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

Innovation that protects

60 years of innovative and reliable protection

The Schneider Electric™ Com**Pact** range is built on 60 years of expertise and leadership in industrial circuit breakers.

Schneider Electric is continuously introducing new features and innovations in its range of molded case circuit breakers.
The comprehensive, optimized Com**Pact** NSX range covers your protection needs and now comes in a smaller size, and with integrated earth leakage protection.

The range combines intelligent metering and monitoring, along with advanced protective functions.

This range can be connected to Schneider Electric's open, interoperable, IoT- (Internet of Things) enabled **EcoStruxure™ Power** architecture. Through this platform we deliver enhanced value in terms of 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, apps, analytics and services.

1952 — Com**Pact** NW

1974 — Com**Pact** C

1994 — Com**Pact** NS

2008 — Com**Pact** NSX

2017 — Com**Pact** NSXm

2018 — Com**Pact** NSX & NSXm with MicroLogic Vigi

Life Is On | Schneider Electric

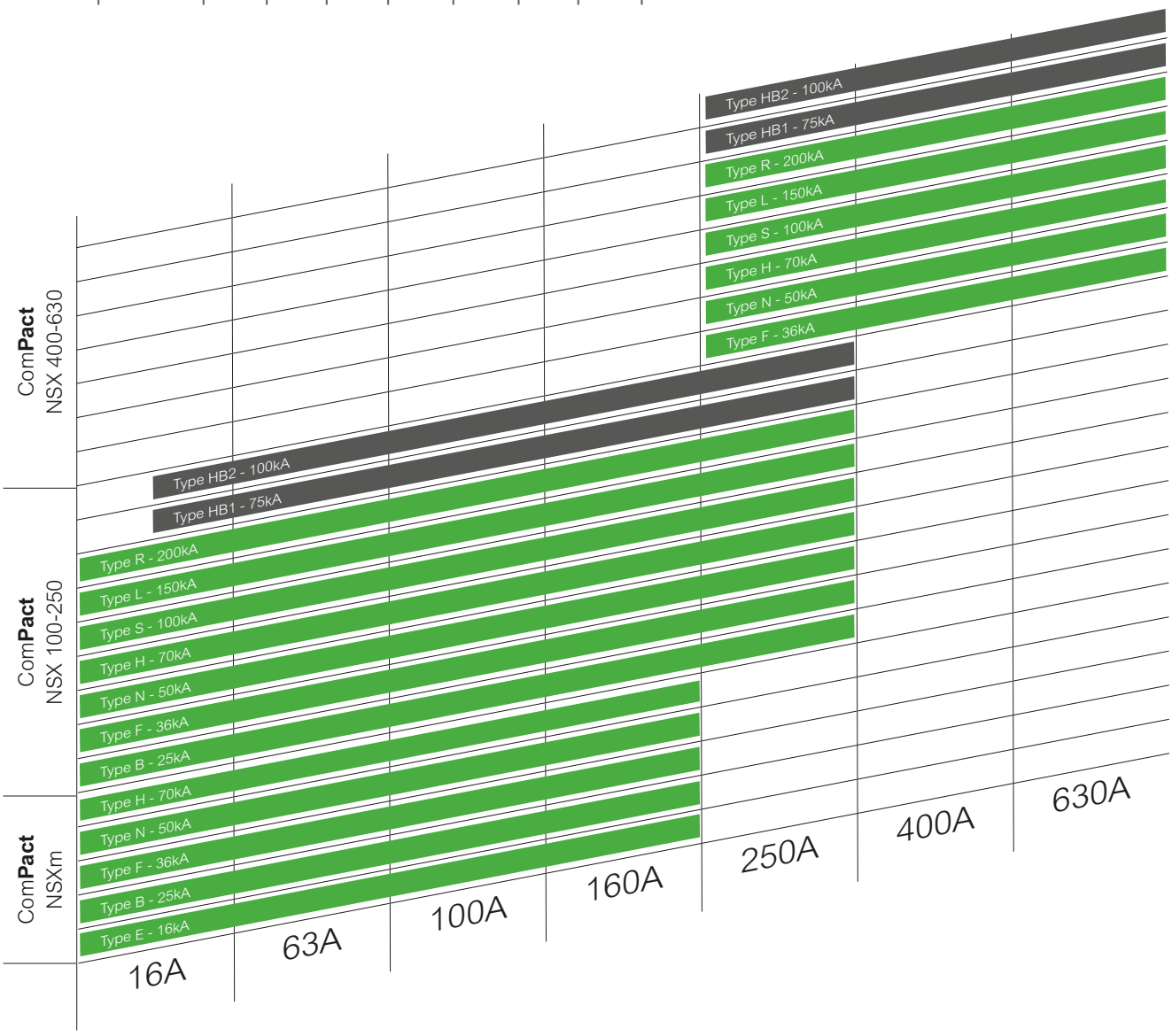
ComPact NSX and NSXm, even more innovative and efficient

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

Life Is On Schneider Electric

Schneider Electric is proud to introduce two new innovations to the Com**Pact** NSX range. As the latest family member, Com**Pact** NSXm comes to you with a smaller footprint as well as integrated earth leakage protection - which is available across the range.

New

Com**Pact** NSXm

Smallest size in the range

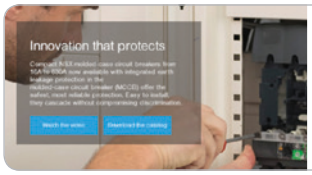
- **The smallest frame size** in the Com**Pact** NSX range, incorporating new features and innovations
- **Gain up to 40%** in space when using with integrated earth leakage protection
- **Reduce up to 40%** mounting and cabling time with EverLink™ connectors, built-in DIN rail and spring-type auxiliaries
- **Select, configure and commission** with ease, thanks to Schneider Electric online tools: EcoStruxure Customer Lifecycle Software

New

MicroLogic Vigi

Integrated earth leakage protection

- **Easy to integrate** into a row that does not have earth leakage protection
- **Simple to use,** reliable, and now comes in the same frame size, and for the same panel support
- **Gain up to 40%** in space when using with integrated earth leakage protection into the MicroLogic Vigi trip units
- **Part of the EcoStruxure Power architecture,** with digital communication capability and data management (settings, measurement, pre-alarms, trip & test history)



Innovation that protects:
Learn about the benefits of the Com**Pact** NSX range here:
se.com/com**pact**-nsx

Scan or click on QR code

Life Is On Schneider Electric

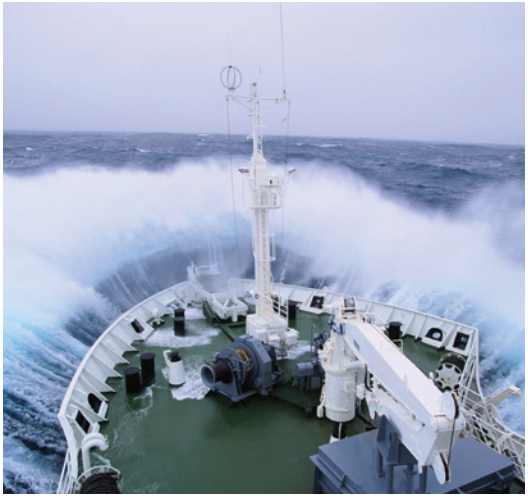
Reliability that fits

Made to protect

You can depend on the Com**Pact** range, even in the most stressful of environments. The Com**Pact** range addresses demanding applications, thanks to its high level of breaking capacities.

- An excellent choice for standard and specific applications
- The highest-rated breaking capacity in its class with 100kA at 690V
- Quality-certified by independent authorities
- Extended breaking capacity available in the same space-saving Com**Pact** NSX frame size

Compliance with international standards and for specific applications.
See catalog for details.



Life Is On Schneider Electric

Optimized size and innovations tailored to your needs.

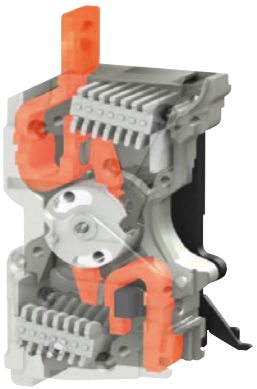
Roto-active™ breaking technology

While the ComPact NSXm is the smallest breaker in the ComPact range,
it nonetheless features all the innovations from previous generations, and notably includes roto-active breaking technology.

Schneider Electric was the first to introduce this technology - an innovation in which the effective fault current limitation benefits the entire installation, particularly its cables.

Reduce the effects of short circuits to extend your installation life:

- Increase life duration of all items downstream of the electrical network
- Provide both outstanding selectivity and cascading



Learn about Roto-active breaking technology:

Scan or click on QR code

EverLink™ connectors - for enduring safety

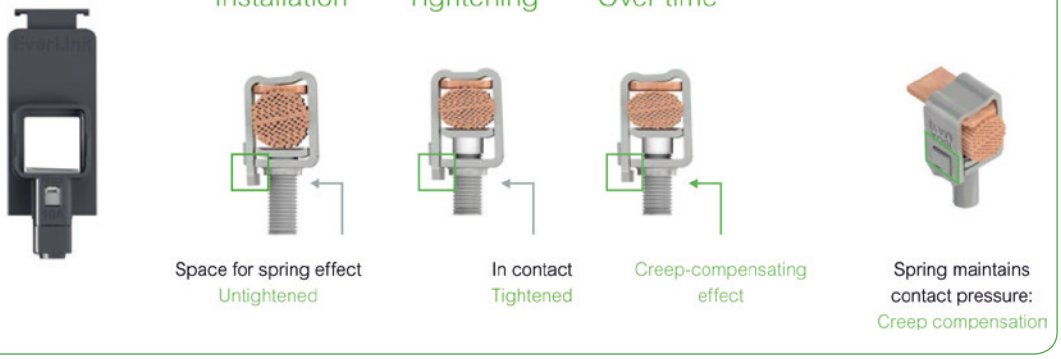
New ComPact NSXm

The ComPact NSXm features EverLink, an innovative cable connection method with patented creep-compensating technology that is built directly into the terminal. EverLink gives you:

- Confidence that your electrical connections maintain consistent pressure on the cable over time
- A space-saving solution as bare cable connections are as reliable as compression lug cable connections
- IP40 protection available thanks to transparent long terminal shield

Learn about EverLink online:

Scan or click on QR code



Efficiency that clicks

Mounting, installing and cabling made easier

Today, the Com**Pact** range is optimized with a high level of breaking capacity, outstanding selectivity and cascading.

It offers more advanced functions and ergonomic designs for easy installation and operations.

The latest innovations that reinforce this:

- The Com**Pact** NSXm is an innovative frame that minimizes space occupation with combinations up to 160A
- Com**Pact** NSX and NSXm are now available with integrated earth leakage protection via MicroLogic Vigi trip unit technology.

Software for each step of your project

To complement its high-quality products, Schneider Electric offers power supply professionals a wide range of online and offline software tools that help to improve efficiency at all stages of your project. These resources include: EcoStruxure Power Design, EcoStruxure Power Build, EcoStruxure
Power Commission and Product Selector.

Free download here:

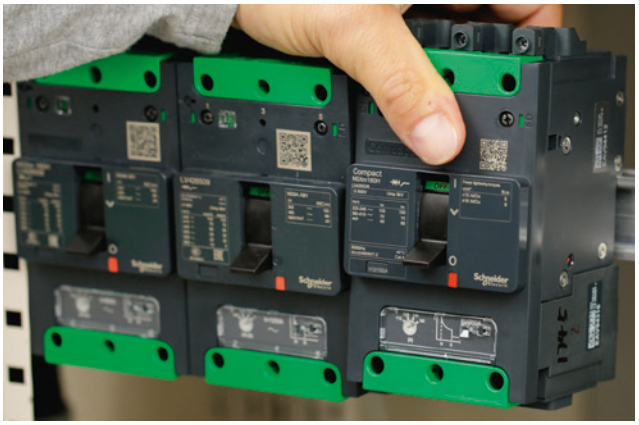
se.com

Life Is On Schneider Electric

New

ComPact NSXm

Smallest size in the range



Flexible installation for your convenience

Click your ComPact NSXm into place with the built-in DIN rail - no extra parts required. Alternatively, vertical plate mounting means you can save space. Available with integrated MicroLogic Vigi.

Scan or click on QR code

Power connections made more efficient

EverLink connectors for reliable and quick bare cable connections. Innovative torque-limiting breakaway bits can be used to tighten power connections in the field.

Scan or click on QR code

New

MicroLogic Vigi

Integrated earth leakage protection

Free up space in your panel board

The ComPact NSX with integrated earth leakage protection fits perfectly in a row with circuit breakers which do not have earth leakage protection. ComPact NSXm is also available with MicroLogic Vigi.

Save time and effort

Now there's no need to order separate earth leakage modules. Save time, now that there's one less item to add to the panel board.

Innovation that protects

Maintenance made more efficient

The Com**Pact** range combines intelligent metering and monitoring with advanced protective functions. The range can be connected as part of an EcoStruxure Power digital architecture. By measuring performance data and offering performance analysis, building owners and managers can anticipate and prevent issues throughout lifecycle of the equipment.

New Com**Pact** NSXm

Instant access to product information

Scan the Com**Pact** NSXm QR code for product information and easy access to the customer care center.

Visible auxiliaries

One-click auxiliaries on the Com**Pact** NSXm with field-installable accessories and auxiliaries.
Their presence in the breaker is externally visible through flags and its window.

Visible auxiliaries

Scan or click on QR code

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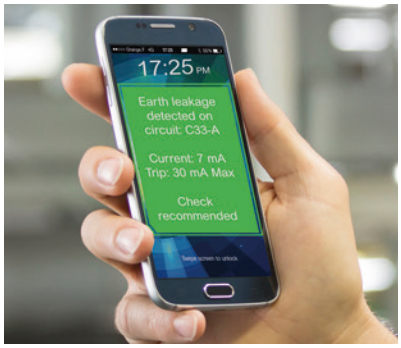
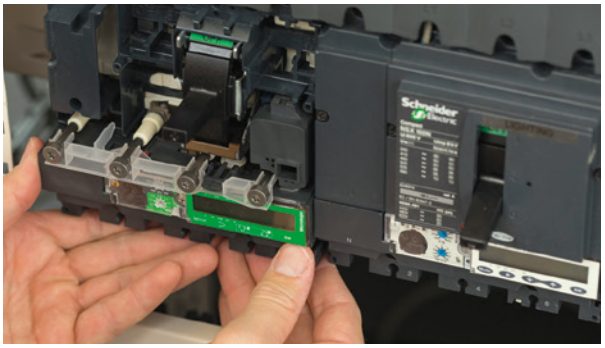
New

MicroLogic Vigi





Real-time connectivity

Thanks to the advanced MicroLogic Vigi trip unit, EcoStruxure Power notifies in the event of overloads or current leakage, before tripping thresholds are reached.

Easy product upgrades

Simply upgrade the Com**Pact** NSX to improve circuit breaker functionality – and to take advantage of earth leakage protection and digital communication. Just replace the former MicroLogic or Thermal-Magnetic trip unit with the new MicroLogic Vigi.

Connectivity: from corrective to predictive maintenance

As Schneider Electric's IoT-connected power supply architecture, EcoStruxure Power makes maintenance more effective, and reduces the probability and duration of blackouts. Com**Pact** circuit breakers play a major role in the EcoStruxure architecture, acting as watchdogs over the power supply systems, and providing data to digital architectures and monitoring software.

Corrective maintenance

EcoStruxure Power enables maintenance managers to dramatically reduce power outage duration.

Example: In case of a tripped breaker, the system automatically sends email alerts. Technical staff can diagnose the incident remotely, decide upon the appropriate actions, and monitor the results.

Preventative maintenance

Enables technicians to fix issues before impacting the comfort and productivity of building occupants. This is done by:

- Sending remote warnings as soon as a creeping fault is detected, especially current leakage.
- Assisting during routine checks, making sure all points are verified regularly and providing access to all information, including event logs, in case of a suspected weakness.

The available information enables preventive maintenance based on wear-out indications and warnings sent via the digital system.

Predictive maintenance

Data collected across the power distribution network, stored and computed by Schneider Electric analytics, provides greater insight for improved long-term planning and life-cycle management. Furthermore, advanced data processing enables predictive maintenance.

Example: By analyzing historical data and monitoring load profiles, maintenance and upgrades can be scheduled efficiently.

Learn about connectivity online:

Scan or click on QR code

EcoStruxure Power connected products – 2018 catalog

Embrace an open partner ecosystem

Today's value chain in electrical distribution is highly fragmented and inefficient from design to maintenance.

With EcoStruxure Power solutions, Schneider Electric can strengthen and simplify the entire project path by shaping a unique ecosystem of specifiers, contractors, panel builders, integrators, distributors and facility managers serving end users.

For these electrical distribution professionals, EcoStruxure Power provides opportunities to broaden and improve the services they offer their customers.

- A comprehensive and innovative range of IoT-enabled LV and MV offers
- Proven, interoperable reference architectures for any building or business
- Design, selection, commissioning and configuration tools to enhance deployment efficiencies across the project life cycle.

450,000+

EcoStruxure installations

1 billion

connected devices.

Apps, Analytics & Services

Actionable predictive maintenance information that protects your customers, safeguard your reputation and minimizing financial impact.

Edge Control

Track maintenance activity to reduce downtime, energy use, and maintenance costs while improving site planning and revealing additional capacity.

Connected Products

Pinpoint overloads and inefficiencies proactively, make informed decisions that improve operational efficiency, and finally stop chasing vague alarms

ComPact NSX & NSXm MCCBs

PowerTag wireless energy sensor

MasterPact MTZ air circuit breaker

Smart Panels

Galaxy UPS

Altivar

PowerLogic power quality meters

SM6 MV switchgear

EcoStruxure Power:
Visit our webpage to discover your possibilities

se.com/ecostruxure-power

Scan or click on QR code

Life Is On Schneider Electric

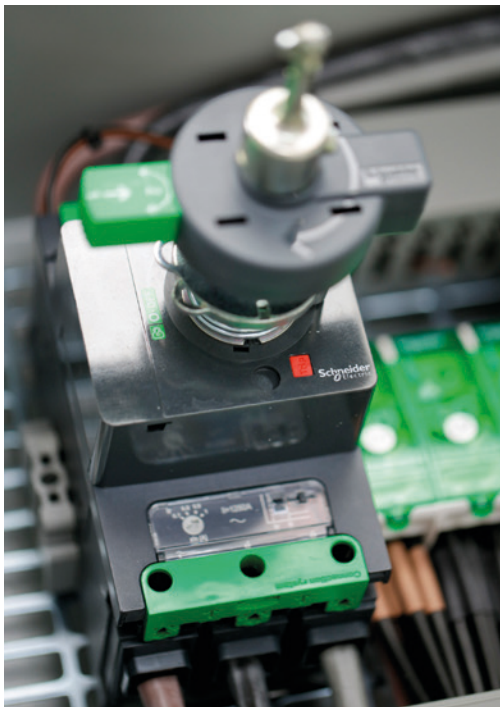
Contribute to a better world. Enhance sustainability with ComPact NSX & NSXm

Achieve Green Building certification with Green Premium ecolabel

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

For example, Com**Pact** NSX & NSXm contributes to 3 LEED™ points in the Building Product Disclosure and Optimization section:

- Environmental Product Declaration
- Material Ingredients



Green Premium™

Com**Pact** NSX range is now enriched with the new Com**Pact** NSXm, designed according to the EcoDesign Way™ by Schneider.
It now features new space saving frame size for reduced resource consumption, and more.

Space saving

The new 160A frame has been designed with a volume 40% smaller, using less resources to manufacture and saving a significant amount of space

Halogen free

The Com**Pact** NSXm TMD is free of halogenated flame retardants in plastic

This product is REACh and RoHS compliant

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

Pact Series

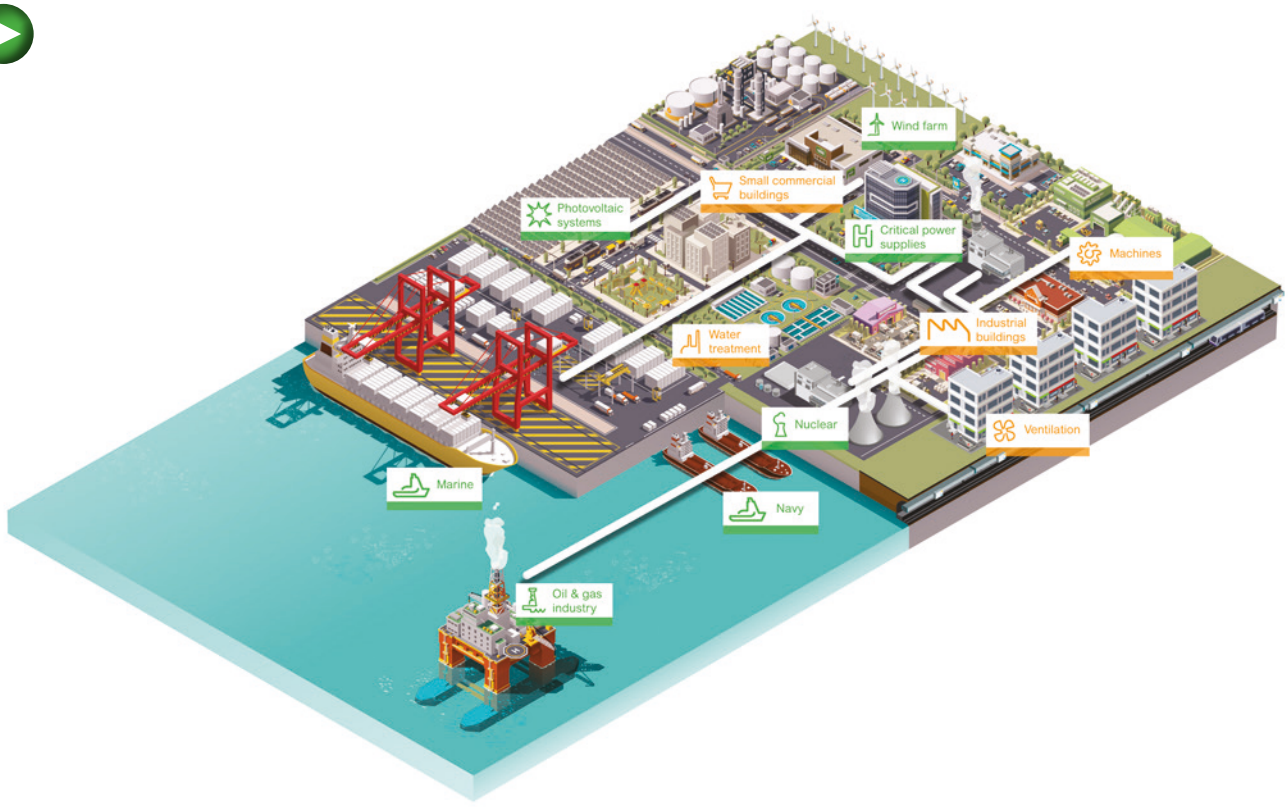
Future-proof your installation with Schneider Electric's low and medium voltage **Pact** Series. Built on legendary Schneider Electric innovation, the **Pact** Series comprises world-class circuit breakers, switches, residual current devices and fuses, for all standard and specific applications. Experience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

Old names	New names
Compact	Com**Pact**
Masterpact	Master**Pact**
Micrologic	MicroLogic
Transferpact	Transfer**Pact**
Fupact	Fu**Pact**

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.


Compact
NSX250 R
OFF
Schneider Electric
250
LOAD


Compact
NSX630F
OFF
Schneider Electric
630


Compact
NSX250 H
OFF
Schneider Electric
Ue~ 440V max
250
MODE
OK


Compact
Compact
NSXm160H
LV426509
OFF
Schneider Electric


Compact
Compact
NSXm160H
LV426748
Vigi
OFF
Schneider Electric

Select your circuit breakers and switch-disconnectors

Characteristics and performance

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

ComPact™ NSXm molded case circuit breaker (MCCB)

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

pb107518_15.eps

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

ComPact NSX" MCCB from "Schneider electric"

PB105112.eps

ComPact NSX100/160/250.

PB110406_40.eps

ComPact NSX250 R.

PB110420.eps

ComPact NSX250 HB2.

[1] OSN: Over Sized Neutral protection for neutrals carrying high currents (e.g. 3rd harmonics).
[2] ZSI: Zone Selective Interlocking using pilot wires.
[3] Vigi 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).

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

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

PB108166.eps

ComPact NSX400/630.

PB111001.eps

ComPact NSX630 R.

PB111013.eps

ComPact NSX630 HB2.

[1] OSN: Over Sized Neutral protection for neutrals carrying high currents (e.g. 3rd harmonics).
[2] ZSI: Zone Selective Interlocking using pilot wires.
[3] Vigi add-on is not available for breaking capacity levels HB1/HB2.
[4] Earth Leakage Circuit Breaker (MicroLogic Vigi 4.3 and 7.3 E)

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	

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	◉

	NSX400								NSX630										
														Ir = 225 - 500 A			Ir = 501 - 630 A		
	F	N	H	S	L	R	HB1	HB2	F	N	H	S	L	R	HB1	HB2	R	HB1	HB2
	400					**400**			**630**					**630**					
	3, 4					3, 4			3, 4					3, 4					
	40	85	100	120	150	200	-	-	40	85	100	120	150	200	-	-	200	-	-
	36	50	70	100	150	200	-	-	36	50	70	100	150	200	-	-	200	-	-
	30	42	65	90	130	200	-	-	30	42	65	90	130	200	-	-	200	-	-
	25	30	50	65	70	80	85	100	25	30	50	65	70	80	85	100	80	85	100
	20	22	35	40	50	65	80	100	20	22	35	40	50	65	80	100	65	80	100
	10	10	20	25	35	45	75	100	10	10	20	25	35	45	75	100	45	75	100
	40	85	100	120	150	200	-	-	40	85	100	120	150	200	-	-	200	-	-
	36	50	70	100	150	200	-	-	36	50	70	100	150	200	-	-	200	-	-
	30	42	65	90	130	200	-	-	30	42	65	90	130	200	-	-	200	-	-
	25	30	50	65	70	80	85	100	25	30	50	65	70	80	85	100	80	85	100
	10	11	11	12	12	65	80	100	10	11	11	12	12	65	80	100	-	-	-
	10	10	10	12	12	45	75	100	10	10	10	12	12	45	75	100	-	-	-
	15000					15000			15000					15000					
	12000					12000			8000					8000					
	6000					6000			4000					4000					
	6000					6000			6000					6000					
	3000					3000			2000					2000					
	85	85	85	-	-	-	-	-	85	85	85	-	-	-	-	-	-	-	-
	35	50	65	-	-	-	-	-	35	50	65	-	-	-	-	-	-	-	-
	20	10	20	-	-	-	-	-	20	20	20	-	-	-	-	-	-	-	-
	◉								◉										
	-								-										
	◉								◉										
	◉								◉										
	◉								◉										
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	◉								◉										
	◉								◉										
	◉								◉										
	◉								◉										
	140 x 255 x 110								140 x 255 x 110										
	185 x 255 x 110								185 x 255 x 110										
	6.05								6.2										
	7.90								8.13										
	45/52.5 mm								45/52.5 mm										
	45/70 mm								45/70 mm										
	4 x 240								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.

PB119115.eps

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 In
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

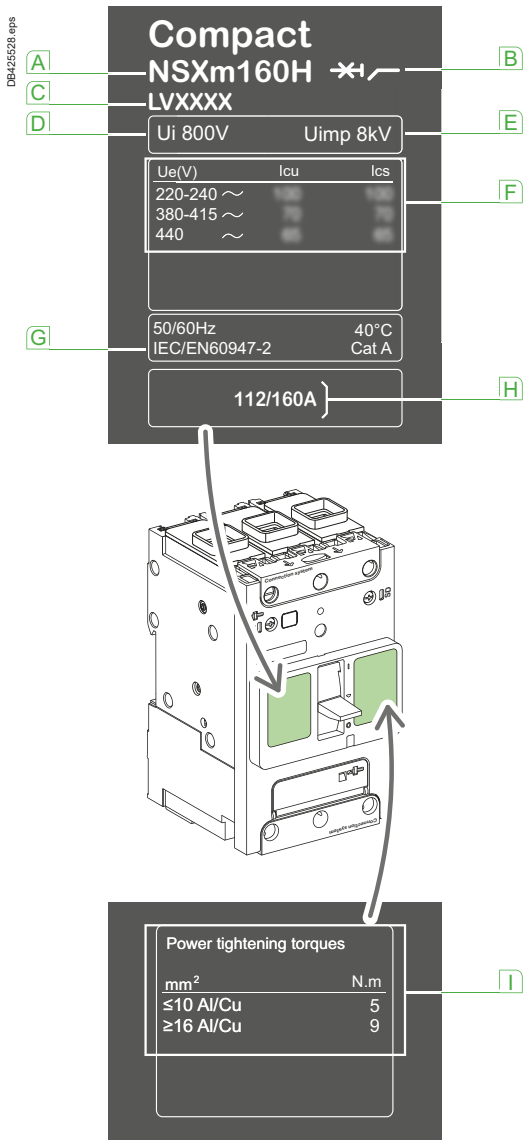
ComPact NSX switch-disconnectors from 100 to 630 A NA

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.

DB410174.eps
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

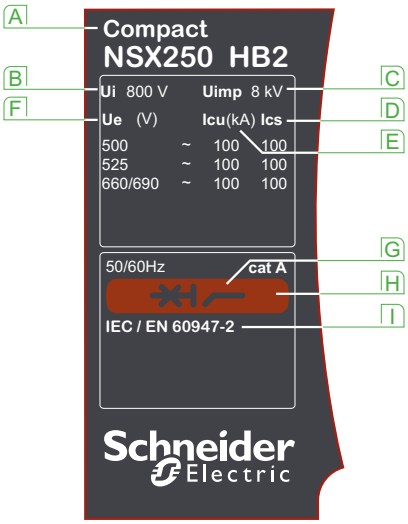
- With toggle: IP40, IK07.
- With direct rotary handle: IP40 IK07.

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.



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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

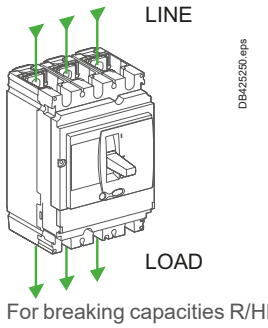
Circuit breakers			NSX100-250 [1]			NSX400			NSX630					
Breaking capacity levels			R	HB1	HB2	R	HB1	HB2	R	HB1	HB2	R	HB1	HB2
Electrical characteristics														
Breaking capacity (kA rms)									Ir < 500 A			Ir > 501 A		
Icu	AC 50/60 Hz	220/240 V	200	-	-	200	-	-	200	-	-	200	-	-
		380/415 V	200	-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

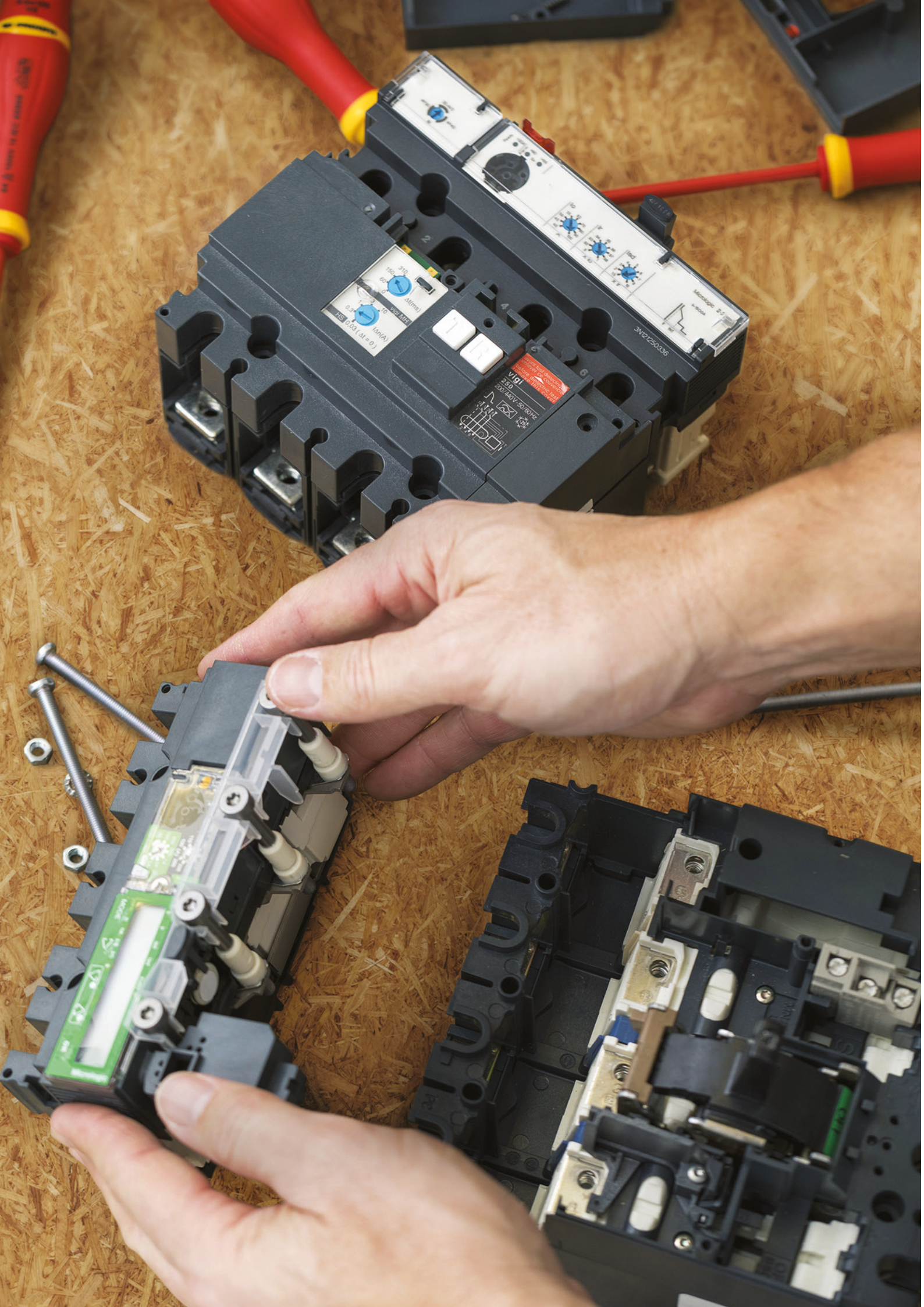
- 100 A frame and 250 A frame, there is no 160 A frame. The 125 - 160 A trip units are used in a 250 A frame.
- All R, HB1 and HB2 circuit breakers are restricted for use as line-load connection. They can not have power fed from the bottom of the circuit breaker. They will be marked with Line and Load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

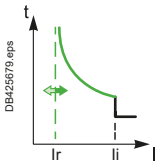
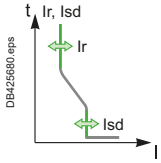
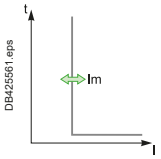
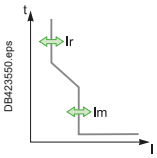

vigi
250
230/440V~50/60Hz
3NT1250336

Select your protection

B

Overview of trip units

ComPact NSXm has a built-in trip unit.

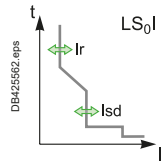
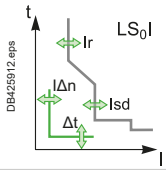
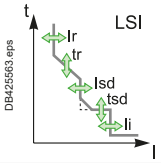
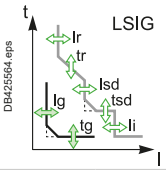
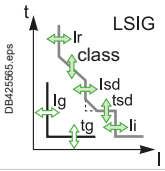
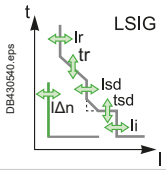
	ComPact NSXm up to 160 A		ComPact NSX up to 250 A	
				
	TM-D distribution	**MicroLogic Vigi 4.1 Distribution and earth leakage protection**	**MA Distribution and motors**	**TM-D distribution TM-G generators**
				
Settings & indications	Pick-up set in amps using dials Non-adjustable time delay			
Front 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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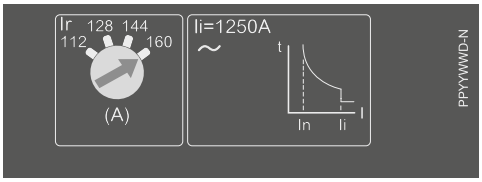


TM-D thermal-magnetic trip units

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.

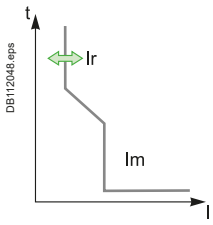
Protection versions

- 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.

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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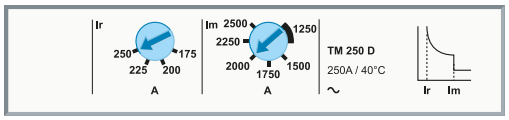

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ComPact NSX250 F.

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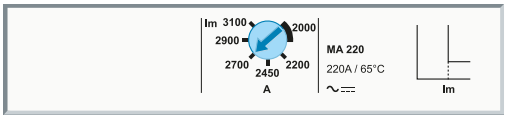


TM-D and TM-G thermal-magnetic trip units

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

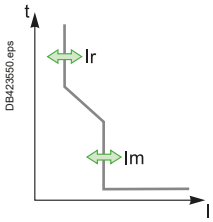
- 3-pole (3P 3D): 3-pole frame (3P) with detection on all 3 poles (3D).
- 4-pole (4P 3D): 4-pole frame (4P) with detection on 3 poles (3D).

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

Protection of distribution systems

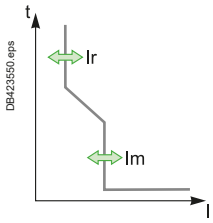
ComPact NSX TM thermal-magnetic and MA magnetic trip units

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											

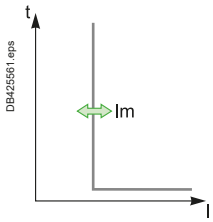
Thermal-magnetic trip units TM16G to 250G



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.

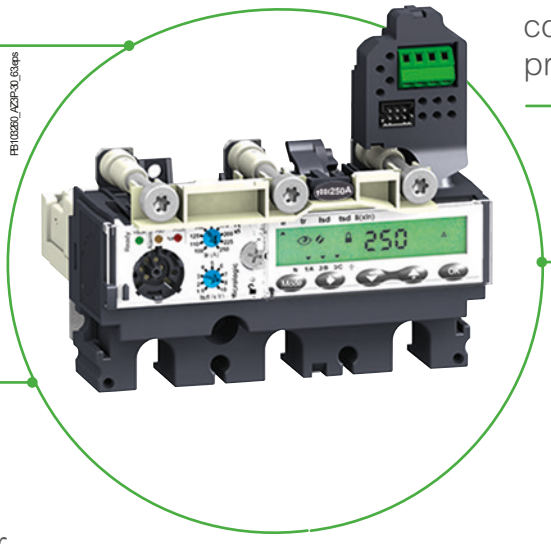
Protection of distribution systems
Overview of functions

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]

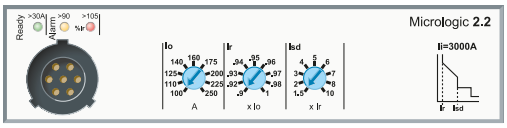
Examples				
MicroLogic 1.3	Instantaneous only	400 or 630 A	-	Distribution
MicroLogic 2.3	LS_0I	400 or 630 A	-	Distribution
MicroLogic Vigi 4.1	LS_0IR	16 to 160 A	-	Distribution
MicroLogic 5.2 A	LSI	100, 160 or 250 A	Ammeter	Distribution
MicroLogic 6.3 E-M	LSIG	400 or 630 A	Energy	Motor

[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).

DB112050.eps



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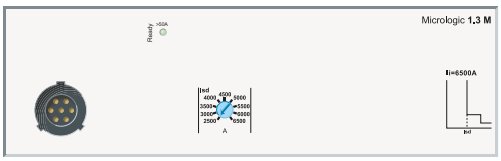
SDx remote indication relay module with its terminal block.

DB112106.eps



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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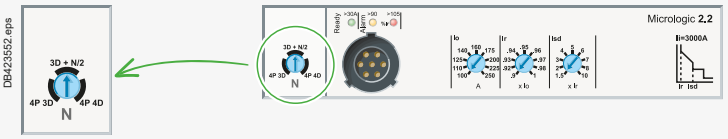
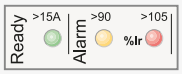


Indications

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.

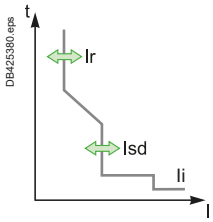
MicroLogic 1.3 M for magnetic protection only

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.

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

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

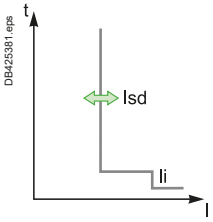
MicroLogic 2



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



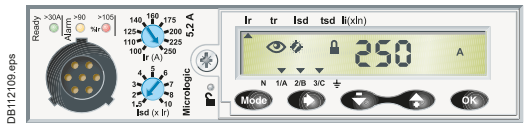
Ratings (A)	In at 65 °C [1]		320	500
Circuit breaker	ComPact NSX400		◉	-
	ComPact NSX630		◉	◉
S Short-time protection				
Pick-up (A) accuracy ±15 %	**Isd**		Adjustable directly in amps	
			9 settings: 1600, 1920, 2240, 2560, 2880, 3200, 3520, 3840, 4160 A	9 settings: 2500, 3000, 3500, 4000, 4500, 5000, 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	

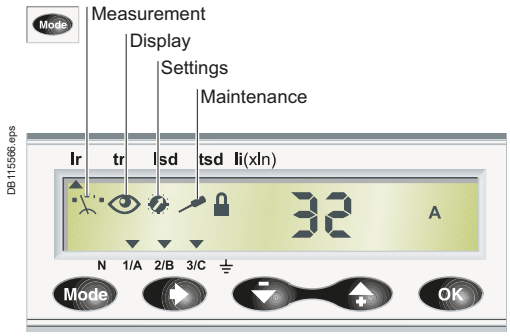
[1] Motor standards require operation at 65 °C. Circuit-breaker ratings are derated to take this requirement into account.

Protection of distribution systems

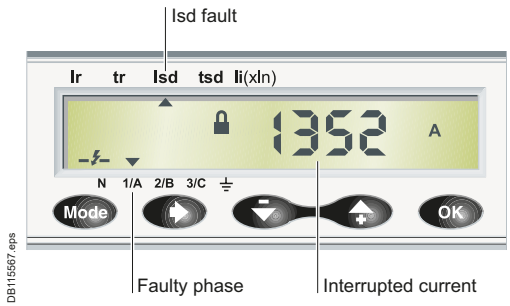
ComPact NSX MicroLogic 5 / 6 A or E trip units

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)

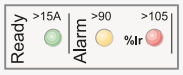
A ZSI terminal block may be used to interconnect a number of MicroLogic control units to provide zone selective interlocking for short-time (Isd) and ground-fault (Ig) protection, without a time delay. For ComPact NSX 100 to 250, the ZSI function is available only in relation to the upstream circuit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

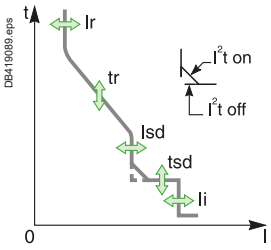
An SDx relay module installed inside the circuit breaker can be used to remotely access to the following information:

- 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							

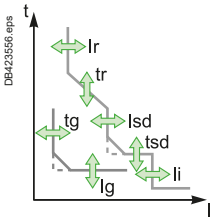
S Short-time protection with adjustable time delay

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.

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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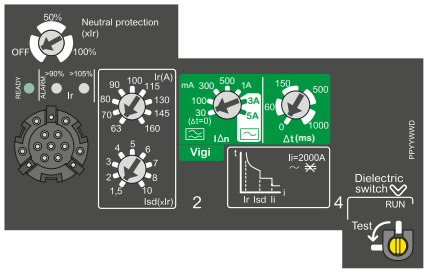

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ComPact NSXm MicroLogic Vgi 4.1.

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

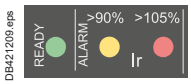
- Green “Ready” LED: flashes slowly when the circuit breaker is ready to trip in the event of an overload or short-circuit fault.
- Orange overload pre-alarm LED: steady on when I > 90 % Ir.
- Red overload LED: steady on when I > 105 % Ir.
- Screen that indicate an earth leakage fault trip - reset when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

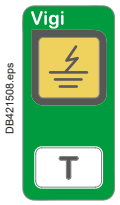
Alarming and fault differentiation

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

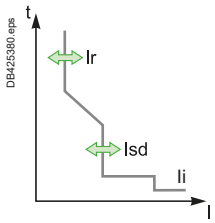
- overload alarm (I > 105 % Ir)
- overload trip indication
- earth leakage alarm (IΔn > 80 % threshold)
- earth leakage trip indication.

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.

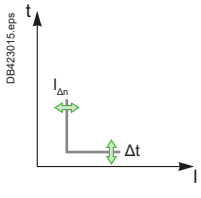




MicroLogic Vigi 4.1



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.

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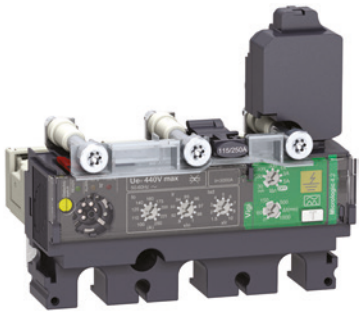
LV433803.eps



MicroLogic Vigi 4 (LS_oIR).

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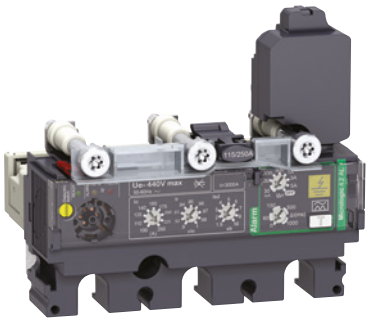


MicroLogic Vigi 4 AL (LS_oI + Earth Leakage Alarm).

MicroLogic Vigi 4

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

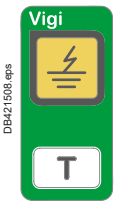
The earth leakage protection is a user safety device. It must be regularly tested using the test button (T) that simulates a real current leakage within the toroid. When IΔn is set on the OFF position, press the T will cancel any test.
As for standard circuit breaker, the circuit breaker with MicroLogic 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).

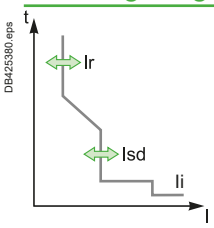


Alarming and fault differentiation

- 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.

MicroLogic Vigi 4

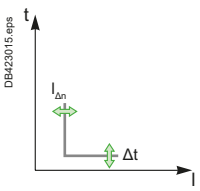


Ratings (A)	In at 40 °C [1]	40	100	160	250	400	570
Circuit breaker	ComPact NSX100	●	●				
	ComPact NSX160	●	●	●			
	ComPact NSX250	●	●	●	●		
	ComPact NSX400					●	
	ComPact NSX630					●	●

L Long-time protection											
Pick-up (A)		Io	value depending on the rating (In) and the dial setting								
tripping between	In = 40 A	Io =	18	18	20	23	25	28	32	36	40
1.05 and 1.20 Ir	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)	**tr**		non-adjustable								
accuracy 0 to -20%	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)	**Isd** = Ir x ...	1.5	2	3	4	5	6	7	8	10
accuracy ±10 %										
Time delay (ms)	**tsd**	non-adjustable								
	Non-tripping time	20								
	Maximum break time	80								

I Instantaneous protection							
Pick-up (A)	Ii non-adjustable	600	1500	2400	3000	4800	6900
accuracy ±15 %	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.

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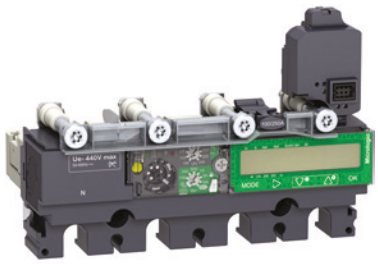
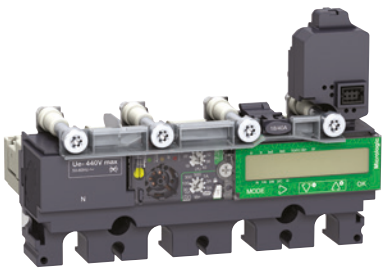
LV433882.eps



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:

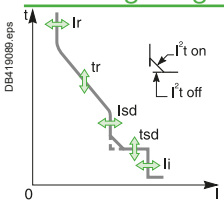
- Overload pre-Alarm
- Overload trip
- Earth leakage pre-alarm (useful for the "trip" version of the circuit breaker with MicroLogic Vigi 7 E only)
- Earth leakage trip (exist for the "trip" version of thecircuit breaker with MicroLogic Vigi 7 E only)
- Earth leakage Alarm without "trip" (circuit breaker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

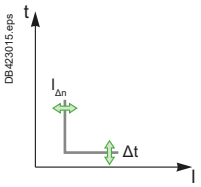
Protection of distribution systems

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.

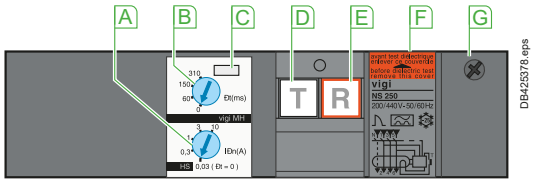
Vigi add-on selection

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.

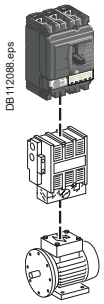
Installation system		Suitable format	
		Front-panel mount	**DIN rail**
Main LV switchboard		◉	
Power distribution switchboard	instrument zone	◉	
	modular-device zone		◉
Motor Control Centre (MCC)			◉ with clip-in toroid
Automatic control panel or machine panel			◉ with mounting lugs
Final distribution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

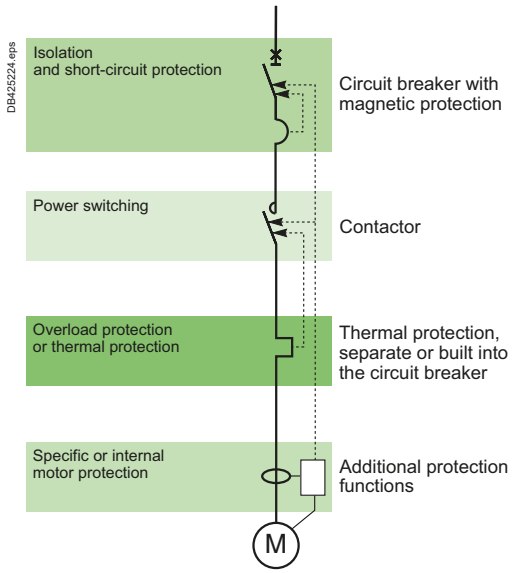
ComPact NSX motor protection
General information on motor feeders

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

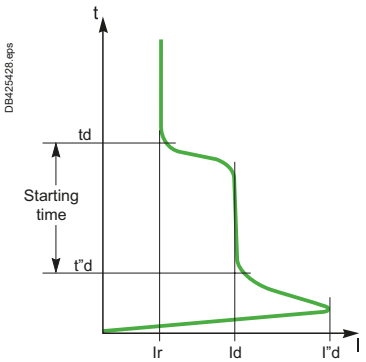
The trip class determines the trip curve of the thermal protection device (inverse-time curve) for a motor feeder.
Standard IEC 60947-4-1 defines trip classes 5, 10, 20 and 30.
These classes are the maximum durations, in seconds, for motor starting with a starting current of 7.2 Ir, where Ir is the thermal setting indicated on the motor rating plate.

B

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.

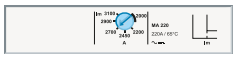
They are designed for use with contactors in the AC-3 utilisation category (80 % of all cases) and they ensure type 2 coordination with the contactor.
For the AC-4 utilisation category, the difficult conditions generally make it necessary to oversize the protection circuit breaker with respect to the 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.

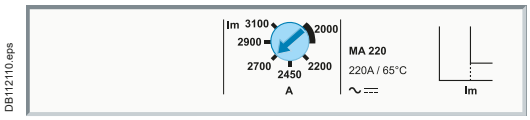
Type of motor protection			3 devices		2 devices	
ComPact NSX circuit breaker			**NSX100/160/250**	**NSX400/630**	**NSX100 to 630**	
	Type 2 coordination with		Contactor + thermal relay		Contactor	
Trip unit	Type Technology		**MA** Magnetic	**MicroLogic 1.3 M** Electronic	**MicroLogic 2 M** Electronic	**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:
TeSys GV

MKTED210011EN

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.



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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

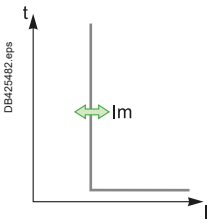
Magnetic protection (Im)

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)

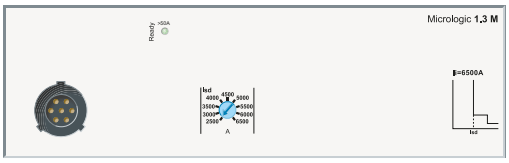
Protection with an adjustable pick-up Isd. There is a very short delay to let through motor starting currents.
- Isd is set in amperes from 5 to 13 x In, as follows:
  - from 1600 to 4160 A for the 320 A rating
  - from 2500 to 6500 A for the 500 A rating.

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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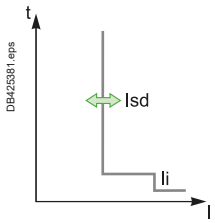
Indications

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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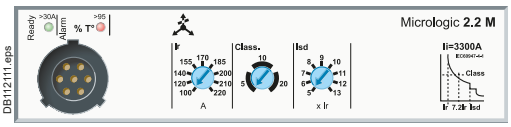
Ratings (A)	In at 65 °C [1]	320	500
Circuit breaker	ComPact NSX400	◉	-
	ComPact NSX630	◉	◉
S Short-time protection			
Pick-up (A) accuracy ±15 %	**Isd**	Adjustable directly in amps	
		9 settings: 1600, 1920, 2440, 2560, 2880, 3200, 3520, 3840, 4160 A	9 settings: 2500, 3000, 3500, 4000, 4500, 5000, 5500, 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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SDTAM remote indication relay module with its terminal block.

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.

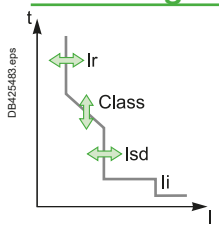
Remote indications via SDTAM module
ComPact NSX devices with a MicroLogic 2 can be equipped with an SDTAM module dedicated to motor applications for:
- a contact to indicate circuit-breaker overload
- a contact to open the contactor. In the event of a phase unbalance or overload, this output is activated 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.

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



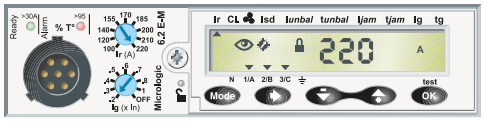
Ratings (A)	In at 65 °C [1]		25	50	100	150	220	320	500		
Circuit breaker	ComPact NSX100		◉	◉	◉	-	-	-	-		
	ComPact NSX160		◉	◉	◉	◉	-	-	-		
	ComPact NSX250		◉	◉	◉	◉	◉	-	-		
	ComPact NSX400		-	-	-	-	-	◉	-		
	ComPact NSX630		-	-	-	-	-	◉	◉		
L Overloads (or thermal protection): Long-time protection and trip 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.

B

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

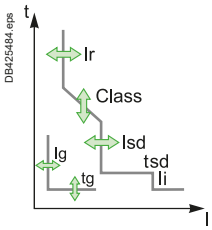
Front indications

- 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.

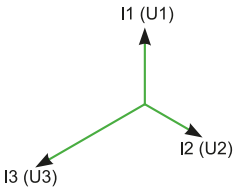
Phase loss
Phase loss is a special case of phase unbalance.
- During normal operation, it produces the effects mentioned above and tripping must occur after four seconds.
- During starting, the absence of a phase may cause motor reversing, i.e. it is the load that determines the direction of rotation.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

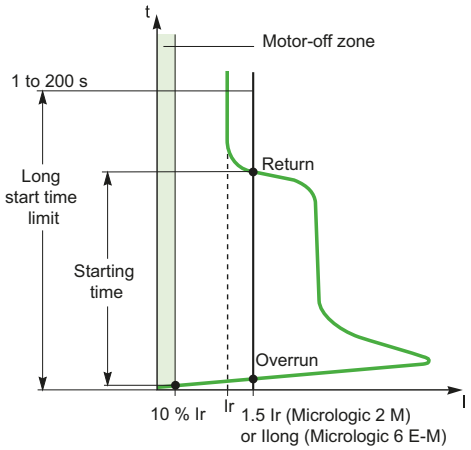
If either of these conditions is not met, the thermal protection trips the device after a maximum time equal to that of the selected class.
Pick-up Ir must have been set to the current indicated on the motor rating plate.

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.



Unbalance of phase currents and voltages.



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.

MicroLogic 5 / 6 / 7 E for energy management functions

Active Power and Energy metering in Com**Pact** 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.

Com**Pact** 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.

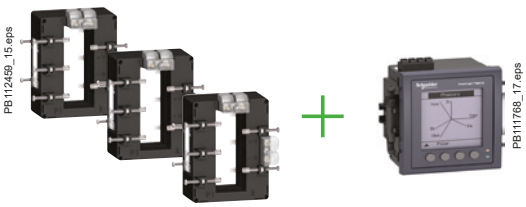
PMD-D - Embedded sensors

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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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 electronic trip units


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MicroLogic built-in LCD display.

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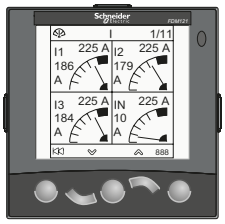
FDM121 display: navigation.



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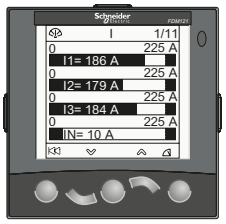
FDM121 display: current



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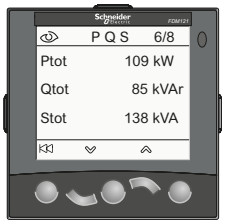
FDM121 display: voltage



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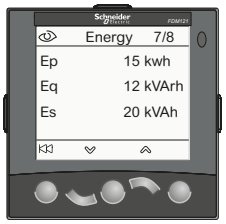
FDM121 display: power.



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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


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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.

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.

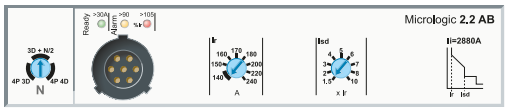
ComPact NSX circuit breakers equipped with MicroLogic AB trip units are installed as incoming devices for consumer installations connected to the public LV distribution system.
With respect to the utility, they have two functions.

- 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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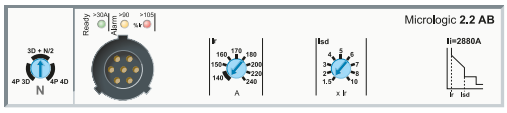
ComPact NSX with MicroLogic 2 AB.

B

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



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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**).

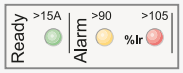
Short-circuits: Short-time protection (Isd) with fixed time delay
Short-circuit protection with an adjustable pick-up Isd. The short-time pick-up values are high enough to avoid nuisance tripping in the event of transient current spikes.

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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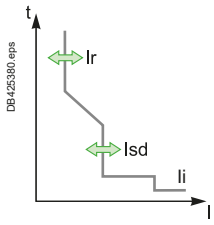
SDx remote indication relay module with its terminal block.

ComPact NSX special applications

Protection of public distribution systems with MicroLogic 2-AB

MicroLogic 2.2 / 2.3 AB



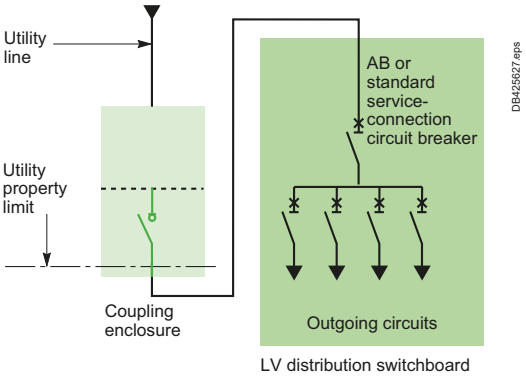
Ratings (A)	In at 40 °C [1]		100	160	240	400
Circuit breaker	ComPact NSX100		◉	-	-	-
	ComPact NSX160		◉	◉	-	-
	ComPact NSX250		◉	◉	◉	-
	ComPact NSX400		-	-	-	◉
	ComPact NSX630		-	-	-	◉
L Long-time protection						
Pick-up (A) tripping between 1.05 and 1.20 Ir	**Ir**		value depending on trip unit rating (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_n 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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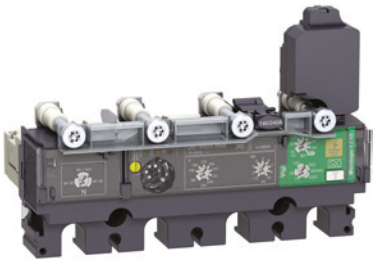


MicroLogic Vigi 4.2-AB trip unit.

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

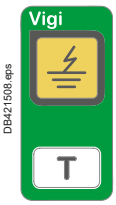
Front indications

- 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).

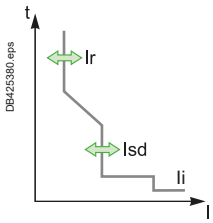
Alarming and fault differentiation

- 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.

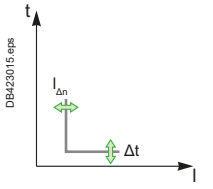
This module receives the signal from the MicroLogic electronic trip unit via an optical link and makes it available on the terminal block. The signal is reset when the breaker is operated.



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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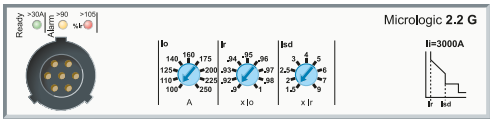

Circuit breakers equipped with MicroLogic G trip units protect systems supplied by generators (lower short-circuit currents than with transformers) and distribution systems with long cable lengths (fault currents limited by the resistance of the cable).

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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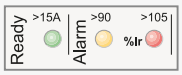

- Green “Ready” LED: flashes slowly when the circuit breaker is ready to trip in the event of a fault.
- Orange overload pre-alarm LED: steady on when I > 90 % Ir.
- Red overload LED: steady on when I > 105 % Ir.

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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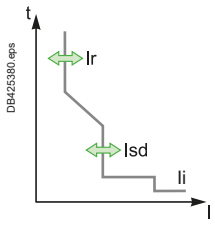
SDx remote indication relay module with its terminal block.

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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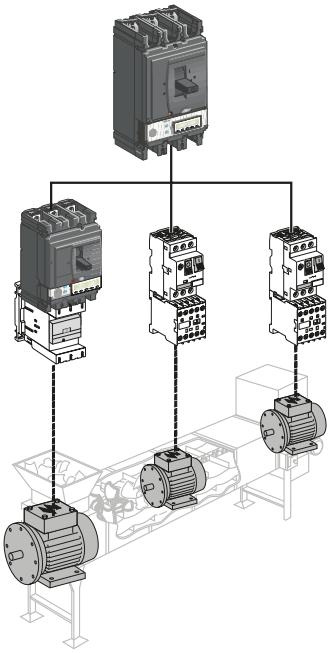

Industrial control panels

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.).

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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

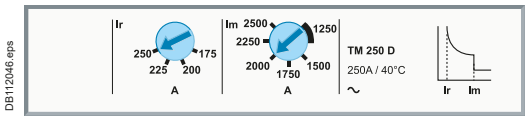
The deratings indicated on pages E-14 to E-17 apply to TMD, MicroLogic 2, 5 and 6 trip units, rated at 40 °C.

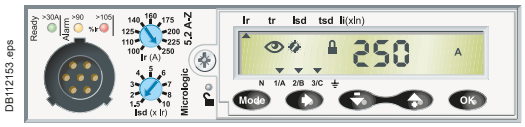
ComPact NSX special applications

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.

B





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.

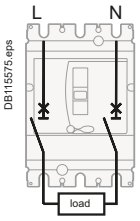
Trip-unit selection

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		

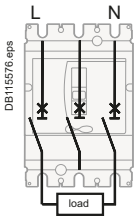
Wiring for NSX100 to 630 A

Phase and isolated neutral interrupted- 250 / 500 V

B and F (3P 2D version)

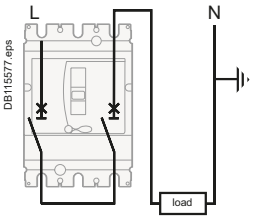


N and H (3P 3D version)

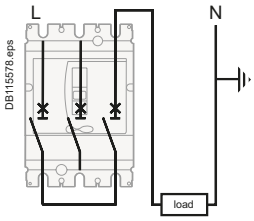


2 poles in series - Earthed neutral - 250 / 500 V

B and F (3P 2D version)



N and H (3P 3D version)



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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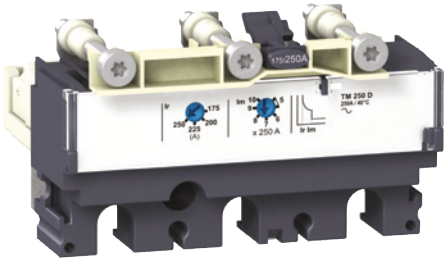

MicroLogic TM-D trip unit.

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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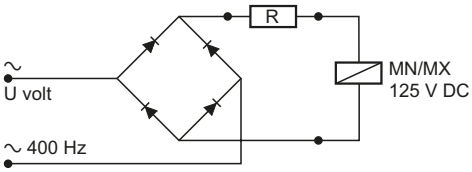
MX or MN voltage release.

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

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



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Wiring diagram.

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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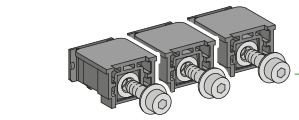
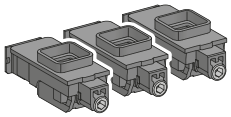
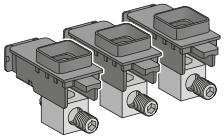
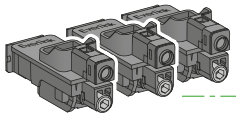
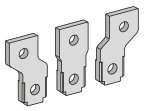

Compression lug / busbar connector

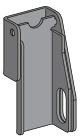

EverLink™ without control wire terminal connector

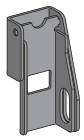

Torque limiting breakaway bit

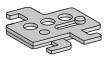

Al mechanical lug

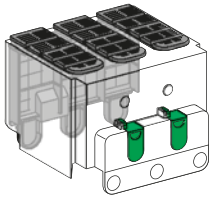

EverLink™ with control wire terminal connector

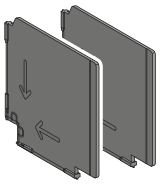

Terminal spreaders

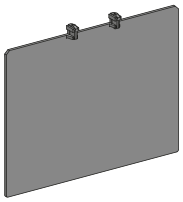

Fixed toggle padlocking device (OFF only)


Fixed toggle padlocking device (OFF and ON)

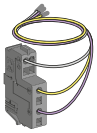

Removable toggle padlocking device (OFF only)

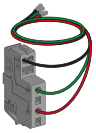

Long terminal shield

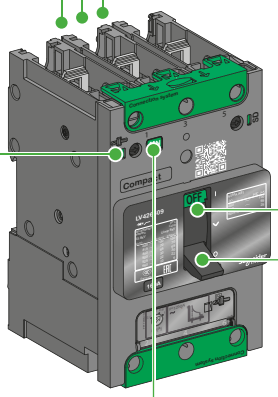

Interphase barriers

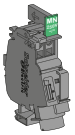

Rear insulation screen

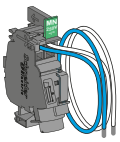

OF or SD auxiliary contact standard

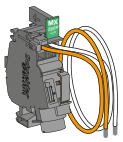

OF auxiliary contact pre-wired

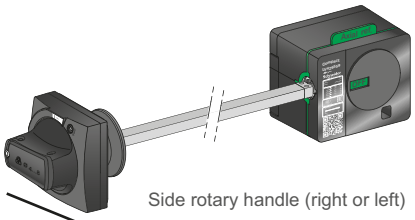

SD auxiliary contact pre-wired

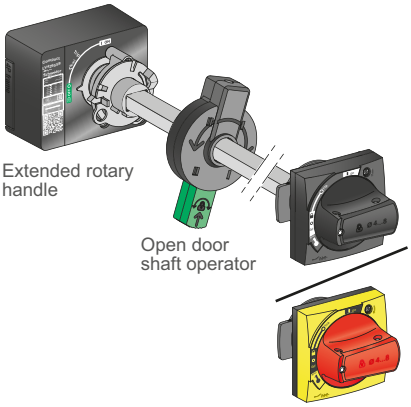



MN or MX voltage releases standard

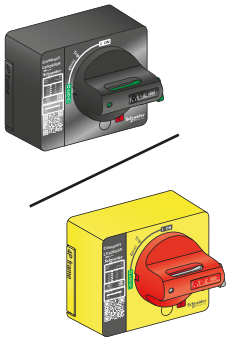

MN voltage releases pre-wired


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

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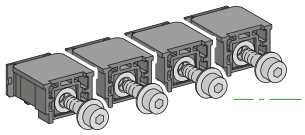
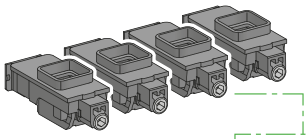
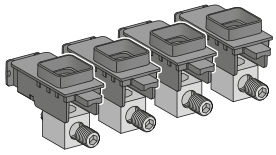


Compression lug / busbar connector

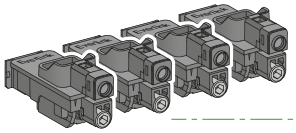


EverLink™ without control wire terminal connector

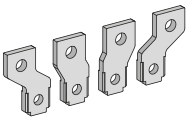
Torque limiting breakaway bit



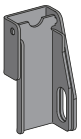
Al mechanical lug



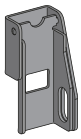
EverLink™ with control wire terminal connector



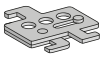
Terminal spreaders



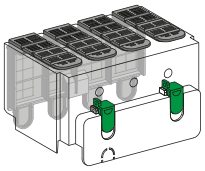
Fixed toggle padlocking device (OFF only)



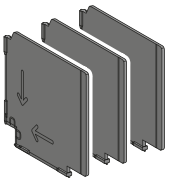
Fixed toggle padlocking device (OFF and ON)



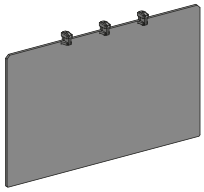
Removable toggle padlocking device (OFF only)



Long terminal shield

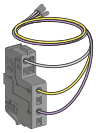


Interphase barriers

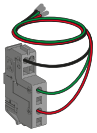


Rear insulation screen

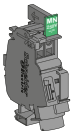
OF or SD auxiliary contact standard



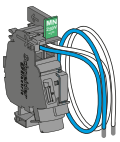
OF auxiliary contact pre-wired



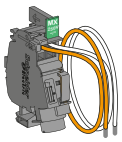
SD auxiliary contact pre-wired



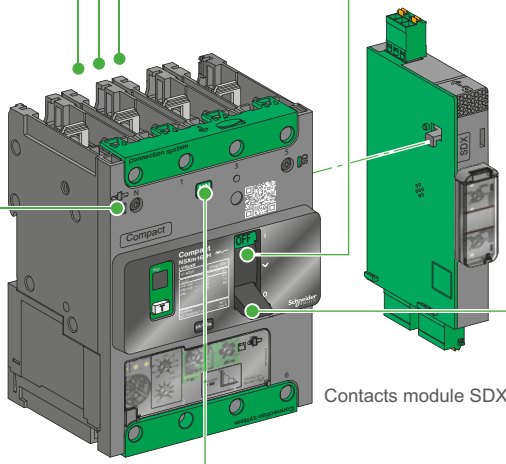
MN or MX voltage releases standard



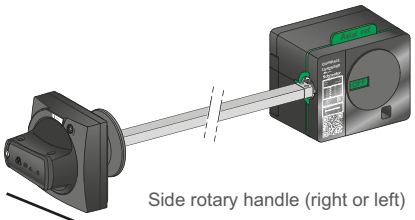
MN voltage releases pre-wired



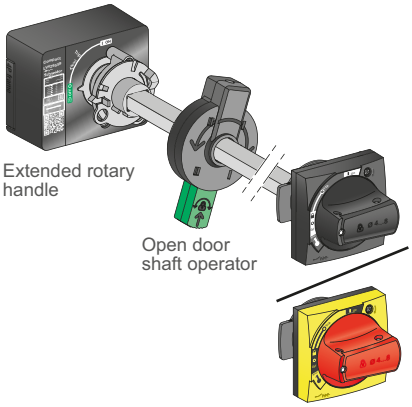
MX voltage releases pre-wired



Contacts module SDX

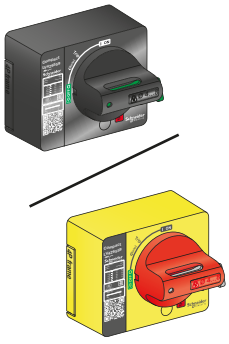


Side rotary handle (right or left)



Extended rotary handle

Open door shaft operator

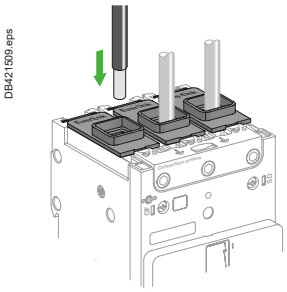


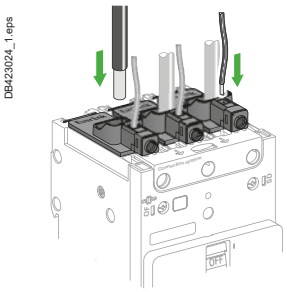
Direct mounted rotary handle

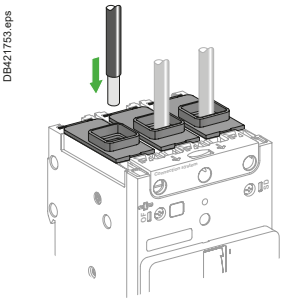
C

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.

ComPact NSXm accessories and auxiliaries

Power connection of fixed devices

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.

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).

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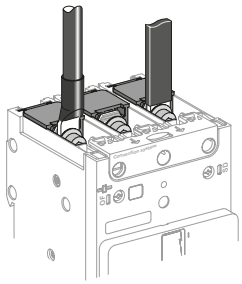

Crimp lugs large size cables

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.

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

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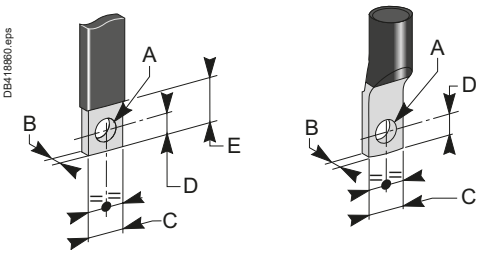

Spreaders

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.

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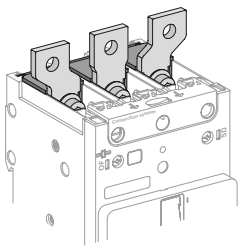

Torque limiting breakaway bits

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

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

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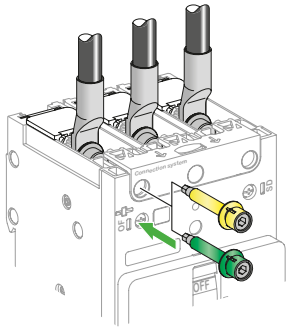
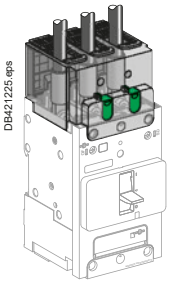
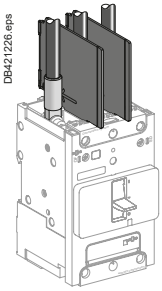


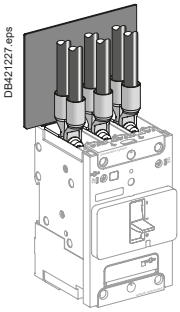
ComPact NSXm accessories and auxiliaries
Insulation of live parts



Long terminal shields.



Interphase barriers.



Rear insulating screens.

C

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