliaries
Additional measurement and indication modules

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Voltage-presence indicator.

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.

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ComPact NSX with current-transformer module.

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.
- voltage measurement output resistance 3500 Ω ±25 %, maximum current 1 mA
- The voltage measurement outputs are intended only for measurements (1 mA max.) and may not be used to supply the display.

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ComPact NSX with ammeter module.

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.

Vigi add-on Alarm

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 add-on, 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

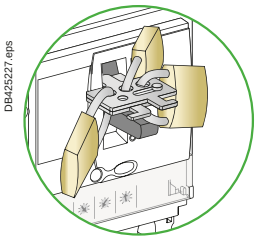
- Settings: 100 - 200 - 500 - 1000 mA.
- Accuracy: -50 +0 %.
- Time delay following insulation drop: 5 to 10 seconds.
- AC-system voltage: 200 to 440 V AC.

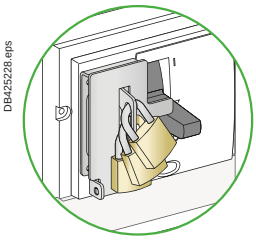
Vigi add-on Alarm.

PB105125.eps

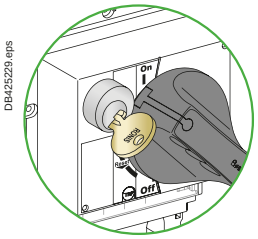
C

ComPact NSX accessories and auxiliaries
Locks

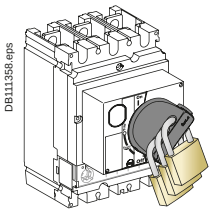


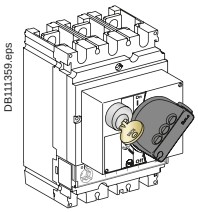


Toggle locking using padlocks and an accessory:
Removable device
Fixed device attached to the case [3].

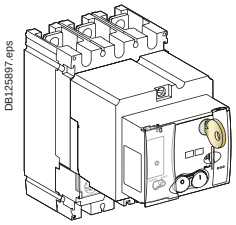


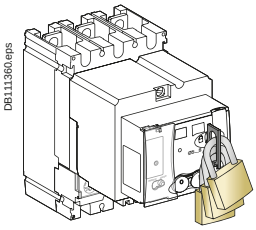
Rotary-handle locking using a keylock.



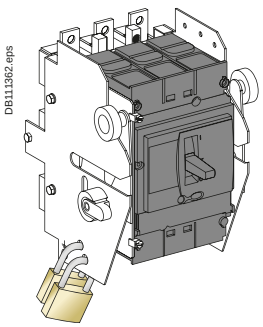


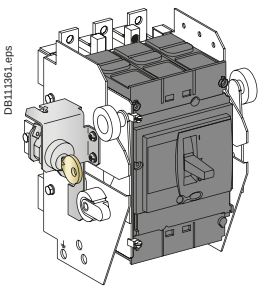
Rotary-handle locking using a padlock or a keylock.





Motor-mechanism locking using a padlock or a keylock.





Chassis locking in the connected position.

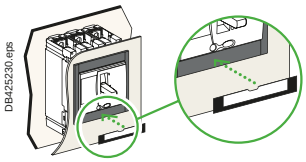
Locking in the OFF position guarantees isolation as per IEC 60947-2. Padlocking systems can receive up to three padlocks with shackle diameters ranging from 5 to 8 mm (padlocks not supplied). Certain locking systems require an additional accessory.

Control device		Function	Means	Required accessories
Toggle		Lock in OFF position	Padlock	Removable device
		Lock in OFF or ON position	Padlock	Fixed device
Direct rotary handle	Standard	Lock in ■ OFF position ■ OFF or ON position [1]	Padlock	-
			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]	Padlock	-
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 mechanism		Lock in OFF position remote operation disabled	Padlock	-
			Keylock	Locking device + keylock
Withdrawable circuit breaker		Lock in ■ disconnected position	Padlock	-
			Keylock	Locking device + keylock
		■ connected position	Keylock	Locking device + keylock

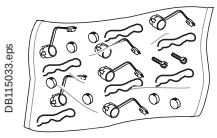
[1] Following a simple modification of the mechanism.
[2] Unless door locking has been voluntarily disabled.
[3] Only for 3P-4P.

ComPact NSX accessories and auxiliaries

Sealing accessories



Identification accessories.



Sealing accessories.

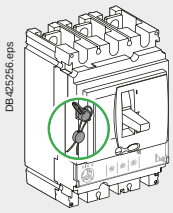
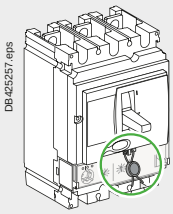
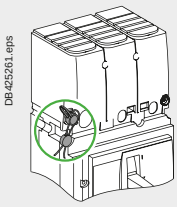
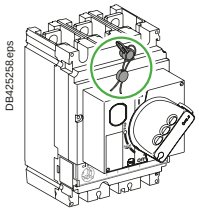
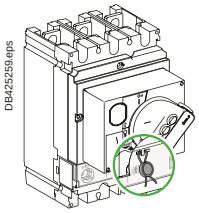
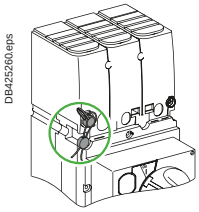
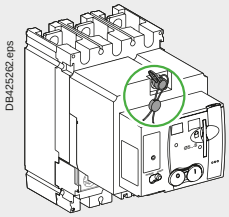
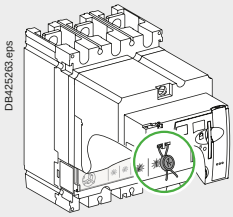
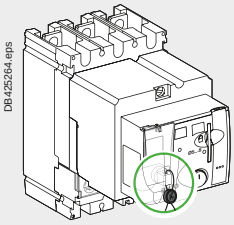
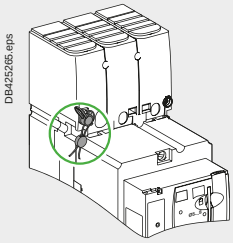
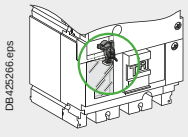
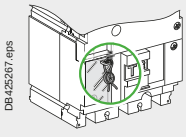
Outgoing-circuit identification

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

Toggle control				
Rotary handle				
Motor mechanism				
Types of seals **Protected operations**	**Front-cover fixing screw** ■ front removal ■ access to auxiliaries ■ trip-unit removal.	**Trip-unit transparent cover** ■ modification of settings ■ access to test connector.	**Motor-mechanism transparent cover** ■ access to manual/auto mode selection switch: depending on its position, manual [1] or automatic operation is not possible. [1] In this case, local operation is not possible.	**Terminal-shield fixing screw** ■ access to power connections (protection against direct contact).
Access to Vigi add-on settings				
Types of seals **Protected operations**	**Vigi add-on fixing device** ■ removal of the Vigi add-on.	**Protection cover for settings** ■ modification of settings.		

ComPact NSX accessories and auxiliaries
Individual enclosures


PB103593-40.eps

IP55 metal enclosure.


PB105120.eps

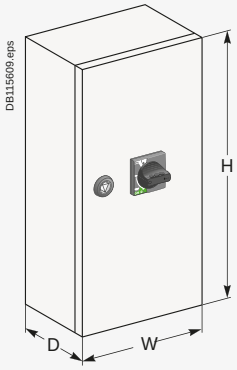
IP55 insulating enclosure.

Individual enclosures are available for ComPact NSX/ComPact NSX Vigi add-on devices with two, three or four poles.
All fixed, front connections are possible, except right-angle, 45°, double-L and edgewise terminal extensions.
All spreaders may be installed in the enclosures intended for ComPact NSX/ ComPact NSX Vigi add-on 250 to 630 devices, except the 70 mm spreaders for NSX400/630.

Two models of enclosures
- ■ IP55 metal individual enclosure, with:
- □ metal enclosure
- □ door with keylock and cut-out for rotary handle
- □ extended rotary handle, IP55, IK08, black or red/yellow
- □ device mounting plate
- □ removable plate (without holes) for cable entry through bottom.
- ■ IP55 insulating individual enclosure, with:
- □ polyester insulating enclosure
- □ transparent cover, screwed, neoprene gasket, with cut-out for extended rotary handle
- □ extended rotary handle, IP55, 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 ComPact NSX100 to 250 Vigi add-on	650 x 350 x 250
□ ComPact NSX400	650 x 350 x 250
□ ComPact NSX630 and ComPact NSX400/630 Vigi add-on	850 x 600 x 250
■ Insulating enclosures:	
□ ComPact NSX100/160	360 x 270 x 235
□ ComPact NSX250 and ComPact NSX100/160 Vigi add-on	540 x 270 x 235
□ ComPact NSX400/630	720 x 360 x 235
□ ComPact NSX250/630 Vigi add-on	720 x 360 x 235



DB115609.eps

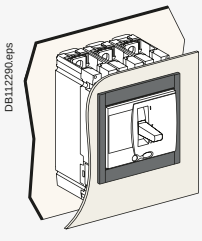
IP30 or IP40 escutcheons for fixed devices

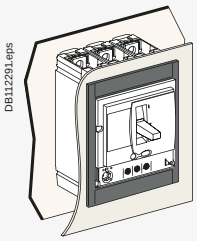
IP30

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 add-on, can be combined with the above.

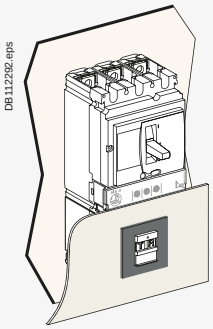
IP40

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.

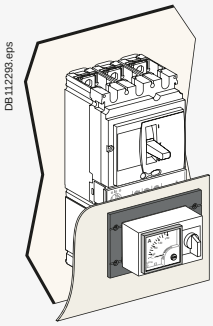




Escutcheon for toggle without and with access to the trip unit.



Escutcheon for Vigi add-on.



Wide escutcheon for ammeter.

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).

IP30 escutcheon.

IP30 escutcheon with access to the trip unit.

C

ComPact NSX accessories and auxiliaries
Escutcheons and protection collars

PB103777-36.eps

Escutcheon with collar for toggle.

PB103780-36.eps

Escutcheon for Vigi add-on.

PB103775-40.eps

Toggle cover.

PB103820_35.eps

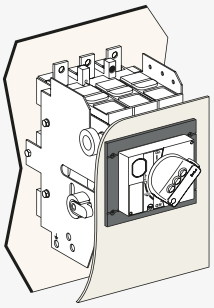
NS retrofit front cover.

IP40 escutcheons for withdrawable devices

IP40 for withdrawable devices

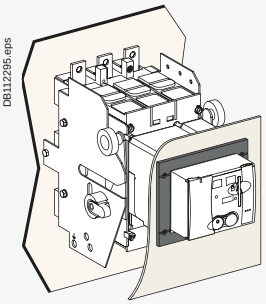
The two types, with a gasket, are screwed to the door cut-out:
- for rotary handle or motor mechanism: standard IP40 escutcheon
- for toggle with extension: standard escutcheon + collar for withdrawal.

DB112294.eps



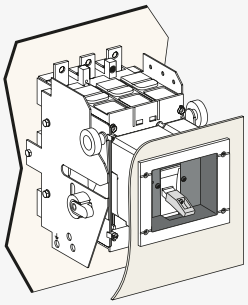
Standard escutcheon with rotary handle.

DB112295.eps



Standard escutcheon for motor mechanism.

DB112296.eps

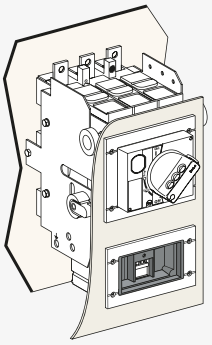


Standard escutcheon with collar for withdrawal, for toggle.

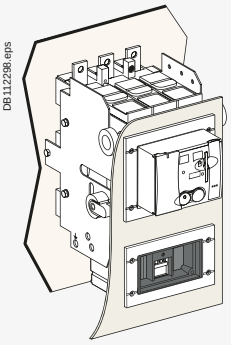
IP40 for Vigi add-on on withdrawable devices

The two types, with a gasket, are screwed to the door cut-out:
- for rotary handle or motor mechanism: standard IP40 escutcheon
- for toggle: standard escutcheon + collar for withdrawal.

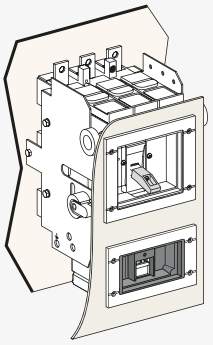
DB112297.eps



DB112298.eps



DB112299.eps



Escutcheon for Vigi add-on, with escutcheons for the three types of control.

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.

DB112218.eps

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.

Smart Panel integration

D

Enerlin☒ functions
Communication wiring system

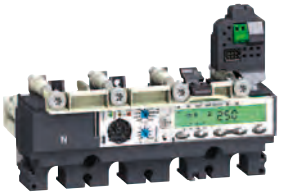
Smart Panels
Enerlin'X

Get circuit breaker status and electrical values
Available information and functions

PB119232.eps

PB115828.eps

PB115829.eps

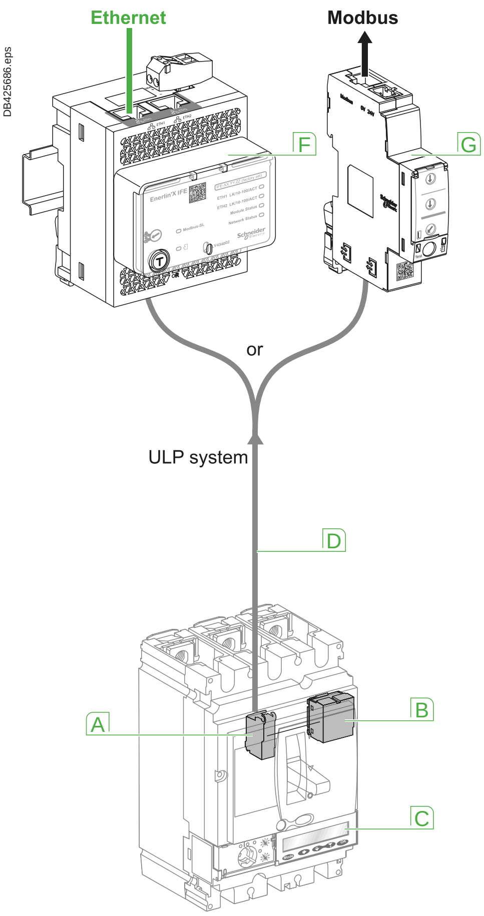


MicroLogic trip units for 3 poles, 4 poles ComPact circuit breakers

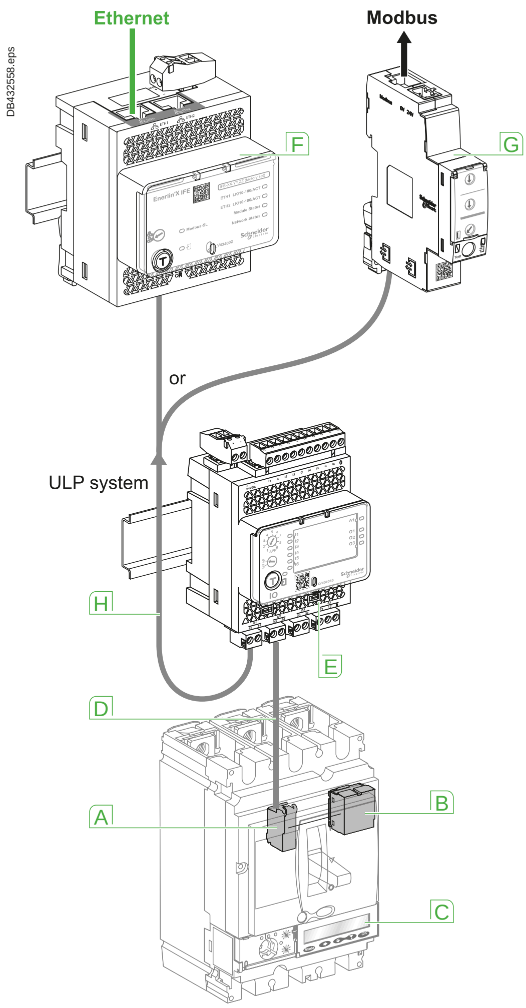
Available functions	MicroLogic type	
Status indications		
ON/OFF (O/F)	A	E
Fault-trip SDE	A	E
Connected / disconnected / test position CE/CD/CT (I/O module only)	A	E
Controls		
Open	A	E
Close	A	E
Measurements		
Instantaneous measurement information	A	E
Averaged measurement information		E
Maximeter / minimeter	A	E
Energy metering		E
Demand for current and power		E
Power quality		E
Operating assistance		
Protection and alarm settings	A	E
Histories	A	E
Time stamped event tables	A	E
Maintenance indicators	A	E

All ComPact circuit breakers are equipped with a MicroLogic trip unit. This adjustable unit is mainly designed for tripping the circuit breaker in case of necessity and monitoring the downstream circuit Alarms may be programmed for remote indications.
Electrical measurements, operation data for predictive maintenance, are provided for local display or distant monitoring.

Fixed ComPact NSX circuit breaker



Drawout ComPact NSX circuit breaker



- [A] Internal terminal block for communication via NSX cord
- [B] BSCM module
- [C] MicroLogic trip unit
- [D] NSX cord
- [E] I/O module
- [F] IFE interface module
- [G] IFM module
- [H] ULP cable

ULP system

is a fast communication link dedicated to circuit breaker monitoring and control. Based on a RS485 physical liaison with cable segments up to 5 meters, it is well adapted to severe environment. A choice of 6 pre-connectorized cables with different length is provided.

IFE interface

ULP to Ethernet interface module

Provides and IP address to any circuit breaker fitted with an ULP port. The IFE interface makes all available data from the circuit breaker accessible from an Ethernet compatible display (FDM128), a PC with common browser, or IFE switchboard server which generates its owns web pages.

IFM

ULP to Modbus Interface module

Makes all available data of a circuit breaker fitted with an ULP port accessible via a Modbus network. IFM acts as a Modbus slave, accessible from a Modbus master (IFE switchboard server, Acti 9 Smartlink Ethernet or Com'X).

I/O

I/O application module

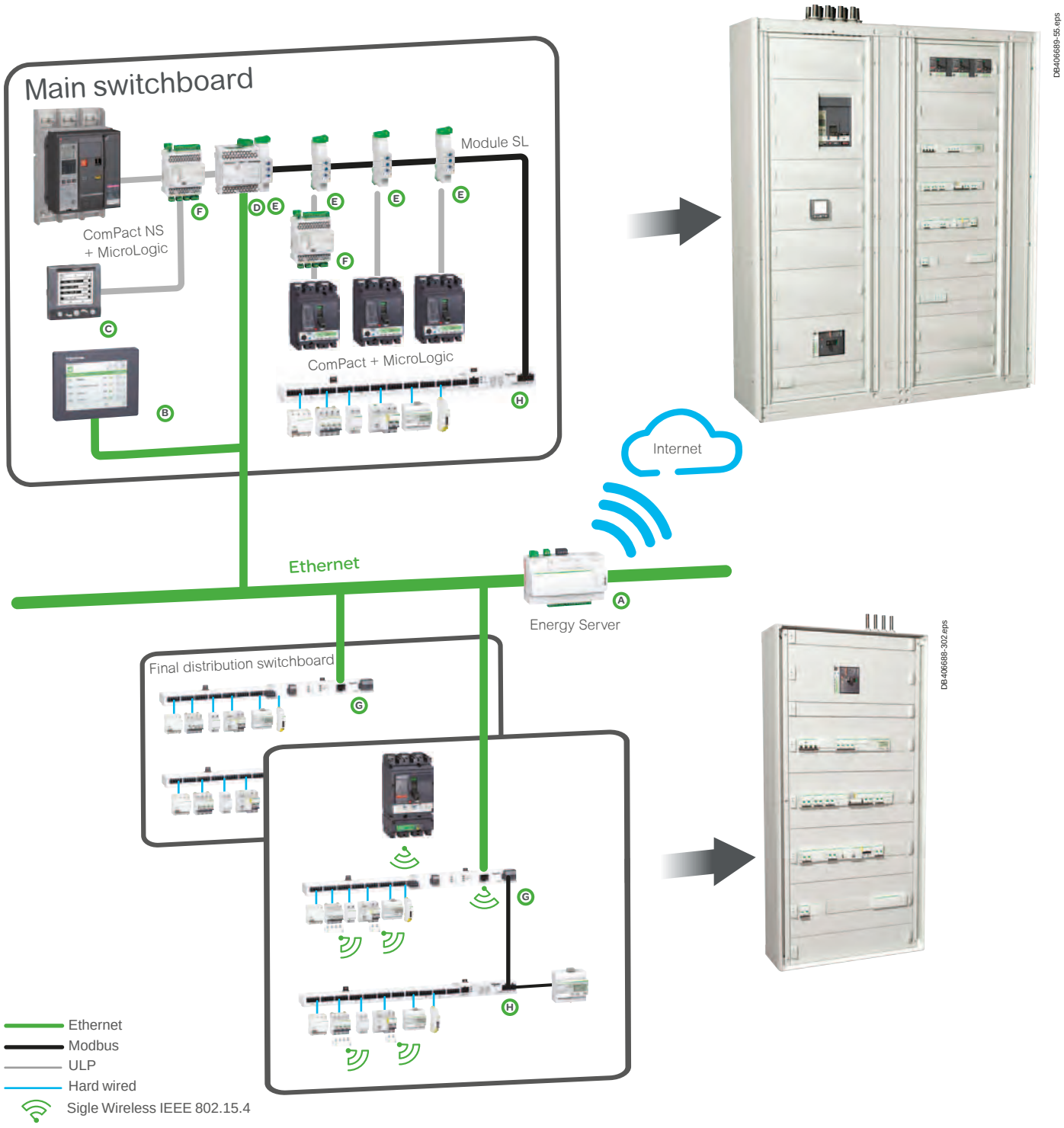
I/O is dedicated to circuit breaker with ULP liaison. It provides the monitoring and control of any application around the circuit breaker (lighting or load control, cooling system, pulse metering acquisition...).

Enerlin'X digital system
Overview

Enerlin'X communication system provides access to status, electrical values and devices control using Ethernet and Modbus SL communication protocols.

Ethernet has become the universal link between switchboards, computers and communication devices inside the building. The large amount of information which can be transferred makes the connection of Enerlin'X digital system to hosted web services of Schneider Electric a reality. More advantages are offered to integrators thanks to configuration web pages available remotely or on the local Ethernet network.

Modbus SL 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).



Enerlin'X digital devices and displays

		Name	Function	Port (to device)	Port (to server)	Inputs	Outputs	Cial. Ref.
A		Com'X 210	Energy data logger + Ethernet Gateway	Ethernet Modbus Master, Zigbee (to wireless meters)	Ethernet cable + WiFi	64 devices: 6 binary 2 analog 32 Modbus devices + other Ethernet devices (Modbus TCP)	-	**EBX210**
		Com'X 510 24 V DC + PoE	Energy server + Ethernet Gateway				-	**EBX510**
B		FDM128	Ethernet LCD colour touch screen	-	Ethernet		-	**LV434128**
C		FDM121	LCD display for circuit breaker	ULP	-	1 circuit breaker	-	**TRV00121**
D		IFE Switchboard server	Switchboard server	Modbus Master & ULP	Ethernet	20 circuit breakers	-	**LV434002**
		IFE interface	Ethernet interface for circuit breakers	ULP	Ethernet	1 circuit breaker	-	**LV434001**
E		IFM	Modbus interface for circuit breaker	ULP	Modbus Slave	1 circuit breaker	-	**LV434000**
F		I/O	Input/Output application module for circuit breaker	ULP	ULP	6 binary 1 analog (PT100 sensor)	3	**LV434063**
G		Acti 9 Smartlink SI B Ethernet wireless	Ethernet server for I/O and Modbus slave devices	Modbus Master & Wireless to PowerTag	Ethernet	14 binary 2 analog	7	**A9XMZA08**
H		Acti 9 Smartlink Modbus slave	Modbus interface with Input/Output functions	-	Modbus Slave	22 binary	11	**A9XMSB11**

Ethernet Gateway or Interface: routes an internal traffic (ULP or other protocole) to the Internet, the outgoing messages are coded with Modbus TCPIP protocol.

Server (Switchboard, Energy): routes the internal traffic to the Internet. Other complementary functions such as data logging and storage. Provides devices status and energy trends on internal web pages...

Note: for more information please consult: Configuration & commissioning guide of connected devices & software - New buildings

Com'X 510
Energy server

Main functions

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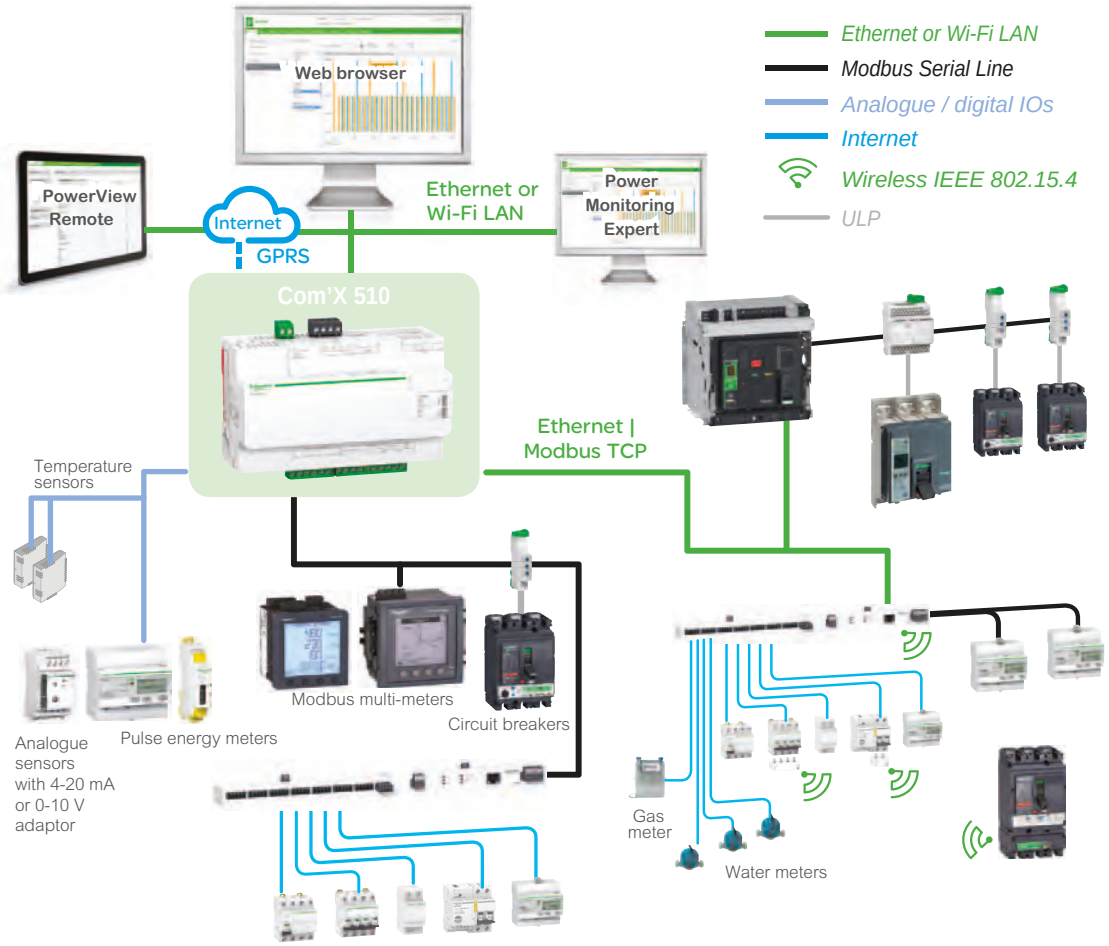

D

Data collector
Collects and stores energy data from up to 64 field devices, connected to either:
- ethernet TCP/IP field network
- modbus Serial line network (up to 32 devices)
- embedded digital and analogue inputs.

"Field devices" consist of :
- PowerLogic meters for power and energy monitoring
- MasterPact, PowerPact, or ComPact circuit-breakers for protection and monitoring
- Acti 9 protection devices, meters, remote controlled switches, etc
- water, Air, Gas, Electricity, and Steam consumption meters, from specialized manufacturers, delivering pulses as per standard (see table at end of this document)
- environmental sensors such as temperatures, humidity, and CO2 levels in a building, providing analogue information.

Data logging and storage capabilities include:
- data logging period: configurable from every minute to once a week
- data storage duration: up to 2 years, depending on quanitity of collected data
- able to set time and send reset instructions to field devices.

Embedded energy management software
The Com'X provides the end-user with immediate visibility into energy consumption throughout the site. As soon as the Com'X is connected to the Local Area Network (LAN), several web pages are accessible via any standard web browser, (without plug-in or additional components).

These web pages display real-time data as it is collected, in easy to understand tabular and summary formats. In addition, users can get simple analysis of historical data in bar graph or trending formats.

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Energy dashboard comparing accumulated over time energy values (partial screen)

PB114327_60.eps

Energy Server Com'X 510 data logger

PB114854-67.eps

Raw data and measurements from one field device (partial screen)

PB114853-67.eps

Historical trending comparing multiple devices or multiple topics (partial screen)

Additional functions

Data publisher

Batches of collected data can also be periodically transmitted to an Internet server, as:

- XML files, for processing by StruXureware™ web services, such as EcoStruxure™ Facility Advisor
- CSV files for viewing in Excel or transformed or uploading to programs such as StruXureware™ EcoStruxure™ Power Monitoring Expert or any compatible software.

Data publishing function supports 4 transfer protocols over Ethernet or Wi-Fi:

- HTTP
- HTTPS
- FTP
- SMTP.

Gateway

If selected by the user, the Com'X510 can make data from connected devices available in real time:

- in Modbus TCP/IP format over Ethernet or Wi-Fi
- for requests by energy management software
- gateway to Zigbee device data by external Modbus TCP/IP clients.

Modbus packets can be sent from managing software to field devices through Modbus serial line or Modbus TCP/IP over Ethernet.

D

Com'X 510 Commercial reference numbers

Com'X 510 energy server 24 V DC power supplied UL rated	**EBX510**
Com'X Wi-Fi USB interface	**EBXA-USB-WiFi**
Com'X GPRS interface SIM card	**EBXA-GPRS-SIM**
Com'X GPRS interface	**EBXA-GPRS**
Com'X External GPRS antenna	**EBXA-ANT-5M**
Com'X Zigbee USB interface	**EBXA-USB-Zigbee**

Please see your Schneider Electric representative for complete ordering information.

FDM128 Ethernet switchboard display

MicroLogic measurement capabilities come into full play with the FDM128 switchboard display. It connects to Ethernet communication via RJ45 port 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.

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FDM128 display.

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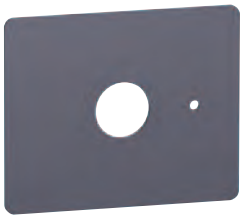

Surface mount accessory.

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FDM128

The FDM128 is an intelligent Ethernet display. It collects the data from up to 8 devices via Ethernet network.
The FDM128 switchboard display unit can be connected to a MicroLogic COM option (BCM ULP via IFE). It uses the sensors and processing capacity of the MicroLogic control unit. It is easy to use and requires no special software or settings.
The FDM128 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 trips

The FDM128 is intended to display MicroLogic A/E measurements, trips and operating information. It cannot be used to modify the protection settings.
Measurements may be easily accessed via a menu.
Trips are automatically displayed.
A pop-up window displays the time-stamped description of the trip.

Status indications

When the circuit breaker is equipped with the Breaker Status Command Module (BSCM) and NSX cord, the FDM128 display can also be used to view circuit breaker status conditions:
- O/F: ON/OFF
- SDE: Fault-trip indication (overload, short-circuit, ground fault)
- CE, CD cradle management with I/O application module.

Remote control

When the circuit breaker is equipped with the BSCM, NSX cord and Communicating Motor Mechanism (MTc), the FDM128 display can also be used to control (open/close) the circuit breaker.

Main characteristics

- 115.2 x 86.4 mm with 5.7" QVGA display 320 x 240 pixels.
- Color TFT LCD, LED backlight.
- Wide viewing angle: vertical ±80°, horizontal ±70°.
- High resolution: excellent reading of graphic symbols.
- Operating temperature range -10 °C to +55 °C.
- CE / UL / CSA marking (pending).
- 24 V DC power supply, with tolerances 24 V (limit 20.4 - 28.8 V DC).
- Consumption ≤ 6.8 W.

Mounting

The FDM128 is easily installed in a switchboard.
- Standard door hole Ø 22 mm.

The FDM128 degree of protection is IP65 in front and IP54.

Connection

The FDM128 is equipped with:
- a 24 V DC terminal block:
  - power supply range of 24 V DC (limit 20.4 - 28.8 V DC). The FDM128 display unit has a 2-point screw connector on the rear panel of the module for this purpose.
- One RJ45 Ethernet jacks.

The MicroLogic connects to the internal communication terminal block on the MasterPact via the breaker ULP cord and Ethernet connection through IFE.

FDM128 Ethernet switchboard display

Navigation

Touch screen is used for intuitive and fast navigation.
The user can select the display language (Chinese, English, French, German, Italian, Portuguese, Spanish, etc.).

Screens

Main menu

Quick view
Alarms
Metering
Maintenance
Control

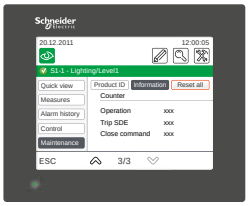
When not in use, the screen is automatically shifted to low back-lighting.

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 the trip history.
- Services provides access to the operation counters, energy and maximeter reset function, maintenance indicators, identification of modules connected to the internal bus and FDM128 internal settings (language, contrast, etc.).



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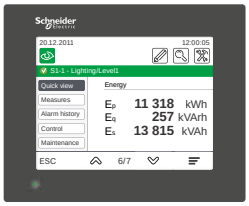
Product identification.



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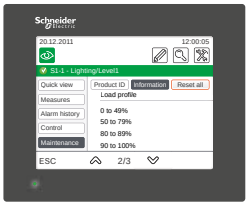
Metering: meter.



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Services.

D

FDM121 switchboard display

MicroLogic measurement capabilities come into full play with the FDM121 switchboard display. It connects to COM option (BCM ULP) via a breaker ULP 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.

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FDM121 display.

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Surface mount accessory.

PB119235.eps

Connection with FDM121 display unit.

FDM121

An FDM121 switchboard display unit can be connected to a ULP IMU using a prefabricated cord to display all measurements, alarms, histories and event tables, maintenance indicators, management of installed devices on a screen. The result is a veritable 96 x 96 mm Power Meter.
The FMD121 display unit requires a 24 V DC power supply.
The FDM121 is a switchboard display unit that can be integrated in the ComPact NSX100 to 630 A, PowerPact H/J/L/P/R, compact NS or MasterPact systems. 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.
Also, it provides monitoring and control with the use of the I/O application module, the motor mecanism module, or the Breaker Status module.
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 Breaker Status Module, 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).

When the circuit breaker system is equipped with the I/O Application module, the FDM121 can monitor and control:
- craddle management
- circuit breaker operation
- light and load control
- custom application.

When the circuit breaker system is equipped with the motor mechanism module, the FDM121 offers remote closing and opening control.

Main characteristics

- 96 x 96 x 30 mm screen requiring 10 mm behind the door (or 20 mm when the 24 V power supply connector is used).
- White backlighting.
- Wide viewing angle: vertical ±60°, horizontal ±30°.
- 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.
- Consumption 40 mA.

Mounting

The FDM121 is easily installed in a switchboard.
- Standard door cut-out 92 x 92 mm.
- Attached using clips.

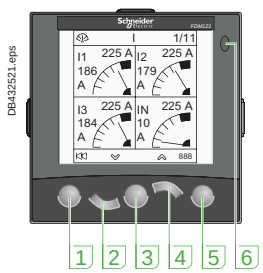
To avoid a cut-out in the door, an accessory is available for surface mounting by drilling only two 22 mm diameter holes.
The FDM121 degree of protection is IP54 in front. IP54 is maintained after switchboard mounting by using the supplied gasket during installation.

Connection

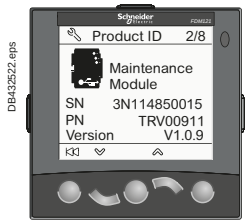
The FDM121 is equipped with:
- a 24 V DC terminal block:
  - plug-in type with 2 wire inputs per point for easy daisy-chaining
  - power supply range of 24 V DC -20 % (19.2 V) to 24 V DC +10 % (26.4 V).

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.

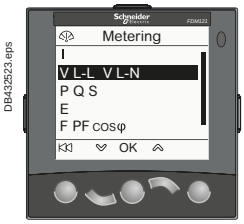
FDM121 switchboard display



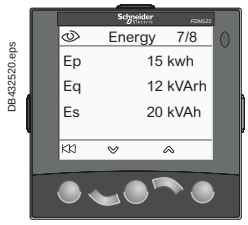
1 escape
2 down
3 ok
4 up
5 context
6 alarm LED



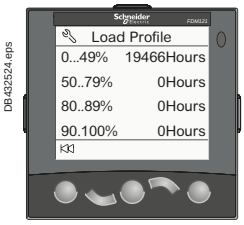
Product identification.



Metering: sub-menu.



Metering: meter.



Services.

■ two RJ45 jacks.
The MicroLogic connects to the internal communication terminal block on the ComPact NSX via the 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.

Navigation

Five buttons are used for intuitive and fast navigation.
The “Context” button may be used to select the type of display (digital, bargraph, analogue).
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.

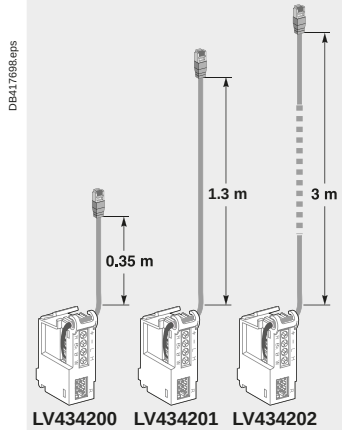
Quick view | Alarms | Metering | Services | Control

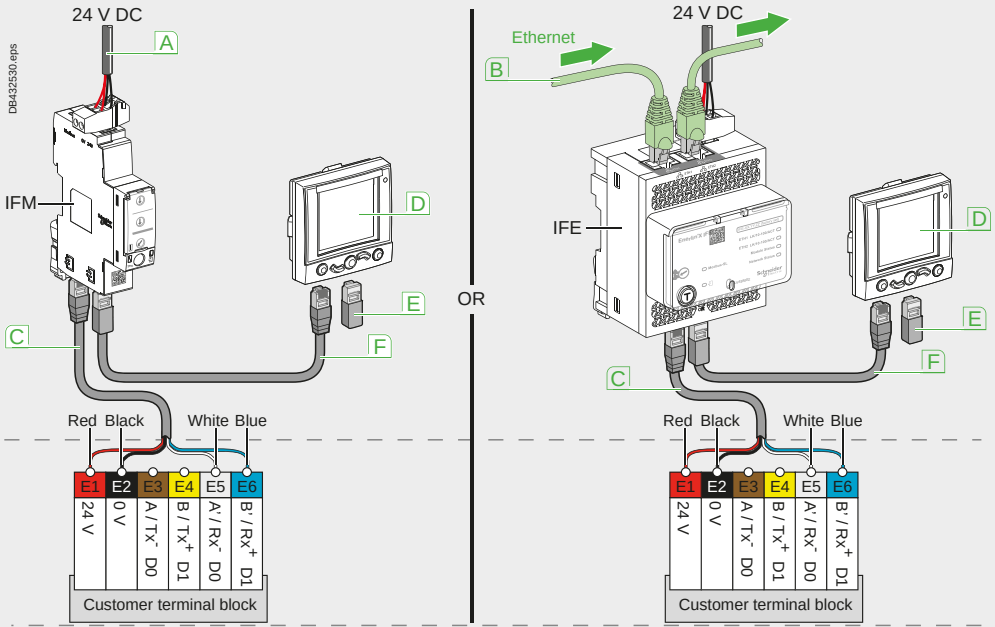
When not in use, the screen is not backlit. Backlighting can be activated by pressing one of the buttons. It goes off after 3 minutes.

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.).

Communication components and FDM121 connections





Connections
■ ComPact NSX is connected to the ULP devices (FDM121 display, IFM, IFE or I/O) unit via the NSX cord.
□ cord available in three lengths: 0.35 m, 1.3 m and 3 m.
□ ULP lengths up to 10 m possible using extensions.

A Modbus network
B Ethernet network
C NSX cord
D FDM121 display
E ULP termination
F ULP cable

IFE interface
IFE switchboard server

PB115852.eps

IFE interface, ref.: LV434001

PB119096.eps

IFE switchboard server, ref.: LV434002

DB406743-67.eps

Description

The IFE interface and IFE switchboard server enable LV circuit breakers as MasterPact NT/NW, MasterPact MTZ, ComPact NSX or PowerPact to be connected to an Ethernet network.

IFE interface: ref. LV434001

Provides an Ethernet access to a single LV circuit breaker.

Function

Interface - one circuit breaker is connected to the IFE interface via its ULP port.

IFE switchboard server: ref. LV434002

Provides an Ethernet access up to 20 LV circuit breakers.

Functions

- Interface - one circuit breaker is connected to the IFE interface via its ULP port.
- Server: several circuit breakers on a Modbus network are connected via the IFE switchboard server master Modbus port.
- Collects and provides web pages from multiple IP devices (other IFE LV434002, Smartlink Ethernet, PM5000 Ethernet…).

IFE interface, IFE switchboard server features

- Dual 10/100 Mbps Ethernet port for simple daisy chain connection.
- Device profile web service for discovery of the IFE interface, IFE switchboard server on the LAN.
- ULP compliant for localization of the IFE interface in the switchboard.
- Ethernet interface for ComPact, MasterPact and PowerPact circuit breakers.
- Gateway for Modbus-SL connected devices (IFE switchboard server only).
- Embedded set-up web pages.
- Embedded monitoring web pages.
- Embedded control web pages.
- Built-in e-mail alarm notification.
- Automatic recovering of Smartlink I/O configurations, allowing contextual I/O status display on web pages (IFE switchboard server only).
- Internal real-time clock with battery back-up.
- RBAC (Role Base Access Control) for the embedded control web pages
- RSTP (Rapid Scanning Tree Protocol) is a solution to implement redundant Ethernet networks.

Mounting

The IFE interface, IFE switchboard server are DIN rail mounting devices.
A stacking accessory enables the user to connect several IFMs (ULP to Modbus interfaces) to an IFE switchboard server without additional wiring.

24 V DC power supply

The IFE interface, IFE switchboard server must always be supplied with 24 V DC.
The IFMs stacked to an IFE switchboard server are supplied by the IFE switchboard server, thus it is not necessary to supply them separately. It is recommended to use an UL listed and recognized limited voltage/limited current or a class 2 power supply with a 24 V DC, 3 A maximum.

IFE interface, IFE switchboard server firmware update

The firmware can be updated using:

- FTP
- customer engineering tool
- EcoStruxure Power Commission software.

Required circuit breaker communication modules

The connection to IFE interface or IFE switchboard server requires a communication module embedded into the circuit breaker:

- ComPact NS, PowerPact P, PowerPact R: BCM ULP communication module
- ComPact NSX: NSX cord and/or BSCM module
- MasterPact NT/NW, MasterPact MTZ or ComPact NS, PowerPact P, PowerPact R (Fixed electrically operated): BCM ULP communication module
- drawout MasterPact NT/NW, MasterPact MTZ or a withdrawable ComPact NS, PowerPact P, PowerPact R: BCM ULP and its respective I/O (Input/Output) application module.

All connection configurations for MasterPact NT/NW, MasterPact MTZ, ComPact NS, PowerPact P, PowerPact R require the breaker ULP cord.
The insulated NSX cord is mandatory for system voltages greater than 480 V AC.
When the second ULP RJ45 connector is not used, it must be closed with an ULP terminator (TRV00880).

IFE interface
IFE switchboard server

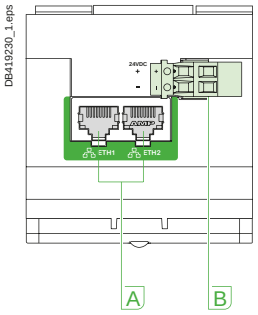
General characteristics

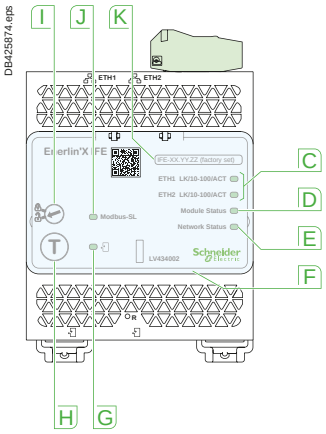
Environmental characteristics	
Conforming to standards	UL 508, UL 60950, IEC 60950, 60947-6-2
Certification	cULus, GOST, FCC, CE
Ambient temperature	-20 to +70°C (-4 to +158 °F)
Relative humidity	5–85 %
Level of pollution	Level 3
Flame resistance	ULV0 conforming to IEC/EN 60068-2-30
Mechanical characteristics	
Shock resistance	1000 m/s2
Resistance to sinusoidal vibrations	5 Hz < f < 8.4 Hz conforming to IEC/EN 60068-2-6
Electrical characteristics	
Resistance to electromagnetic discharge	Conforming to IEC/EN 61000-4-3
Immunity to radiated fields	10 V/m
Immunity to surges	Conforming to IEC/EN 61000-4-5
Consumption	150 mA at 24 V input
Physical characteristics	
Dimensions	72 x 105 x 71 mm (2.83 x 4.13 x 2.79 in.)
Mounting	DIN rail
Weight	182.5 g (0.41 lb)
Degree of protection of the installed I/O application module	On the front panel (wall mounted enclosure): IP4x Connectors: IP2x Other parts: IP3x
Connections	Screw type terminal blocks
Technical characteristics - 24 V DC power supply	
Power supply type	Regulated switch type
Rated power	72 W
Input voltage	100–120 V AC for single phase 200–500 V AC phase-to-phase
PFC filter	With IEC 61000-3-2
Output voltage	24 V DC
Power supply out current	3 A

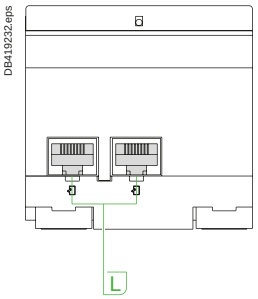
Note: it is recommended to use an UL listed/UL listed recognized limited voltage/Limited current or a class 2 power supply with a 24 V DC, 3 A maximum.

IFE interface, IFE switchboard server web page description

Monitoring web page	
Real time data	■
Device logging	■
Control web page	
Single device control	■
Diagnostics web page	
Statistics	■
Device information	■
IMU information	■
Read device registers	■
Communication check	■
Maintenance web page	
Maintenance log	■
Maintenance counters	■
Setup web page	
Device localization/name	■
Ethernet configuration (dual port)	■
IP configuration	■
Modbus TCP/IP filtering	■
Serial port	■
Date and time	■
E-mail server configuration	■
Alarms to be e-mailed	■
Device list	■
Device logging	■
Device log export	■
SNMP parameters	■
Documentation links	■
Preferences	■
Advanced services control	■
User accounts	■
Web page access	■







A Ethernet 1 and Ethernet 2 communication port.
B 24 Vdc power supply terminal block.
C Ethernet communication LEDs:
yellow: 10 Mb
green: 100 Mb.
D Module status LED:
steady off: no power
steady green: device operational
steady red: major fault
flashing green: standby
flashing red: minor fault
flashing green/red: self-test.
E Network status LED:
steady off: no power/no valid IP address
steady green: connected, valid IP address
steady orange: default IP address
steady red: duplicated IP address
flashing green/red: self-test.
F Sealable transparent cover.
G ULP status LED.
H Test button (accessible closed cover).
I Locking pad.
J Modbus traffic status LED (LV434002 only).
K Device name label.
L ULP ports.

D

IFM Modbus interface

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IFM Modbus communication interface.
Ref.: LV434000.

Function

IFM - Modbus communication interface - is required for connection of a MasterPact or ComPact to a Modbus network as long as this circuit breaker is provided with a ULP (Universal Logic Plug) port. The port is available on respectively a BCM ULP or BSCM embedded module.
The IFM is defined as an IMU (Intelligent Modular Unit) in the ULP connection System documentation.

Once connected, the circuit breaker is considered as a slave by the Modbus master. Its electrical values, alarm status, open/close signals car be monitored or controlled by a Programmable Logic Controller or any other system.

Characteristics

ULP port

2 RJ45 sockets, internal parallel wiring.
- Connection of a single circuit breaker (eventually via its I/O application module).
- A ULP line terminator or an FDM121 display unit must be connected to the second RJ45 ULP socket.

The RJ45 sockets deliver a 24 VDC supply fed from the Modbus socket.
Built-in test function, for checking the correct connection to the circuit breaker and FDM121 display unit.

Modbus slave port

- Top socket for screw-clamp connector, providing terminals for:
  - 24 VDC input supply (0 V, +24 V)
  - Modbus line (D1, D2, Gnd).
- Lateral socket, for Din-rail stackable connector.
- Both top and lateral sockets are internally parallel wired.
- Multiple IFM can be stacked, thus sharing a common power supply and Modbus line without individual wiring.
- On the front face:
  - Modbus address setting (1 to 99): 2 coded rotary switches
  - Modbus locking pad: enables or disable the circuit breaker remote control and modification of IFM parameters.
- Self adjusting communication format (Baud rate, parity).

D

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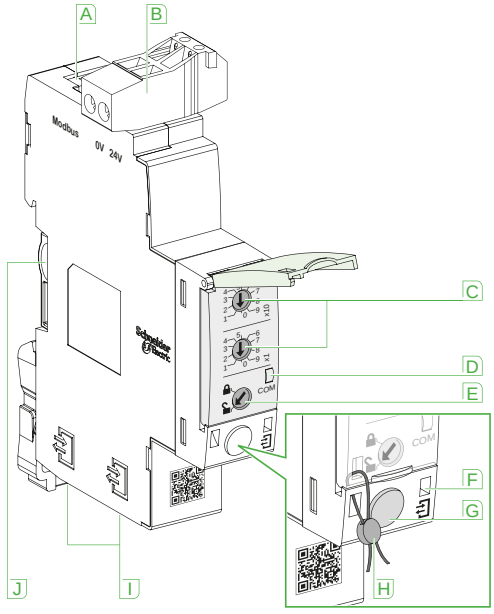


- A Modbus Serial RJ45 port.
- B 0-24 V DC power supply.
- C Modbus address switches.
- D Modbus traffic LED.
- E Modbus locking pad.
- F ULP activity LED.
- G Test button.
- H Mechanical lock and locking seal.
- I ULP RJ45 connectors.
- J Stacking accessory connection.

Catalog numbers

IFM Modbus communication interface

Type	Set of	Cat. no.
IFM -Modbus communication interface module	-	**LV434000**
Connector modbus adaptor		**LV434211**
Stacking accessories if more than 1 IFM	10	**TRV00217**
ULP line terminator	-	**TRV00880**

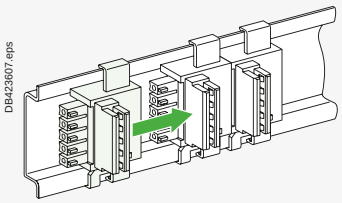
Technical characteristics

IFM Modbus communication interface

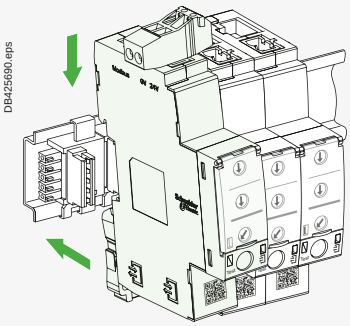
Dimensions		18 x 72 x 96 mm
Maximum number of stacked IFM		12
Degree of protection of the installed module	Part projecting beyond the escutcheon	IP4x
	Other module parts	IP3x
	Connectors	IP2x
Operating temperature		-25...+70°C
Power supply voltage		24 V DC -20 %/+10 % (19.2...26.4 V DC)
Consumption	Typical	21 mA/24 V DC at 20°C
	Maximum	30 mA/19.2 V DC at 60°C
Certification		
CE		IEC/EN 60947-1
UL		UL 508 - Industrial Control Equipment
CSA		No. 142-M1987 - Process Control Equipment CAN/CSA C22.2 No. 0-M91 - General requirements - Canadian Electrical Code Part CAN/CSA C22.2 No. 14-05 - Industrial Control Equipment

Simplified IFM installation

Staking IFM

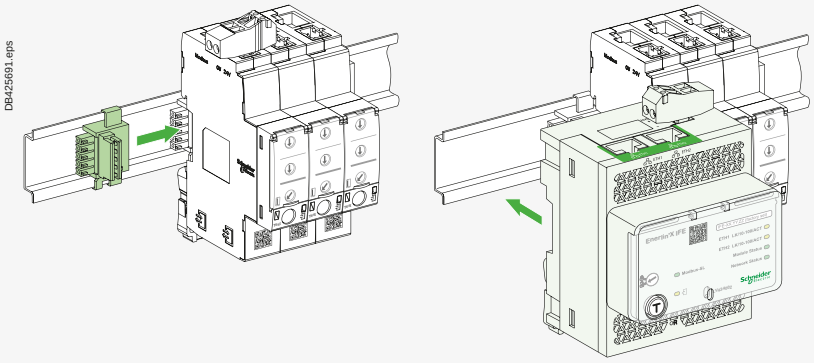


Stacking accessories



Up to 12 stacked IFM

Stacking an IFE interface + gateway with IFMs



Components
I/O Application module

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I/O application module.

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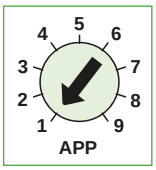

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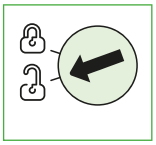

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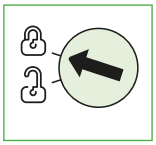


I/O application module description

Description

The I/O input/output application module for LV breaker is one of the components of ULP architecture. Built in functionalities and applications enhance control and monitoring needs.
ULP system architecture including I/O modules can be built without any restrictions using a wide range of circuit breakers:

- MasterPact MTZ1/MTZ2/MTZ3,
- ComPact NS1600b-3200,
- ComPact NS630b-1600,
- ComPact NSX100-630 A.

The I/O application module is compliant with the ULP system specifications.
Two I/O application modules can be connected in the same ULP architecture.

I/O input/output interface for LV breaker resources

The I/O application module resources are the following:

- 6 digital inputs that are self powered for either NO and NC dry contact or pulse counter,
- 3 digital outputs that are bistable relay (5 A maximum),
- 1 analog input for Pt100 temperature sensor.

Pre-defined applications

Pre-defined applications improve the IMU approach (Intelligent Modular Unit) in a simple way.
A 9-position rotary switch on the front of the I/O module allows to select the pre-defined applications. Each position is assigned to a pre-defined application except position 9 which allows the user to define a specific application by means of the customer engineering tool. The switch is set in factory to the pre-defined application 1.

For each application the input/output assignment and the wiring diagram are pre-defined. No additional setting with the customer engineering tool is required. The I/O and other resources not assigned to the pre-defined applications are free for user specific applications.

User applications

The user applications with the corresponding resources are defined by means of EcoStruxure Power Commission engineering tool. They use the resources not assigned to the predefined applications. User applications may be required for:

- Protection improvement,
- Circuit breaker control,
- Motor control,
- Energy management,
- Monitoring.

24 Vdc power supply

The I/O module can be supplied with a 24 Vdc AD power supply or with any other 24 Vdc power supply having the same characteristics.

Mounting

The I/O is a DIN rail mounting device.
Note: The connection of the +/- of the power supply on +/- terminals of the I/O module must be strictly respected. Crossing the polarities may damage the device.

Setting locking pad

The setting locking pad on the front panel of the I/O enables the setting of the I/O by EcoStruxure Power Commission engineering tool.

General characteristics

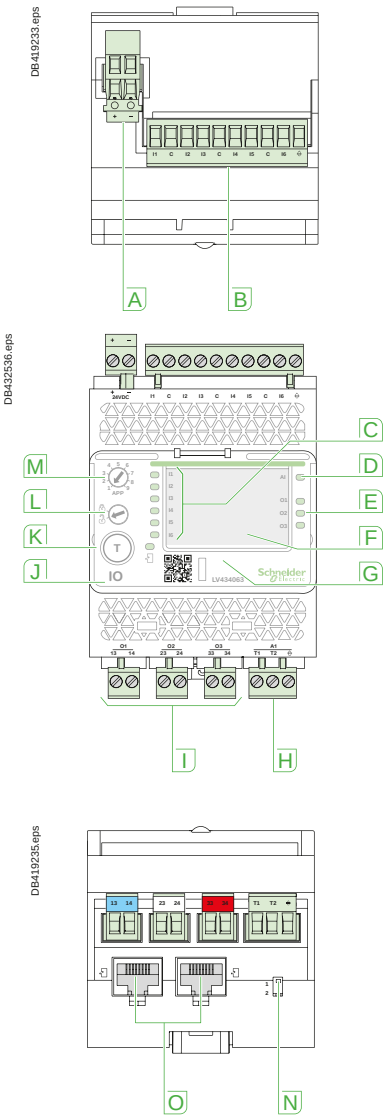
Environmental characteristics	
Conforming to standards	UL 508, UL 60950, IEC 60950, IEC 60947-6-2
Certification	cULus, GOST, FCC, CE
Ambient temperature	-20 to +70 °C (-4 to +158 °F)
Relative humidity	5 - 85 %
Level of pollution	Level 3
Flame resistance	ULV0 conforming to IEC/EN 60068-2-30
Mechanical characteristics	
Shock resistance	1000 m/s^2
Resistance to sinusoidal vibrations	5 Hz < f < 8.4 Hz
Electrical characteristics	
Resistance to electromagnetic discharge	Conforming to IEC/EN 61000-4-3
Immunity to radiated fields	10 V/m
Immunity to surges	Conforming to IEC/EN 61000-4-5
Consumption	165 mA
Physical characteristics	
Dimensions	71.7 x 116 x 70.6 mm
Mounting	DIN rail
Weight	229.5 g (0.51 lb)
Degree of protection of the installed I/O application module	On the front panel (wall mounted enclosure): IP4x I/O parts: IP3x Connectors: IP2x
Connections	Screw type terminal blocks

Digital inputs	
Digital input type	Self powered digital input with current limitations as per IEC 61131-2 type 2 standards (7 mA)
Input limit values at state 1 (close)	19.8 - 25.2 V DC, 6.1 - 8.8 mA
Input limit values at state 0 (open)	0 - 19.8 V DC, 0 mA
Maximum cable length	10 m (33 ft)

Note: for a length greater than 10 m (33 ft) and up to 300 m (1.000 ft), it is mandatory to use a shielded twisted cable. The shield cable is connected to the I/O functional ground of the I/O application module.

Digital outputs	
Digital output type	Bistable relay
Rated load	5 A at 250 Vac
Rated carry current	5 A
Maximum switching voltage	380 Vac, 125 Vdc
Maximum switch current	5 A
Maximum switching power	1250 VA, 150 W
Minimum permissible load	10 mA at 5 V DC
Contact resistance	30 mΩ
Maximum operating frequency	18000 operations/hr (Mechanical) 1800 operations/hr (Electrical)
Digital output relay protection by an external fuse	External fuse of 5 A or less
Maximum cable length	10 m (33 ft)

Analog inputs		
I/O application module analog input can be connected to a Pt100 temperature sensor.		
Range	-30 to 200 °C	-22 to 392 °F
Accuracy	±2 °C from -30 to 20 °C ±1 °C from 20 to 140 °C ±2 °C from 140 to 200 °C	±3.6 °F from -22 to 68 °F ±1.8 °F from 68 to 284 °F ±3.6 °F from 284 to 392 °F
Refresh interval	5 s	5 s



- A 24 Vdc power supply terminal block.
- B Digital input terminal block: 6 inputs, 3 commons and 1 shield.
- C 6 input status LEDs.
- D Analog input status LED.
- E 3 output status LEDs.
- F I/O application module identification labels.
- G Sealable transparent cover.
- H Analog input terminal block.
- I Digital output terminal blocks.
- J ULP status LED.
- K Test/reset button (accessible with cover closed).
- L Setting locking pad.
- M Application rotary switch: 1 to 9.
- N Switch for I/O addressing (I/O 1 or I/O 2).
- O ULP connectors.

D

Customer engineering tool: EcoStruxure Power Commission software

Key Features

Build

I want to test & deliver a "ready to commission" panel

- Device Discovery
- Switchboard setting & testing
- Communication Test & Reports
- Save my project & reports

Commission

I want to "shorten" my commissioning time

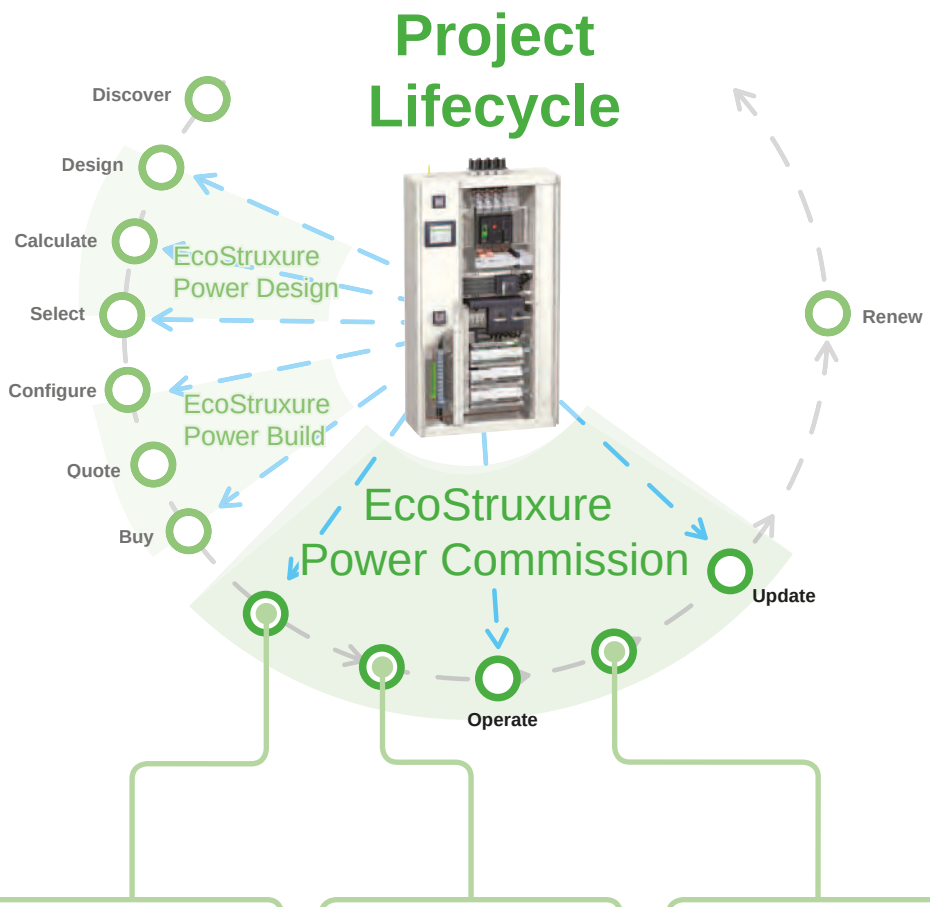
- Device Discovery
- Multi Device Configuration
- Communication Test & Reports
- Save my project & reports

Maintain

I want to ensure "continuity" of services in "safe conditions"

- Settings consistency check
- Firmware upgrade
- Standard Diagnostic data
- Save my project & reports

EcoStruxure Power Commission Experience



Build

Panel builders

Simple & easy software to set up and test a panelboard with smart phones

Commission

Electrical contractors & system integrator

Shorten commissioning time and speed up SAT delivery with easy-to-use software

Maintain

Facility managers

Software to track installation changes & diagnostic features for preventive maintenance

Customer engineering tool: EcoStruxure Power Commission software

Operation and Maintenance

- Devices monitoring and control.
- Measurement parameter logs.
- Log reports.
- Download of current devices settings, compare with previous settings saved in EcoStruxure Power Commission.
- Firmware upgrade and compatibility matrix.

Compatibility

Devices

Configuration of below devices through the range of Enerlin'X interfaces devices.

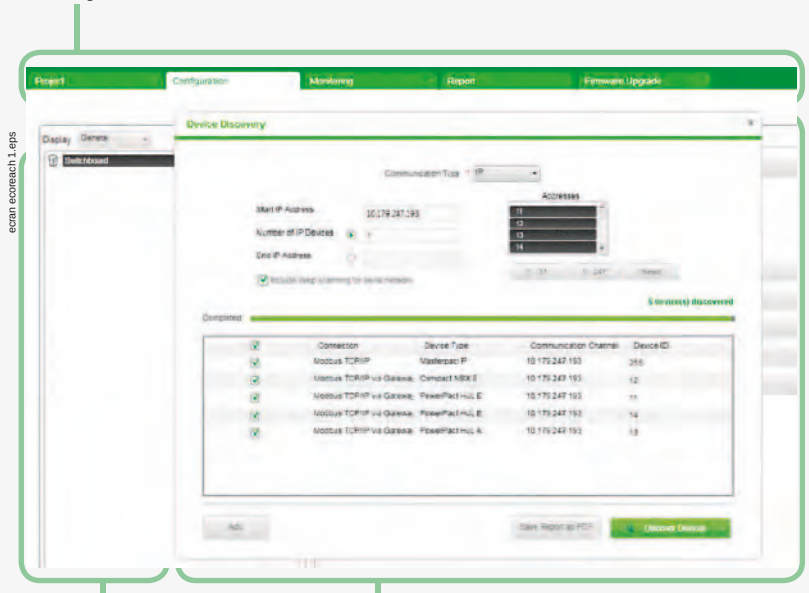
- Circuit breakers: MasterPact MTZ, ComPact NSX ranges.
- Circuit breakers and control components: Acti 9 range.

EcoStruxure Power Commission software for PC

- Compatible with Windows XP pro, Windows Seven.

Example of EcoStruxure Power Commission win

Browsing tabs



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Smart Panels architecture

Contextual window, for monitoring, settings…

- Key Features:

□ Device Discovery: EcoStruxure Power Commission helps the user to discover the communicating devices in a switchboard either through Ethernet or a serial network. Once the devices in the switchboard are discovered, the user can add those devices to the project area.

□ Communication Test: When a user has installed communicating devices in a switchboard, EcoStruxure Power Commission offers the capability to test the communication network. Once a communication test is done, the user can generate a time stamped communication test report.

□ Reports: EcoStruxure Power Commission offers the following reports to the users

- Communication Test Report.
- Comprehensive project report.
- Logs and trip history reports.

□ Firmware Upgrade: EcoStruxure Power Commission offers the compatibility check and firmware upgrade for the following devices.

- MicroLogic X control units,
- EIFE / IFE,
- I/O modules.

Switchboard integration

Switchboard integration

Other chapters
Select your circuit breakers and switch-disconnectors A-1
Select your protection B-1
Customize your circuit breaker with accessories C-1
Smart Panel integration D-1
Catalog numbers F-1
Glossary G-1
Additional characteristics H-1

Switchboard integration

E

ComPact NSX & NSXm
Operating and installation conditions

ComPact NSXm may be mounted vertically, horizontally or flat on their back or on their side without any derating of characteristics.

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ComPact NSXm.

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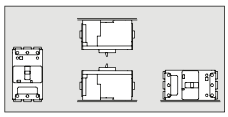

Fixed device installation positions.

Fixed circuit breakers

ComPact NSXm may be mounted vertically, horizontally or flat on their back or on their side without any derating of characteristics.
These devices can be mounted on a DIN rail using the integrated DIN rail mounting feature.
For backplate mounting, the devices are supplied with two mounting screws (M4), washers and nuts. These mounting screws can be inserted through mounting holes molded into the device case and threaded into the mounting enclosure, rails or plate.

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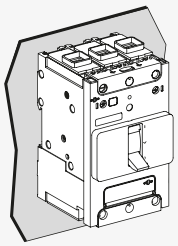

Mounting on a backplate.

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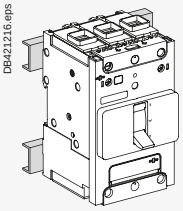

Mounting on rails.

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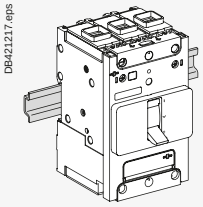

Mounting on DIN rail.

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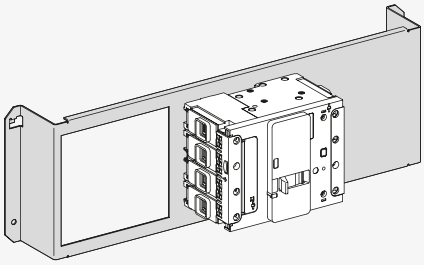

Mounting on a Prisma mounting plate.

ComPact NSX & NSXm
Operating and installation conditions

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 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.

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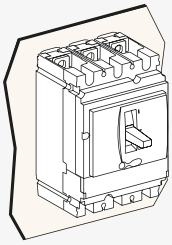

Mounting on a backplate.

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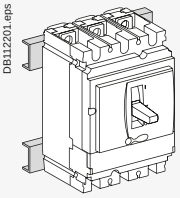

Mounting on rails.

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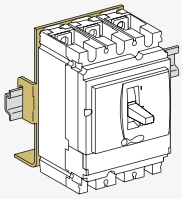

Mounting on DIN rail (with adapter).

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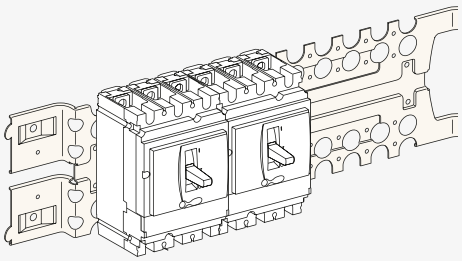

Mounting on a Prisma mounting plate.

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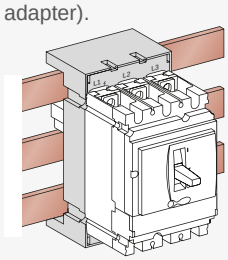

Mounting on busbars with an adapter.

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Fixed ComPact NSX250.

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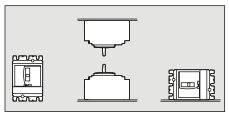

Fixed device installation positions.

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Plug-in ComPact NSX250.

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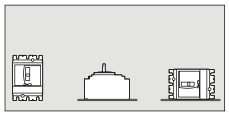

Withdrawable device installation positions.

E

ComPact NSX & NSXm
Operating and installation conditions

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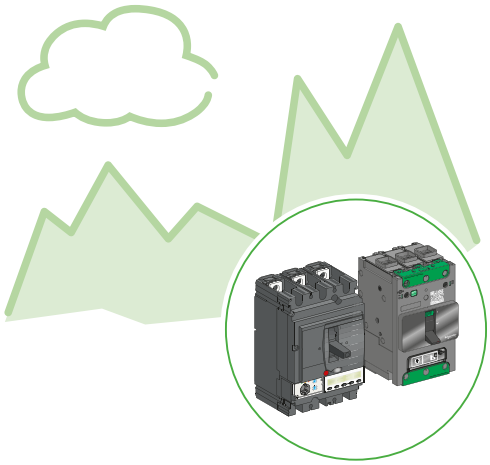

Altitude derating

Altitude does not significantly affect the characteristics of ComPact NSX and NSXm 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 m. The breaking capacities remain unchanged.

Altitude (m)		2000	3000	4000	5000
Impulse withstand voltage (kV)		8	7.1	6.4	5.6
Insulation voltage (V)	Ui	800	710	635 [1]	560
for ELCB [3]	Ui	500	445	400	350
Maximum operational voltage (V)	Ue	690	690	635 [1]	560
for ELCB [3]	Ue	440	440	400	350
Average current capacity (A) at 40 °C	In x	1.0	0.98 [2]	0.96	0.94

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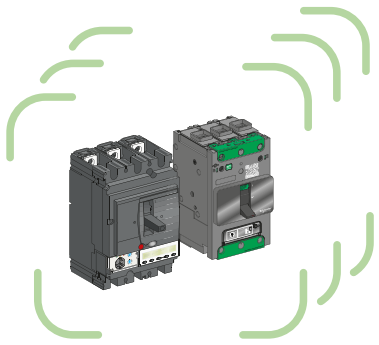

Vibrations

ComPact NSX and NSXm devices resist mechanical vibrations.
They meet IEC 60068-2-6:
- 2.0 to 13.2 Hz and amplitude ±1 mm
- 13.2 to 100 Hz acceleration ±0.7 g.

Excessive vibration may cause tripping, breaks in connections or damage to mechanical parts.

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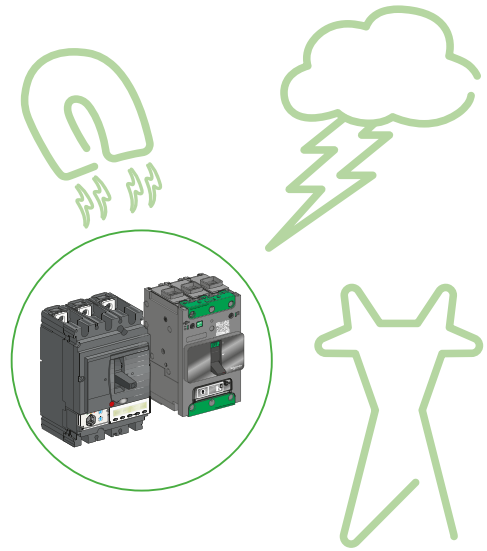


Electromagnetic disturbances

ComPact NSX and NSXm 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 and NSXm devices have successfully passed the electromagnetic-compatibility tests (EMC) defined by the international standards listed page A-15.
These tests ensure that:
- no nuisance tripping occurs
- tripping times are respected.

[1] 640 for ComPact NSX.
[2] 0.99 for ComPact NSX.
[3] Earth Leakage Circuit Breaker.

Protection degree

Protection degree of the product, according to IEC 60529, depends of its configuration:

Colours	Definition
	IP54/65: side / front extended rotary handle
	IP40: front cover, side, back, long terminal shield, direct rotary handle
	IP20: power connection cover
	may be IP20 or less depending of the kind of power connections and cable size used

Power supply from the top or bottom

ComPact NSXm circuit breakers can be supplied from either the top or the bottom, even when equipped with a MicroLogic Vigi 4.1 with integrated earth leakage protection, 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.

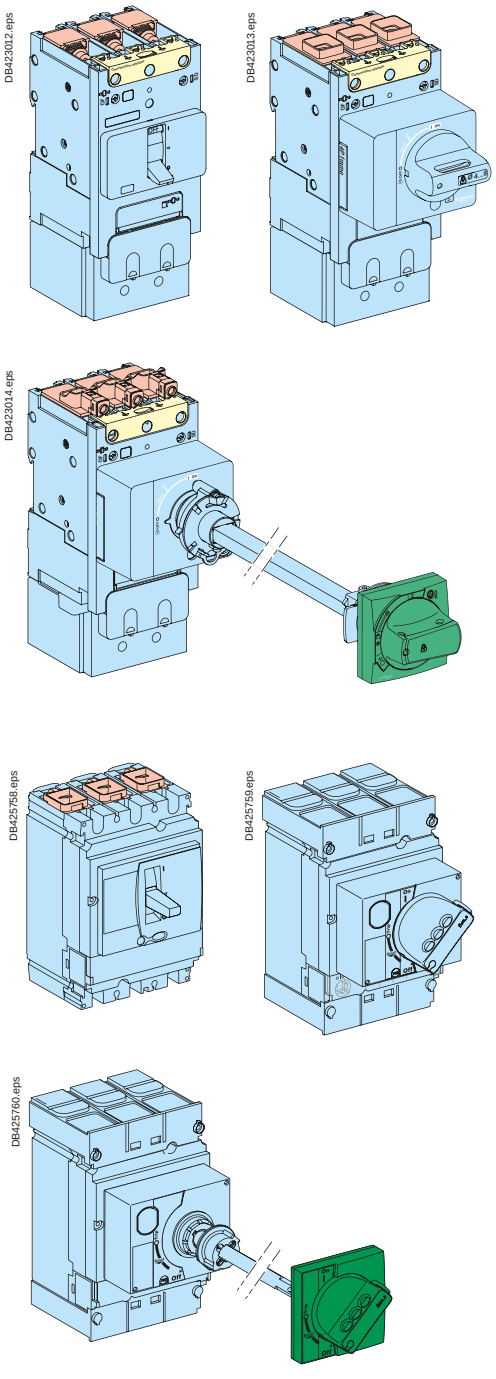
Power supply from the top or bottom [1]

ComPact NSX circuit breakers can be supplied from either the top or the bottom, even when equipped with a Vigi add-on, 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.
[1] 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.

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		Circuit breakers	Base	Chassis	Vigi add-on	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



ComPact NSXm
Operating and installation conditions

Derating and correction factor depending of temperature

The overload protection is calibrated at 40 °C in the lab. This means that when the ambient temperature is less or greater than 40 °C, the Ir protection pick-up is slightly modified.

Choosing the right rating depending of the temperature:

Over the reference temperature of 40 °C, the circuit breaker has to be derated following the table below:

Temperature derating for thermal-magnetic (TM-D) NSXm at In						
Temperature °C						
40	**45**	**50**	**55**	**60**	**65**	**70**
Rating (A) In						
16	16	15	15	14	14	13
25	24	24	23	23	22	21
32	31	30	30	29	28	27
40	39	38	37	36	34	33
50	49	48	46	45	44	42
63	61	60	58	56	54	53
80	77	73	70	67	64	60
100	96	94	90	87	83	80
125	120	117	113	109	104	100
160	155	149	144	139	133	126

Temperature derating for NSXm with MicroLogic Vigi 4.1 at In						
Temperature °C						
40	**45**	**50**	**55**	**60**	**65**	**70**
Rating (A) In						
25	25	25	25	25	25	25
50	50	50	50	50	50	50
100	100	100	100	100	100	100
160	155	150	145	140	135	130

Doing the setting or calculating the tripping time for a given temperature:

After having determine the corrected ratio I/In, the tripping time at 40 °C is defined with the tripping curves (see pages H-2 to H-3).
To obtain the right setting or the tripping time at a different temperature, the ratio I/In has to be corrected with the correction factor below:

Correction factor table for thermal magnetic (TM-D) NSXm to determine setting or tripping time at In

Rating (A) In	Temperature °C												
	10	15	20	25	30	35	40	45	50	55	60	65	70
16	1.16	1.13	1.11	1.08	1.05	1.03	1.00	0.97	0.94	0.91	0.88	0.85	0.81
25	1.13	1.11	1.09	1.07	1.05	1.02	1.00	0.98	0.95	0.93	0.90	0.88	0.85
32	1.14	1.11	1.09	1.07	1.05	1.02	1.00	0.98	0.95	0.93	0.90	0.87	0.84
40	1.15	1.12	1.10	1.08	1.05	1.03	1.00	0.97	0.95	0.92	0.89	0.86	0.83
50	1.13	1.11	1.09	1.07	1.05	1.02	1.00	0.98	0.95	0.93	0.90	0.87	0.85
63	1.14	1.12	1.10	1.07	1.05	1.02	1.00	0.97	0.95	0.92	0.89	0.86	0.83
80	1.21	1.18	1.14	1.11	1.07	1.04	1.00	0.96	0.92	0.88	0.83	0.80	0.75
100	1.18	1.16	1.12	1.10	1.06	1.04	1.00	0.96	0.94	0.90	0.87	0.83	0.80
125	1.17	1.14	1.11	1.08	1.06	1.03	1.00	0.96	0.93	0.90	0.87	0.84	0.80
160	1.17	1.15	1.12	1.09	1.06	1.03	1.00	0.97	0.93	0.90	0.87	0.83	0.79

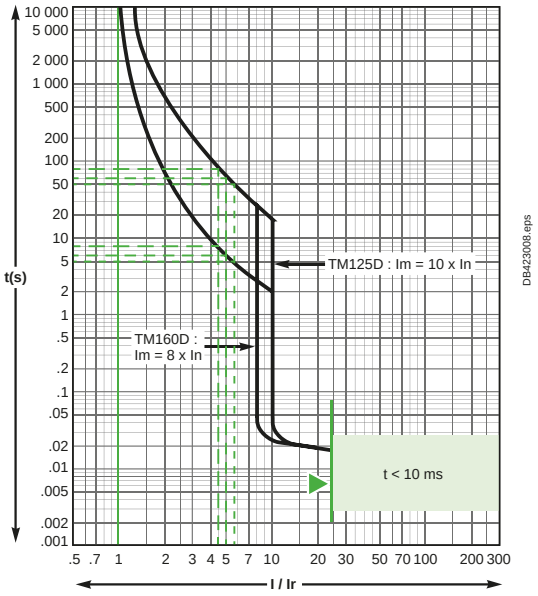
Doing the right setting depending of the temperature:
Example: What is the setting to obtain a real Ir of 105 A, taking into account the temperature, for a ComPact NSXm 125 A?
The necessary dial setting, in amperes, is shown below.

- At 40 °C, Ir = 105 / 1 = 105 A
- At 20 °C, Ir = 105 / 1.11 = 95 A
- At 60 °C, Ir = 105 / 0.87 = 121 A.

Calculating the tripping time at Ir = In for a given temperature:
Example: What is the tripping time of a ComPact NSXm 100A at Ir = In for an overload of 500 A?

- At 40 °C, I/Ir = 5, tripping time is between 6 and 60 seconds
- At 20 °C, I/Ir = 5 / 1.12 = 4.46, tripping time is between 8 and 80 seconds
- At 60 °C, I/Ir = 5 / 0.87 = 5.75, tripping time is between 5 and 50 seconds

For Ir = 0.7 to 0.9 In, additional correction factor need to be applied - please consult us.



E

ComPact NSXm
Safety clearances and minimum distances

General rules

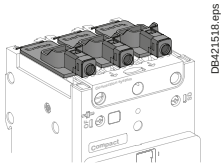
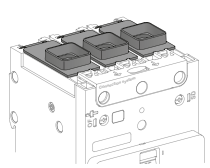
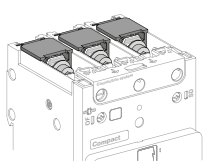
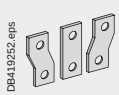
When installing a circuit breaker, minimum distances (safety clearances) must be maintained between the device and panels, bars and other protection devices installed nearby. These distances, which depend on the ultimate breaking capacity, are defined by tests carried out in accordance with standard 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 NSXm devices, terminal shields and interphase barriers are recommended and may be mandatory depending on the kind of power connections of the device and type of installation.

Power connections

The table below indicates the rules to be respected for ComPact NSXm devices to ensure insulation of live parts for the various types of connection.
Connection accessories such as crimp lugs, power distribution connectors, and spreaders are supplied with interphase barriers.
Long terminal shields provide a degree of protection of IP40 (ingress) and IK07 (mechanical impact).

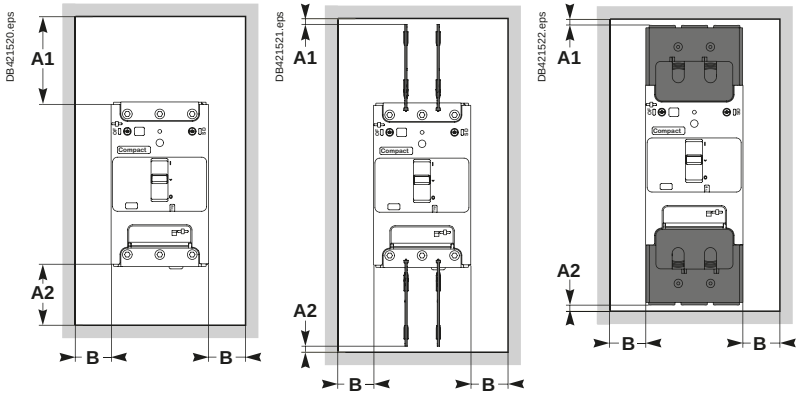
ComPact NSXm: rules to be respected to ensure insulation of live parts

	EverLink connector with or without control wire terminal			Mechanical lug connector			Compression lug / busbar connector		
	 DB421518.eps			 DB418827.eps			 DB421519.eps		
Insulation accessory options per conductor type									
Type of conductor	**No insulating accessory**	**Interphase barriers**	**Long terminal shield**	**No insulating accessory**	**Interphase barriers**	**Long terminal shield**	**No insulating accessory**	**Interphase barriers**	**Long terminal shield**
Cables  DB419248.eps	Possible	-	-	Possible	Possible	Possible	-	-	-
Insulated bars  DB419249.eps	-	-	-	-	-	-	Possible [2]	Possible	Possible
Cables + crimp lugs  DB419250.eps	-	-	-	-	-	-	Forbidden	Mandatory [3]	Possible [1]
Cables + crimp lugs with heat-shrinkable sheath  DB419251.eps							Possible [2]	Possible	Possible
Extension terminals: spreader  DB419252.eps	-	-	-	-	-	-	Forbidden	Mandatory [4]	-

[1] Instead of phase barriers.
[2] Safety air clearance of 8 mm has to be respected between live parts.
[3] When > 5 mm clearance between devices Interphase barriers are mandatory otherwise for < 5 mm Long terminal shields are mandatory.
[4] When > 5 mm clearance between devices Interphase barriers are mandatory otherwise > 5 mm clearance between devices is forbidden.
Note: For uninsulated bar connections, please consult us.

IEC standard

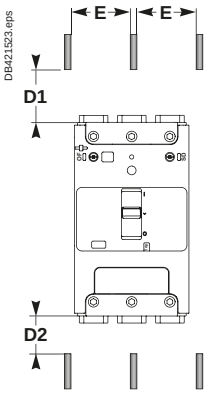
Minimum safety clearances



Operating voltage	Clearance (mm)						
	Between devices	Between device and sheet metal					
		Painted sheet metal			Bare sheet metal		
U ⩽ 690 V		A1	A2	B	A1	A2	B
for devices equipped with:							
no accessories	0	30 mm	5 mm	0	40 mm	5 mm	5 mm
interphase barriers [1]	0	0	0	0	0	0	5 mm
long terminal shields	0	0	0	0	0	0	5 mm

[1] 20 mm clearance when using spreaders and 5mm clearance when using crimp lugs between devices is mandatory.

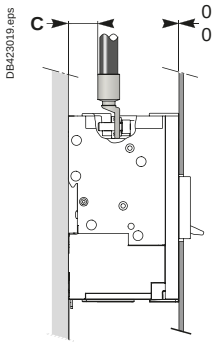
Minimum safety clearances to bare busbars



Operating voltage	Clearances to live bare busbars [2]			
	Spacing E ⩽ 60 mm		Spacing E > 60 mm	
	D1	D2	D1	D2
U ⩽ 690 V	200 mm	100 mm	120 mm	60 mm

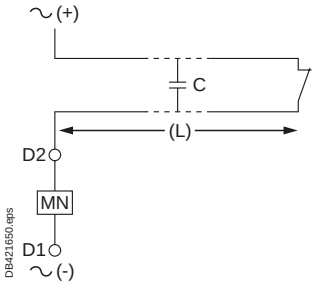
[2] These clearances can be reduced for special installations as long as the configuration is checked by tests.

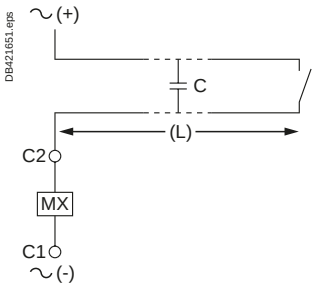
Compression lug safety clearance

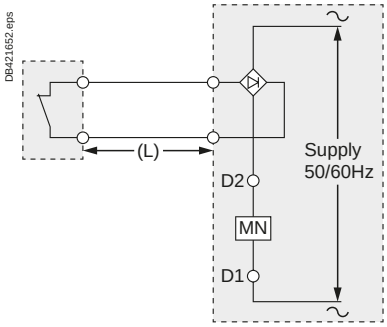


An insulating screen or long terminal shield is required if C < 8 mm.

ComPact NSXm
Voltage release wiring rules







Shunt trip (MX) and undervoltage release (MN)

Recommended maximum cable lengths

In certain circumstances, high cable capacitance due to an excessive cable length could prevent an undervoltage release MN from dropping out resulting in safety issues. In case of a shunt trip MX, an untimely trip may occur due to capacitive current leak.
To avoid these dysfunction due to cable capacitance C, the maximum cable length (L) is defined by the following table for a 1.5 mm² cable.

Power supply voltage (Un)	Maximum cable length undervoltage trip (MN) [1]	Shunt trip (MX) [1]
24 V AC	1 243 m	3 653 m
24 V DC	unlimited	> 3653 m
48 V AC	583 m	1 667 m
48 V DC	unlimited	> 1667 m
110...130 V AC	126 m	913 m
110...130 V DC	unlimited	> 913 m
208-240 V AC	109 m	160 m
250 V DC	unlimited	> 160 m
277 V AC	98 m	120 m
380-415 V AC	86 m	80 m
440-480 V AC	56 m	67 m

[1] Make sure auxiliaries supply voltage is within working range (0.85 Un mini...1.1 Un maxi).

If a longer cable length is required, several solutions are possible to counteract excessive cable capacitance:
- use DC operated auxiliaries
- use lower control voltage (make sure auxiliaries supply voltage is within working range: 0.85 Un minimum...1.1 Un maximum)
- if high voltage and long control cables are required for an AC undervoltage release (MN), add a rectifier bridge (ref LV426899 – DIN rail compatible) in the control circuit. It will prevent drop out problems but increase operating time.

Electrical characteristics of MN/MX

Characteristics			AC	DC
Rated voltage (V)			24, 48, 110...130, 208...240, 277, 380...415, 440...480	24, 48, 125, 250
Power requirements	MX	Pickup (< 50 ms)	< 6 VA	< 10 W
		Seal-in	< 4 VA	< 1 W
	MN		< 7 VA	< 2 W
Clearing time (ms)			< 50	< 50
Operating range			up to 1.1 Un	

ComPact NSXm thermal power loss values are used to calculate total temperature rise in the switchboard in which the circuit breakers are installed.

The values indicated in the tables below are typical values for a device at full rated load and 50/60 Hz.

Power loss per pole (P/pole) in Watts (W)
The value indicated is the power loss at In, 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 (mΩ)
The value of the resistance per pole is provided as a general indication for a new device.
The value of the contact resistance is determined on the basis of the measured voltage drop, in accordance with the manufacturer's test procedure.
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.

Calculation of total power loss
Total power loss at full rated load and 50/60 Hz is equal to power losses per pole multiplied by the number of poles (3 or 4).

ComPact NSXm with TM-D

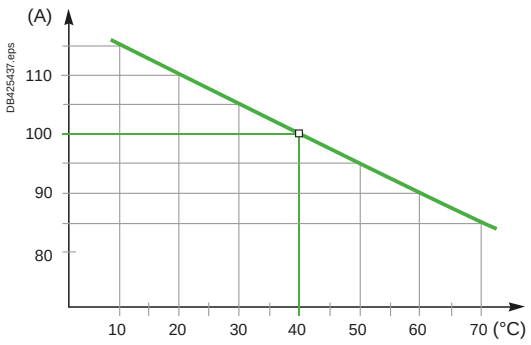
Rating (A)	R total / pole (mΩ)	P / Pole (W)
16	8.87	2.3
25	4.50	2.8
32	3.10	3.3
40	2.30	3.8
50	1.85	4.6
63	1.44	5.7
80	0.90	5.8
100	0.75	7.5
125	0.59	9.3
160	0.53	13.7

ComPact NSXm with MicroLogic Vigi 4.1

Rating (A)	R total / pole (mΩ)	P / Pole (W)
25	2.44	1.5
50	0.48	1.2
100	0.48	4.8
160	0.48	12.3

ComPact NSX temperature derating
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.

Derating and correction factor depending of temperature

The overload protection is calibrated at 40 °C in the lab. This means that when the ambient temperature is less or greater than 40 °C, the Ir protection pick-up is slightly modified.

Choosing the right rating depending of the temperature:

Over the reference temperature of 40 °C, the circuit breaker has to be derated following the table below:

Temperature derating for thermal-magnetic (TM-D) NSX at In

Temperature °C						
40	45	50	55	60	65	70
Rating (A) In						
16	15.6	15.2	14.8	14.5	14	13.8
25	24.5	24	23.5	23	22	21
32	31.3	30.5	30	29.5	29	28.5
40	39	38	37	36	35	34
50	49	48	47	46	45	44
63	61.5	60	58	57	55	54
80	78	76	74	72	70	68
100	97.5	95	92.5	90	87.5	85
125	122	119	116	113	109	106
160	156	152	148	144	140	136
200	195	190	185	180	175	170
250	244	238	231	225	219	213

Doing the setting or calculating the tripping time for a given temperature:

After having determine the corrected ratio I/In, the tripping time at 40 °C is defined with the tripping curves (see pages H-5 to H-7).
To obtain the right setting or the tripping time at a different temperature, the ratio I/In has to be corrected with the correction factor below:

Correction factor table for thermal magnetic (TM-D) NSX to determine setting or tripping time at In

Rating (A) In	Temperature °C												
	10	15	20	25	30	35	40	45	50	55	60	65	70
16	1.15	1.17	1.13	1.13	1.06	1.04	1.00	0.98	0.95	0.93	0.91	0.88	0.86
25	1.15	1.12	1.10	1.08	1.05	1.02	1.00	0.98	0.96	0.94	0.92	0.88	0.84
32	1.15	1.13	1.10	1.07	1.05	1.03	1.00	0.98	0.95	0.94	0.92	0.91	0.89
40	1.15	1.13	1.10	1.08	1.05	1.03	1.00	0.98	0.95	0.93	0.9	0.88	0.85
50	1.15	1.12	1.10	1.08	1.05	1.02	1.00	0.98	0.96	0.94	0.92	0.90	0.88
63	1.14	1.13	1.10	1.08	1.05	1.03	1.00	0.98	0.95	0.92	0.90	0.87	0.86
80	1.15	1.13	1.10	1.08	1.05	1.03	1.00	0.98	0.95	0.93	0.90	0.88	0.85
100	1.15	1.13	1.10	1.08	1.05	1.03	1.00	0.98	0.95	0.93	0.90	0.88	0.85
125	1.15	1.128	1.10	1.07	1.05	1.02	1.00	0.98	0.95	0.93	0.90	0.87	0.85
160	1.15	1.125	1.10	1.08	1.05	1.03	1.00	0.98	0.95	0.93	0.90	0.88	0.85
200	1.15	1.125	1.10	1.08	1.05	1.03	1.00	0.98	0.95	0.93	0.90	0.88	0.85
250	1.15	1.124	1.11	1.08	1.05	1.02	1.00	1.63	0.95	0.92	0.90	0.88	0.85

For Ir = 0.7 to 0.9 In, additional correction factor need to be applied - please consult us.

ComPact NSX temperature derating
Equipped with thermal-magnetic trip units

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 H-6 (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

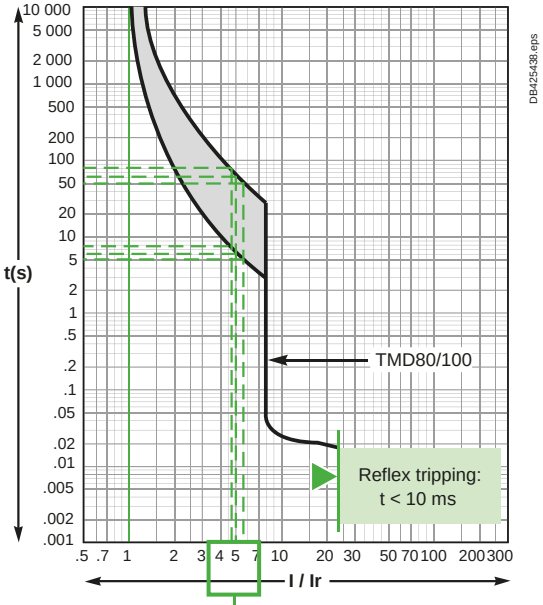
Additional derating coefficient for an add-on module

The values indicated in the previous tables are valid for **fixed** circuit breakers equipped with one of the following modules:
- Vigi add-on
- Vigi add-on Alarm
- 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 add-on or a Vigi add-on Alarm, 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 add-on or Vigi add-on Alarm	Ammeter, current transformer module, or PowerTag NSX
Fixed	NSX100	16 to 100	1	1
	NSX160 to 250	125 to 160		
	NSX250	200 to 250		
Plug-in or withdrawable	NSX100	16 to 100		
	NSX160	125 to 160		
	NSX250	200 to 250	0.84	



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.

E

ComPact NSX temperature derating
Equipped with electronic trip units

Changes in temperature do not affect measurements by electronic trip units.
- The built-in CT sensors with Rogowski toroids measure the current.
- The control electronics compare the value of the current to the settings defined for 40 °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 device	Rating (A)	Temperature (°C) 40	45	50	55	60	65	70
NSX100/160								
Fixed, plug-in or withdrawable	100	no derating						
	160	no derating						
NSX250 + MicroLogic 2.2/5.2/6.2								
Fixed	250	250	250	250	245	237	230	225
Plug-in or withdr.	250	250	245	237	230	225	220	215
NSX250 + MicroLogic Vigi 4.2/7.2								
Fixed	250	250	250	245	237	230	225	218
Plug-in or withdr.	250	225	220	215	210	205	198	190

ComPact NSX400 and 630

The table below indicates the maximum long-time (LT) protection setting Ir (A) depending on the ambient temperature.

Type of device	Rating (A)	Temperature (°C) 40	45	50	55	60	65	70
NSX400 + MicroLogic 2.3/5.3/6.3								
Fixed	400	400	400	400	390	380	370	360
Plug-in/withdr.	400	400	390	380	370	360	350	340
NSX400 + MicroLogic Vigi 4.3/ 7.3								
Fixed	400	400	400	390	380	370	360	350
Plug-in/withdr.	400	400	390	380	370	360	350	340
NSX630 + MicroLogic 2.3/5.3/6.3								
Fixed	630	630	615	600	585	570	550	535
Plug-in/withdr.	630	570	550	535	520	505	490	475
NSX630 + MicroLogic Vigi 4.3/7.3								
Fixed	630	570	555	540	530	515	500	485
Plug-in/withdr.	630	480	470	457	445	435	420	405

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.

E

ComPact NSX temperature derating
Equipped with electronic trip units

Additional derating coefficient for an add-on module

For **fixed** or **plug-in / withdrawable** circuit breakers, the addition of a:
- Vigi add-on
- Vigi add-on Alarm
- 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 type	Vigi add-on or Vigi add-on Alarm	PowerTag NSX	Coupling busbar	Current transformer
Fixed	NSX100	2.2/5.2/6.2	1	1	1	1
		4.2/7.2	-		1	
	NSX160	2.2/5.2/6.2	1		1	
		4.2/7.2	-		1	
	NSX250	2.2/5.2/6.2	1		1	
		4.2/7.2	-		0.95	
Plug-in or withdrawable	NSX100	2.2/5.2/6.2	1		-	
		4.2/7.2	-			
	NSX160	2.2/5.2/6.2	1			
		4.2/7.2	-			
	NSX250	2.2/5.2/6.2	0.86			
		4.2/7.2	-			
Fixed	NSX400	2.3/5.3/6.3	0.97	0.97	1	1
		4.3/7.3	-		0.97	
	NSX630	2.3/5.3/6.3	0.9	0.9	1	
		4.3/7.3	-		0.9	
Plug-in or withdrawable	NSX400	2.3/5.3/6.3	0.97	1	-	
		4.3/7.3	-			
	NSX630	2.3/5.3/6.3	0.9			
		4.3/7.3	-			

Note:
- Coupling busbar is forbidden with Vigi add-on.
- Current transformer is forbidden with Vigi add-on and coupling busbar.
- Coupling busbar is forbidden with withdrawable installation.
- To provide the Visu function, ComPact NSX circuit breakers, with or without a Vigi add-on, are combined with INV switch-disconnectors. Tripping values for the selected combination are indicated in the ComPact INS/INV catalog.

ComPact NSX 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.

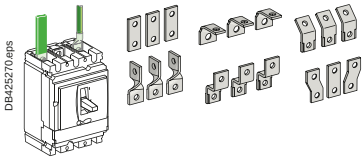
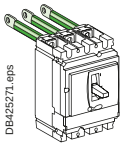
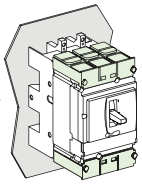
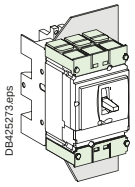
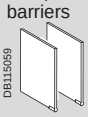
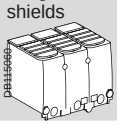
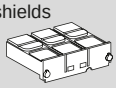
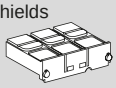
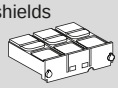
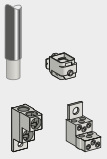
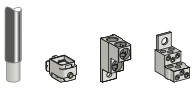
For ComPact NSX100 to 630 devices, terminal shields and interphase barriers are recommended and may be mandatory depending on the operating voltage of the device and type of installation (fixed, withdrawable, etc.).

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).

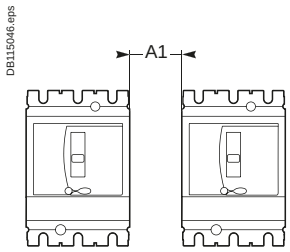
ComPact NSX100 to 630: rules to be respected to ensure insulation of live parts

Type of connection		Fixed, front connection			Fixed, rear connection	Plug-in or withdrawable	
						On backplate 	Through panel 
Possible, recommended or mandatory accessories: With:		No insulating accessory	Interphase barriers 	Long terminal shields 	Short terminal shields 	Short terminal shields 	Short terminal shields 
operating voltage	**type of conductor**						
< 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)			
≥ 500 V	Insulated bars 	No	No	Mandatory (use of short terminal shield possible)	Mandatory [2]	Mandatory [2]	Mandatory [2]
	Extension terminals Cables + crimp lugs 	No	No	Mandatory	Mandatory [2]	Mandatory [2]	Mandatory [2]
	Bare cables + connectors 	No	No	Mandatory	Mandatory [2]	Mandatory [2]	Mandatory [2]

[1] Long terminal shields, mandatory if the device is fixed through the door, whatever the voltage.
[2] LV433693 (3P) or LV433694 (4P) Short Terminal Shield are mandatory for R/HB1/HB2 400 A and 630 A performance.

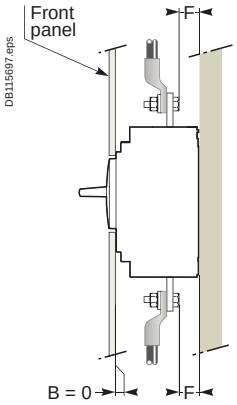
Safety clearance

Minimum distance between two adjacent circuit breakers



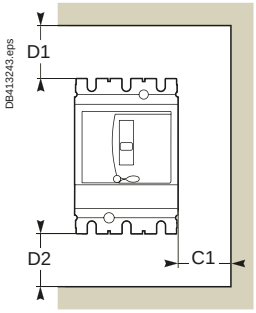
Bare or painted sheetmetal

Minimum distance between circuit breaker and front or rear panels

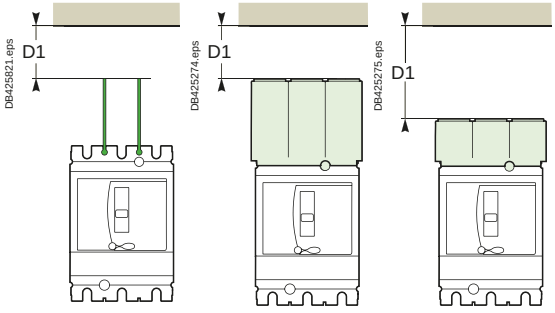


Note: if F < 8 mm: an insulating screen or long terminal shield is mandatory (see page C-23).

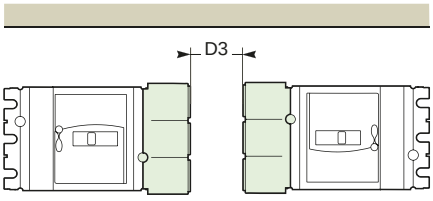
Minimum distance between circuit breaker and top, bottom or side panels



Devices without accessories.



Devices with interphase barriers or long or short terminal shields.



Short terminal shield rear connected.

Minimum safety clearances for ComPact NSX100 to 630

Operating voltage	Clearance (mm)							
	Between devices	Between device and sheetmetal						
		Painted 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 ⩽ 500 V								
for devices equipped with:								
■ short terminal shields	0	0	30	30	10	40	40	50
■ interphase barriers [1]	0	0	0	0	20	10	10	-
■ long terminal shields [2]	0	0	0	0	10	10	10	-
U > 500 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	-

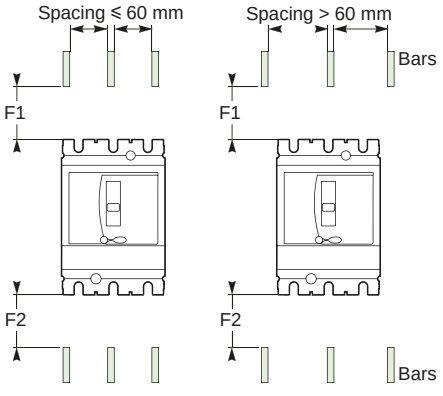
[1] Only for NSX100 to 250.
[2] For all cases.

Clearances with respect to live bare busbars

Minimum clearances for ComPact NSX100 to 630

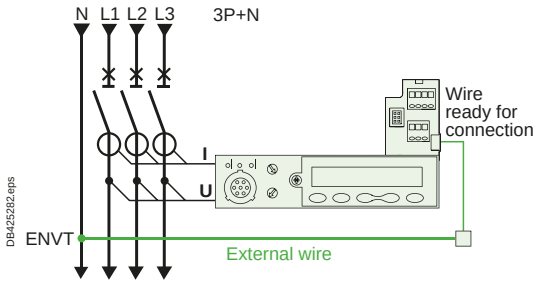
Operating voltage	Clearances with respect to live bare busbars			
	spacing ⩽ 60 mm		spacing > 60 mm	
	F1	F2	F1	F2
U < 440 V	350	350	80	80
440 V ⩽ U ⩽ 500 V	350	350	120	120
U > 500 V	prohibited: insulating screen required between device and busbars			

These clearances can be reduced for special installations as long as the configuration is checked by tests.

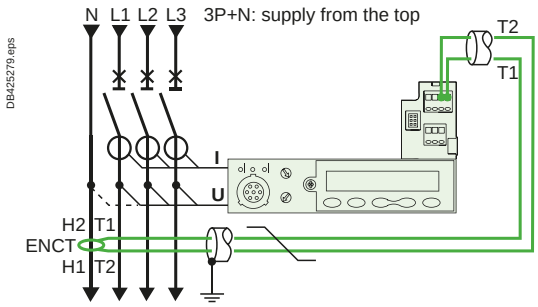


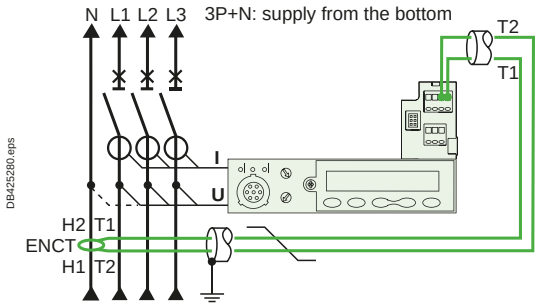
Live busbars.

E

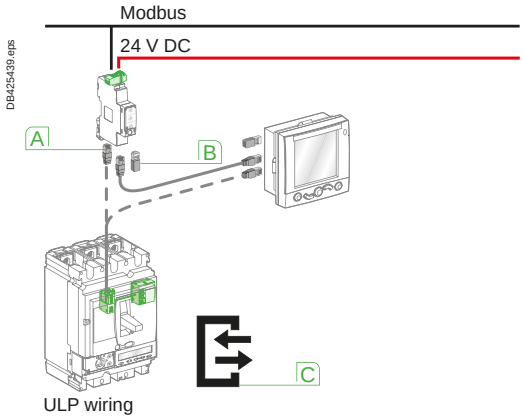


External neutral voltage tap (ENVT).





External neutral current transformer (ENCT).



ULP wiring

ULP connection system.

A RJ45
B Line terminator
C ULP symbol

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)		12 V		24 V		48 V	
Cable cross-section (mm²)		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 mechanism	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.

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)

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 mm² to 1.5 mm²
- maximum length of 10 metres.

ULP connection system between MicroLogic, FDM121 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.

Available cords

All connections are made with prefabricated cords:
- NSX cord for connection of the internal terminal block to the Modbus interface or the FDM121 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.

External 24 V DC power-supply module (AD)

The external power-supply module makes it possible:
- to use the display even if the circuit breaker is open or not supplied (for the exact conditions of use, see the “electrical diagrams” part of this catalog)
- to display fault currents after tripping
- to modify settings when the circuit breaker is open (OFF position)

An external 24 V DC power supply is required for installation with communication, whatever the type of trip unit.
This module is not designed to power on 24 V DC voltage releases and electric motor mechanism.
This module powers both the control unit and the M2C programmable contacts.
We recommended using the AD power supply due to its low stray primary secondary capacitance. Good operation of the MicroLogic control unit in noisy environment is not guaranteed with other power supplies.
If the COM option is used, a second dedicated power supply shall be used.
This module powers both the control unit and the M2C programmable contacts or ESM module.

Characteristics
- Power supply AC-to-DC or DC-to-DC
- Output voltage: 24 V DC ±5 %.
- Output current: 1 A.
- DIN rail or platine Fixing with Acti9 form factor
- Conducted emissions power line: class B per EN/IEC 61000-6-3.

Wiring (see page E-89)

MicroLogic 5 / 6 / 7 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.

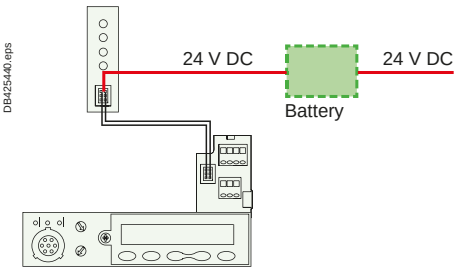
MicroLogic 5 / 6 / 7 using the Communication function
The external 24 V DC supply is connected via the Modbus interface using a five-pin connector, including two for the power supply. Stacking accessories (see page D-2) can be used to supply a number of interfaces by fast clip-on connection.
The 24 V 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.

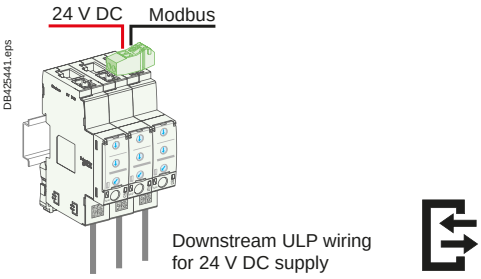
Modbus (see page E-89)

Each ComPact NSX circuit breaker equipped with MicroLogic 5 / 6 / 7 and an FDM121 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.



Power supply, without the Communication function, via the terminal block with a backup battery.



Supply, with the Communication function, via the Modbus interface.

External 24 V DC power supply module (AD)

E

PF106349SE_ABL8RPS24050.eps

ABL8 RPS power supply.

24 V DC Universal Phaseo™ ABL8 power supplies

The Universal Phaseo ABL8 RPS 24050 and ABL8 RPS 24030 power supplies can be connected phaseto-
neutral or phase-to-phase.
They deliver a voltage that is precise to 3%, whatever the load and whatever the value of the AC
supply, within the ranges 85 to 132 V AC and 170 to 550 V AC.
The Universal Phaseo ABL8 powers:
- circuit breaker communication module and interface
- programmable MicroLogic.

Characteristics
- Power supply AC-to-DC,
- Network frequency: 50/60 Hz (±5 %).
- Output voltage: 24 V DC ±3%.
- Output current: 3 or 5 A
- DIN rail or platine Fixing
- Conducted emissions power line: class B per EN/IEC 61000-6-3.

To assist cooling there must be sufficient clearance around the Universal range Phaseo power supplies:
- 50 mm above and below
- 10 mm on the side.

		ABL8RPS●●●●	Module AD
Over Voltage Category		Cat I per VDE 0106-1	Cat IV per IEC 62477-1 (AC model) Cat III per IEC 62477-1 (DC model) Cat III per UL 61010-1
Degree of pollution as per IEC 60664-1		2	3
Input supply voltage AC		100…120 V AC and 200…500 V AC	110-130 or 200-240 V AC
Input supply voltage DC		N/A	24-30 or 48-60 or 100-125 V DC
Dielectric	Input/Output	4 kV rms -1 mn.	3 kV rms - 1 mn. (110-130 V AC and 200-240 V AC model)
			3 kV rms - 1 mn. (110-125 V DC model)
			2 kV rms - 1 mn. (24-30 V DC and 48-60 V DC model)
	Input/Ground	3.5 kV rms -1 mn.	3 kV rms - 1 mn.
	Ouput /Ground	0,5 kV rms - 1 mn.	1.5 kV rms - 1 mn.
Temperature		■ 50 °C ■ 60 °C with 80 % of the rated current maximum	70°C
Output current		3 A (ABL8RPS24030) 5 A (ABL8RPS24050)	1 A
Inrush current for 2 ms		< 30 A	< 20 A
Ripple		200 mV peak-peak	200 mV peak-peak
Output voltage limits		24 to 28.8 V DC	22.8 to 25.2 V DC
Protection degree		IP20	IP4x front face / IP2x terminals / IP3x other

Note: For the applications requiring an over voltage category higher than 2, a surge arrester shall be associated to ABL8 RPS power supplies. The iQuick20prd type 2 surge arrester is recommended.

ComPact NSX power loss/ resistance
Equipped with thermal-magnetic 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.

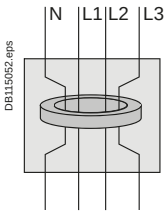
The values indicated in the tables below are typical values for a device at full rated load and 50/60 Hz.

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 (mΩ)
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 add-on: 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 is installed, it is necessary to differentiate between N and L3 on one hand and L1 and L2 on the other.



With a Vigi add-on, 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.

ComPact NSX100 to 250 equipped with TM-D and TM-G trip units

Type of device		Fixed device		Additional power / pole					
3/4 poles	Rat. (A)	R/pole	P/pole	Vigi add-on (N, L3)	Vigi add-on (L1, L2)	Plug-in / withdr.	Ammeter module	Transfo. module	PowerTag NSX module
NSX100	**16**	11.42	2.92	0	0	0	0	0	0
	25	6.42	4.01	0	0	0.1	0	0	0
	32	3.94	4.03	0.06	0.03	0.15	0.1	0.1	0
	40	3.42	5.47	0.10	0.05	0.2	0.1	0.1	0
	50	1.64	4.11	0.15	0.08	0.3	0.1	0.1	0.1
	63	2.17	8.61	0.3	0.15	0.4	0.1	0.1	0.1
	80	1.37	8.77	0.4	0.2	0.6	0.1	0.1	0.1
	100	0.88	8.8	0.7	0.35	1	0.2	0.2	0.2
NSX160	**80**	1.26	8.06	0.4	0.2	0.6	0.1	0.1	0.1
	100	0.77	7.7	0.7	0.35	1	0.2	0.2	0.2
	125	0.69	10.78	1.1	0.55	1.6	0.3	0.3	0.3
	160	0.55	13.95	1.8	0.9	2.6	0.5	0.5	0.5
NSX250	**125**	0.61	9.45	1.1	0.55	1.6	0.3	0.3	0.3
	160	0.46	11.78	1.8	0.9	2.6	0.5	0.5	0.5
	200	0.39	15.4	2.8	1.4	4	0.8	0.8	0.8
	250	0.3	18.75	4.4	2.2	6.3	1.3	1.3	1.3

ComPact NSX100 to 630 equipped with MA/1.3-M trip units

Type of device		Fixed device		Additional power / pole					
3 poles	Rat. (A)	R/pole	P/pole	Vigi add-on (N, L3)	Vigi add-on (L1, L2)	Plug-in / withdr.	Ammeter module	Transfo. module	PowerTag NSX module
NSX100	**2.5**	148.42	0.93	0	0	0	0	0	0
	6.3	99.02	3.93	0	0	0	0	0	0
	12.5	4.05	0.63	0	0	0	0	0	0
	25	1.66	1.04	0	0	0.1	0	0	0
	50	0.67	1.66	0.2	0.1	0.3	0.1	0.1	0.1
	100	0.52	5.2	0.7	0.35	1	0.2	0.2	0.2
NSX160	**150**	0.38	8.55	1.35	0.68	2.6	0.45	0.45	0.5
NSX250	**220**	0.3	14.52	2.9	1.45	4.89	0.97	0.97	1
NSX400	**320**	0.12	12.29	3.2	1.6	6.14	1.54	1.54	1.43
NSX630	**500**	0.1	25	13.99	7	15	3.75	3.75	3.5

ComPact NSX power loss/ resistance
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 device		Fixed device				Additionnal power (W)/ pole				
3/4 poles	Rating (A)	R/pole (mΩ)		P/Pole (w)		Vigi add-on (N/L3)	Vigi add-on (L1/L2)	Plug-In	Transfo Module	PowerTag NSX module
NSX + MicroLogic 2.2/5.2/6.2										
NSX100	<40 A	0.84		1.3		0.1	0.06	0.2	0.1	0
	40 A ⩽ 100 A	0.47		4.7		0.7	0.35	1	0.2	0.2
NSX160	<40 A	0.73		1.2		0.4	0.2	0.6	0.1	0
	40 A ⩽ 160 A	0.36		9.2		1.8	0.9	2.6	0.5	0.5
NSX250	<40 A	0.27		2.7		1.1	0.55	1.6	0.2	0
	40 A ⩽ 250 A	0.28		17.6		4.4	2.2	6.3	1.3	1.3
NSX + MicroLogic 2.3/5.3/6.3										
NSX400	<400 A	0.12		19.2		3.2	1.6	9.6	2.4	2.24
NSX630	<630 A	0.1		39.7		6.5	3.25	19.49	5.95	5.56
NSX + MicroLogic add-on 4.2/7.2		**N/L1/L3**	**L2**	**N/L1/L3**	**L2**					
NSX100	<100 A	0.58	0.49	5.8	4.9	-	-	1	0.2	0.2
NSX160	<160 A	0.48	0.39	12.3	10.0	-	-	2.6	0.5	0.5
NSX250	<250 A	0.4	0.33	25	20.6	-	-	6.3	1.3	1.3
NSX + MicroLogic add-on 4.3/7.3										
NSX400	<400 A	0.16	0.14	25.6	22.4	-	-	9.6	2.4	2.24
NSX630 [1]	<630 A	0.14	0.12	55.6	47.6	-	-	19.49	5.95	5.56

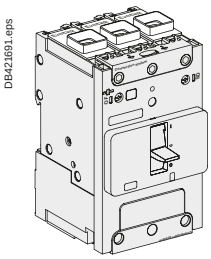
Power loss/resistance values presented above are not contractual.
[1] The power loss values for Vigi add-on and withdrawable circuit breakers are given for 570 A.

E

ComPact NSXm dimensions and mounting

Circuit breaker and switch-disconnector

Circuit breaker



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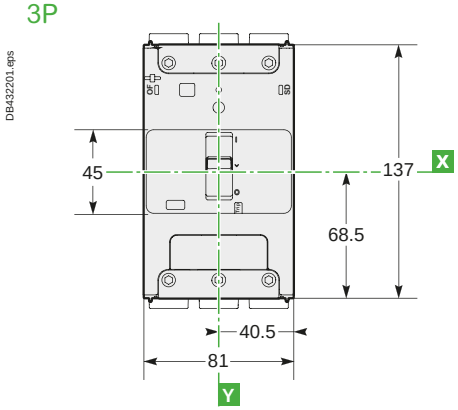

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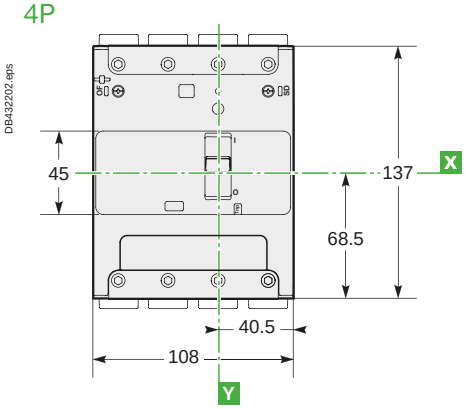
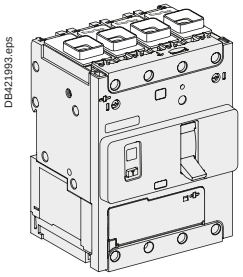


Circuit breaker with MicroLogic Vigi 4.1



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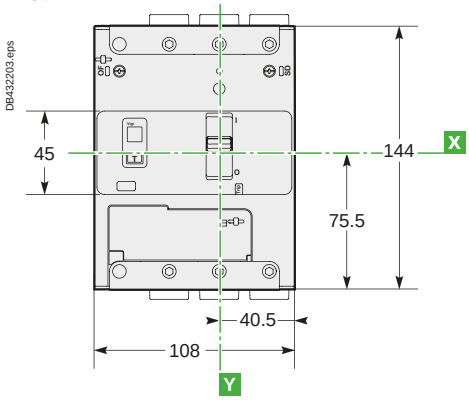

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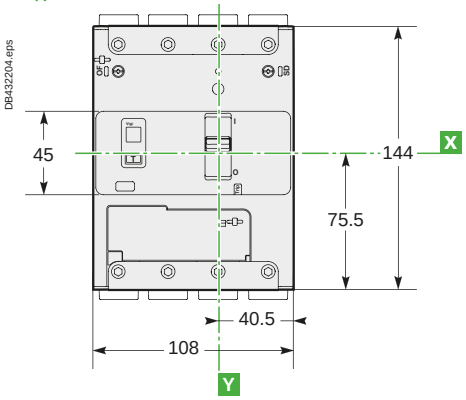
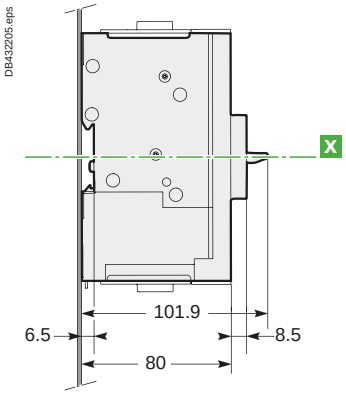
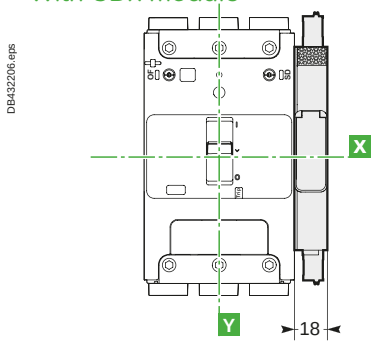


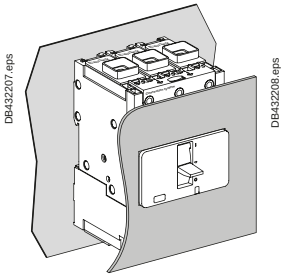
Side view

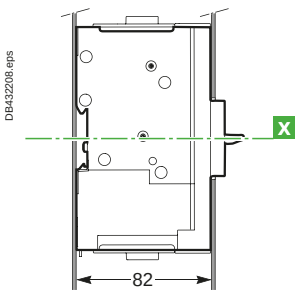


With SDx module



Front-panel cutouts





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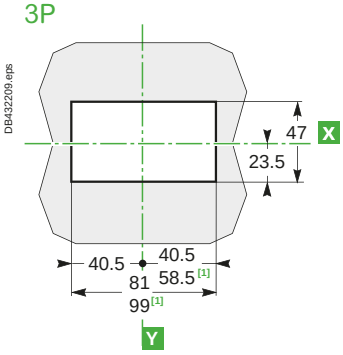

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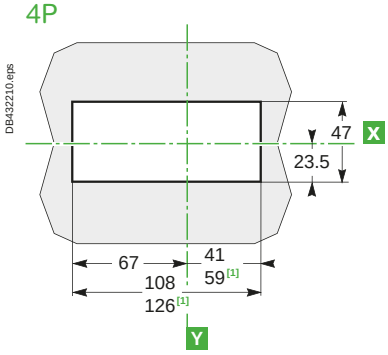


[1] With SDx module.

E

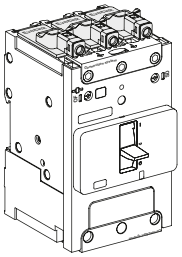
ComPact NSXm dimensions and mounting

Circuit breaker and switch-disconnector

Connectors

EverLink with control wire terminal connector

DB421697.eps



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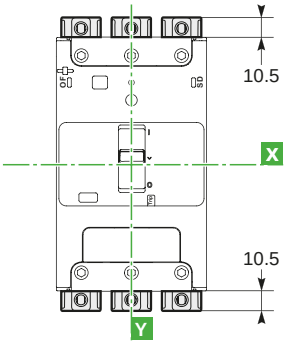

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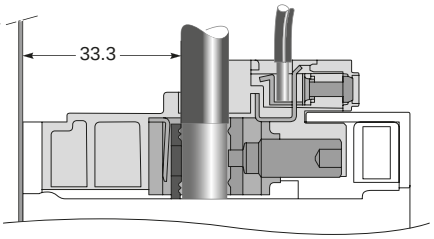

EverLink without control wire terminal connector

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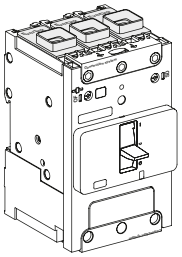

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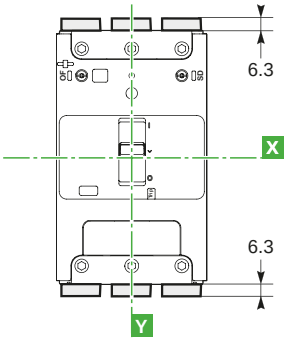

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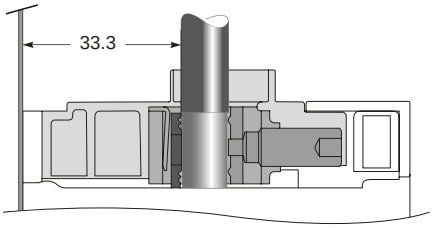

Mechanical lug connector

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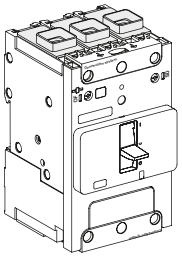

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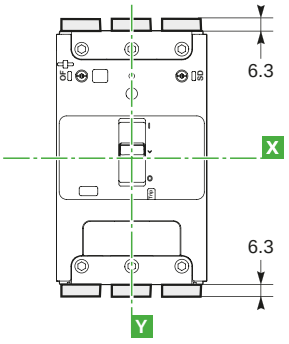

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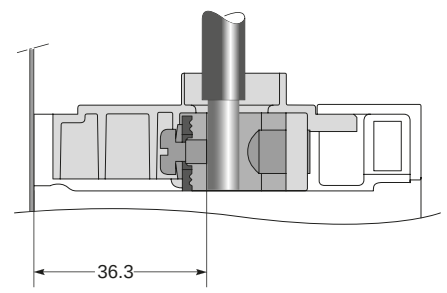

Compression lug / busbar connector

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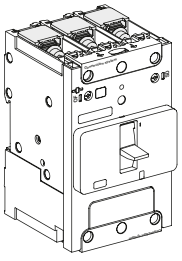

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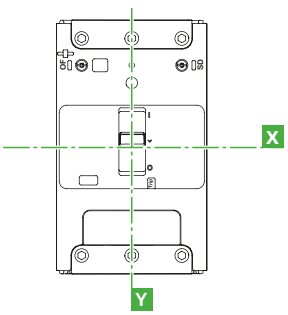

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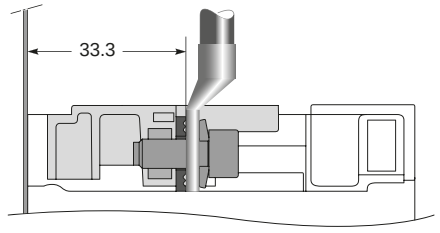


E

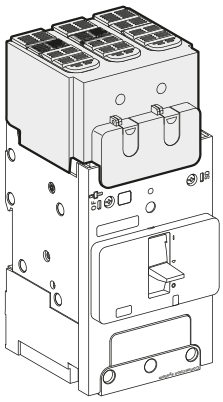
ComPact NSXm dimensions and mounting

Circuit breaker and switch-disconnector

Insulation of live parts

Long terminal shields

DB421706.eps



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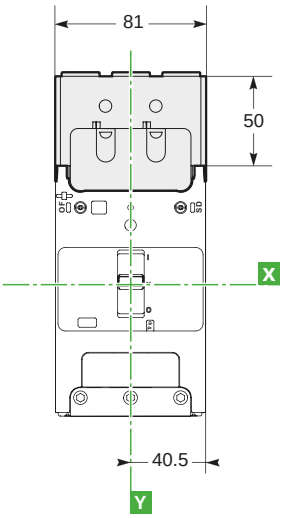

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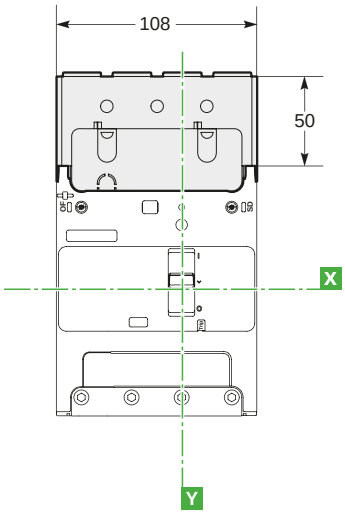

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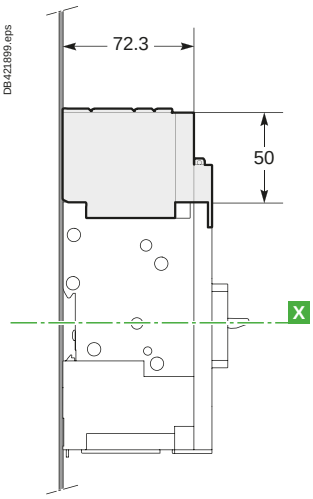
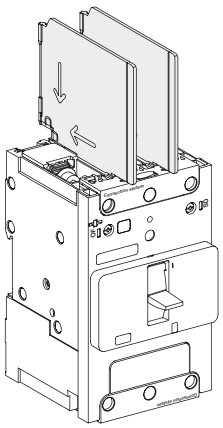


Interphase barriers

DB421708.eps



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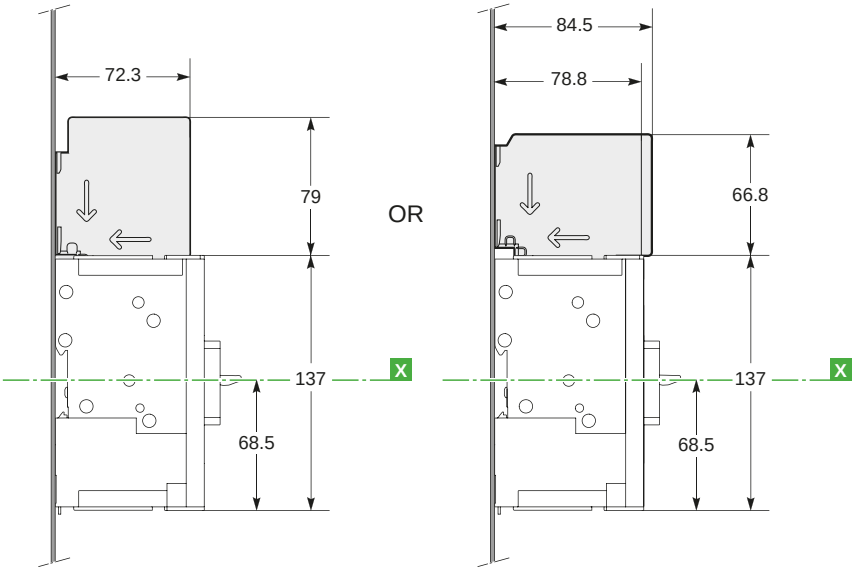


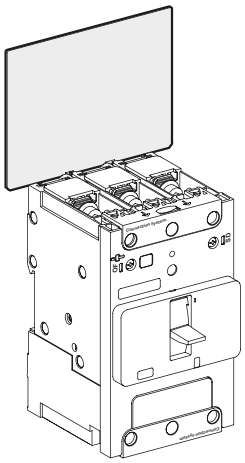
E

ComPact NSXm dimensions and mounting

Circuit breaker and switch-disconnector

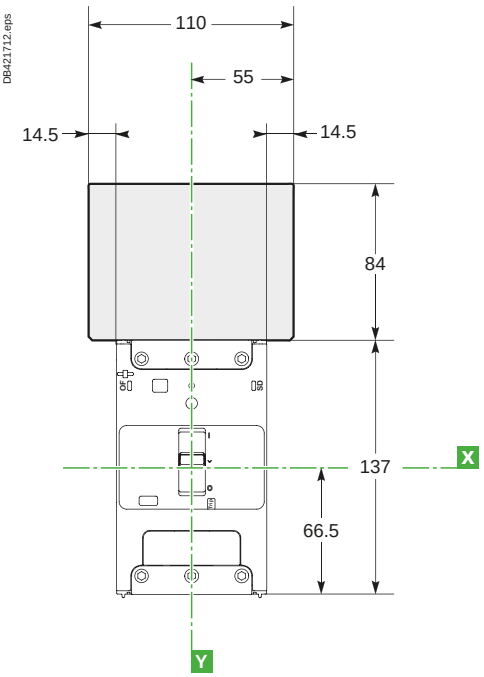
Rear insulating screens

DB421710.eps



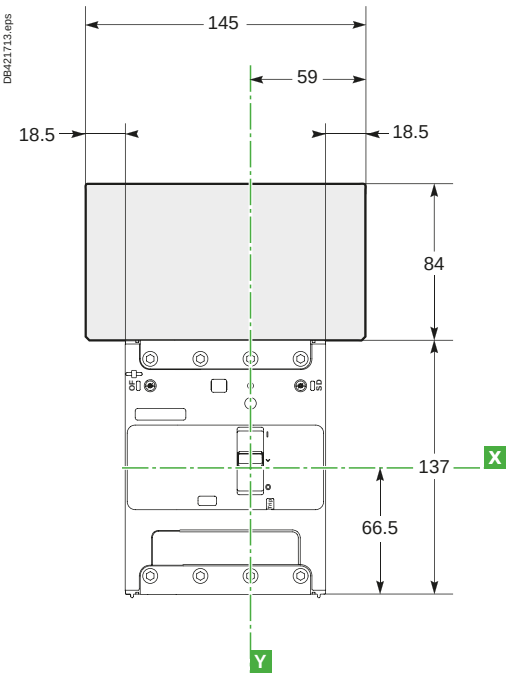
3P

DB421712.eps



4P

DB421713.eps



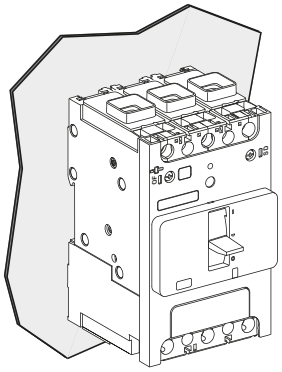
E

ComPact NSXm dimensions and mounting

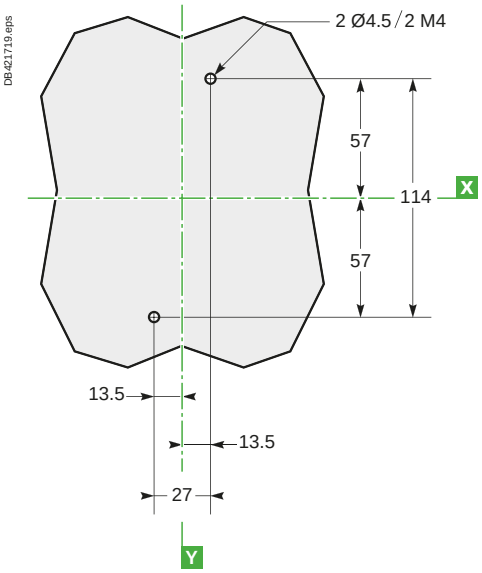
Circuit breaker and switch-disconnector

Mounting on backplate

3P/4P



3P



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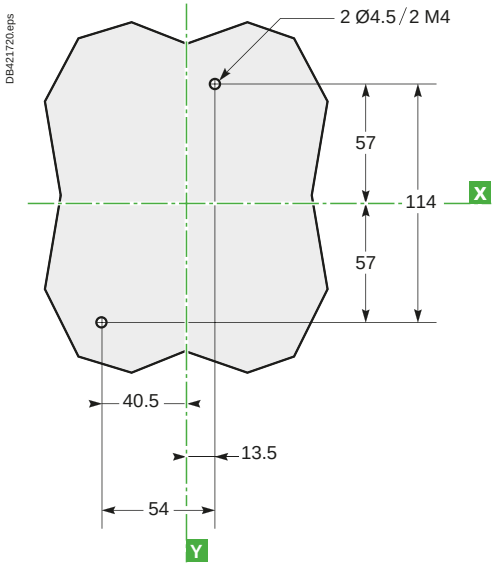
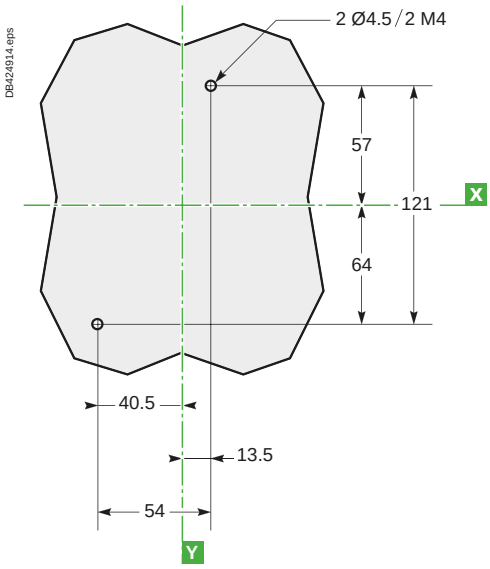
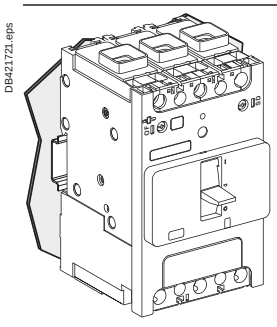


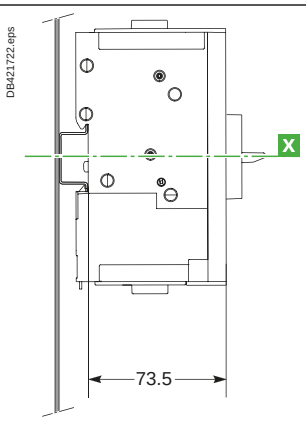
3P/4P Circuit breaker with MicroLogic Vigi 4.1



Mounting on DIN rail

3P





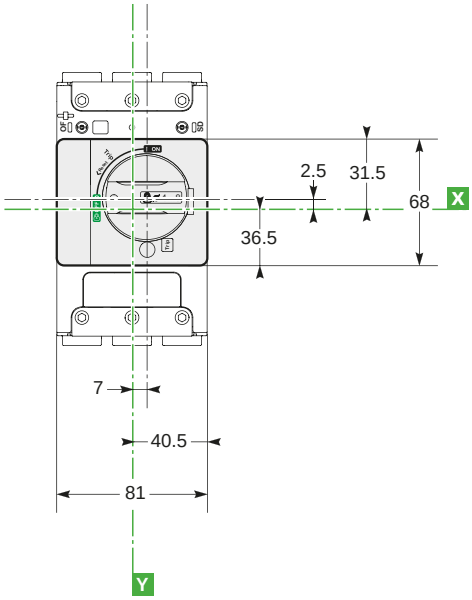
ComPact NSXm dimensions and mounting

Circuit breaker and switch-disconnector

Direct rotary handle

3P

DB421723.eps



4P

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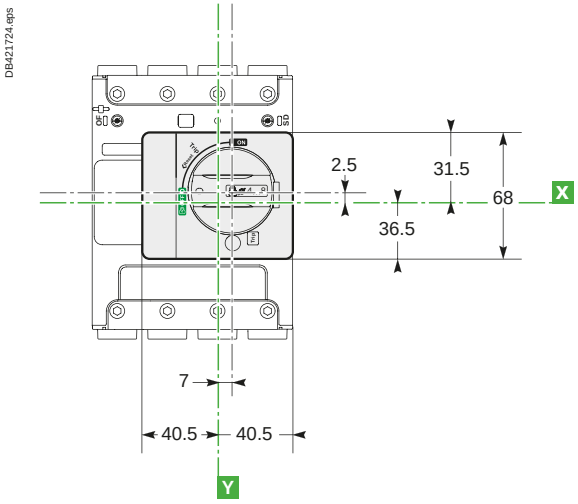
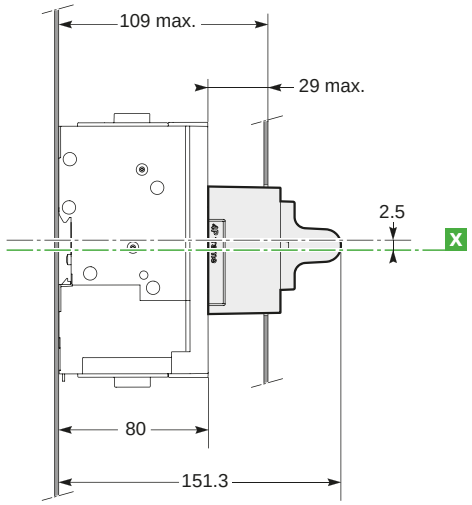


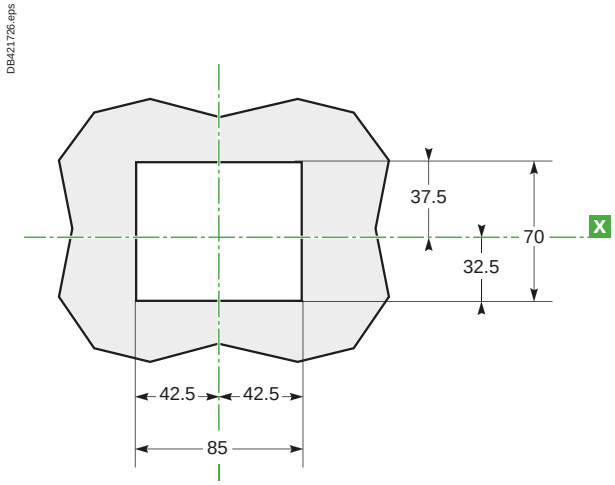
Side view

DB421725.eps



Door cutout for 3P/4P

DB421726.eps



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