EcoStruxure
Innovation At Every Level

PacT Series

ComPacT NSX & NSXm

Catalog 2021
Molded-Case Circuit Breakers
And Switch-Disconnectors
From 16 To 630 A - Up To 690 V

se.com

Life Is On | Schneider Electric

Green Premium™

More than 75% of our product sales offer superior transparency on the material content, regulatory information and environmental impact of our products:

- RoHS compliance
- REACh substance information
- Industry leading # of PEP's*
- Circularity instructions

The Green Premium program stands for our commitment to deliver customer valued sustainable performance. It has been upgraded with recognized environmental claims and extended to cover all offers including Products, Services and Solutions.

CO_2 and P&L impact through… Resource Performance

Green Premium brings improved resource efficiency throughout an asset's lifecycle. This includes efficient use of energy and natural resources, along with the minimization of CO_2 emissions.

Cost of ownership optimization through… Circular Performance

We're helping our customers optimize the total cost of ownership of their assets. To do this, we provide IoT-enabled solutions, as well as upgrade, repair, retrofit, and remanufacture services.

Peace of mind through… Well-being Performance

Green Premium products are RoHS and REACh compliant. We're going beyond regulatory compliance with step-by-step substitution of certain materials and substances from our products.

Improved sales through… Differentiation

Green Premium delivers strong value propositions through third-party labels and services. By collaborating with third-party organizations we can support our customers in meeting their sustainability goals such as green building certifications.

Discover what we mean by green
Check your products!

*PEP: Product Environmental Profile (i.e. Environmental Product Declaration)

Meet the new face of connected breaker technology

70 years of innovative and reliable protection

The Schneider Electric™ Com**PacT**™ range is built on 70 years of expertise and leadership in industrial circuit breakers.

Today Schneider Electric is launching its new generation of Com**PacT** molded case circuit breakers.
The comprehensive, optimized Com**PacT** range covers your protection and has been redesigned with a superior customer experience in mind.

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

This range can be connected to Schneider Electric's open, interoperable, IoT-enabled EcoStruxure™ Power architecture. Through this platform we deliver enhanced value in terms of safety, reliability, efficiency, sustainability, and connectivity.

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.

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1952 — Compact NW

1974 — Compact C

1994 — Compact NS

2008 — Compact NSX

2017 — Compact NSXm

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

2021 — Com**PacT** NSX & NSXm New Generation

se.com/compact-nsx

Life Is On Schneider Electric™

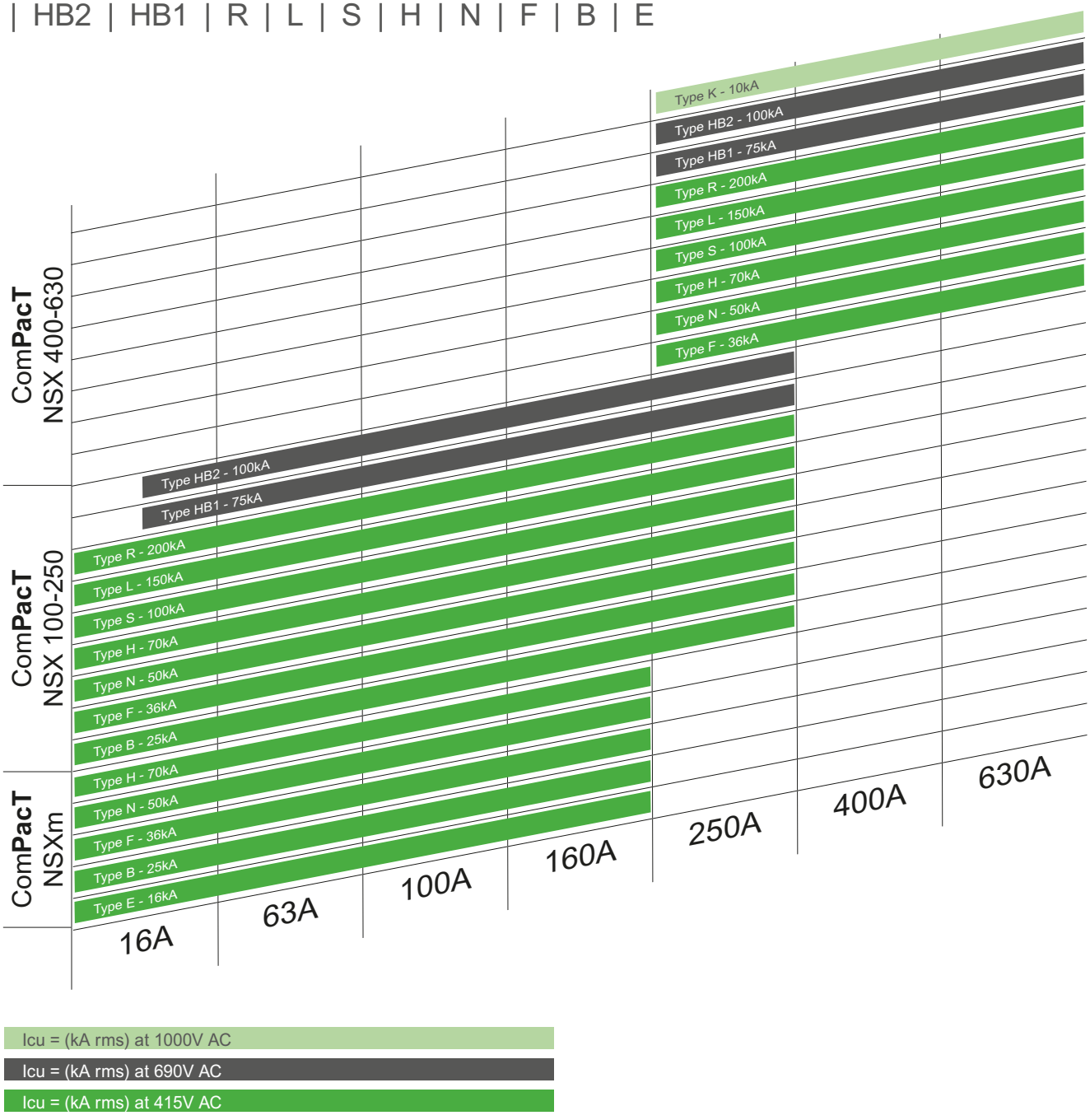
Com**PacT** NSX and NSXm, even more innovative and efficient

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

Today, the Com**PacT** 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.

Eleven Performance Levels

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



Icu = (kA rms) at 1000V AC

Icu = (kA rms) at 690V AC

Icu = (kA rms) at 415V AC

Schneider Electric is proud to introduce the new generation of Com**PacT** MCCBs.
These breakers talk to you, wherever you are, in all transparency. New design complements new wireless connectivity capabilities with our latest wireless auxiliary contact.

New

Com**PacT** Design

New signature design

- Schneider Electric green signature style for the entire Com**PacT** range
- Estimated 40% reduction of wiring time for panel builders
- Experience easier installation thanks to a new ergonomic front-plate design
- Gain the confidence that all auxiliaries are on the right spot, and simply double check that you have the right coil rating
- Ergonomic new toggle for easier breaker manual operation

New

Wireless Auxiliary Contact

Wireless breaker status

- Plug & play technology for clear connection status (0 or 1, no half-way wired)
- Placed in the same position as the wired version, its LED light will give you direct indication in case of a tripping
- If you are away, your Com**PacT** will send you an immediate notification via EcoStruxure Facility Expert for instance
- Wireless auxiliary accelerates overall wiring time: status communication is done very simply and commissioned wirelessly
- Communication architecture is fully EcoStruxure Power validated, with any application

Ready to meet the new face of Com**PacT**?

In 2021 you will meet the new generation of Com**PacT**™ circuit breakers with semi-transparent faceplate, screwless auxiliaries and remote monitoring features.

Learn about the benefits of the Com**PacT** range here:
se.com/compact-nsx

While we are launching a new generation of Com**PacT** breakers, we are building upon the very latest innovations that made the success of the range in the first place. The following innovations were launched recently and are still very much applicable to the new generation of Com**PacT** breakers.

Com**PacT** NSXm

Smallest size in the range

- Com**PacT** NSXm is the smallest frame size in the 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, such as EcoStruxure Power Design – Ecodial

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
- Standard protection of distribution cables
- Part of the EcoStruxure Power architecture, with digital communication capability and data management (settings, measurement, pre-alarms, trip & test history)

Innovation that protects:

In 2021 you will meet the new generation of Com**PacT**™ circuit breakers with semi-transparent faceplate, screwless auxiliaries and remote monitoring features.

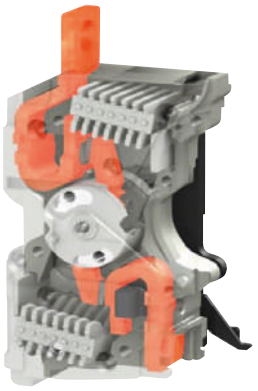
Learn about the benefits of the Com**PacT** NSX range here:
se.com/compact-nsx

Optimized size and innovations tailored to your needs

Roto-active™ breaking technology

While the Com**PacT** NSXm is the smallest breaker in the Com**PacT** 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

EverLink™ connectors – for enduring protection

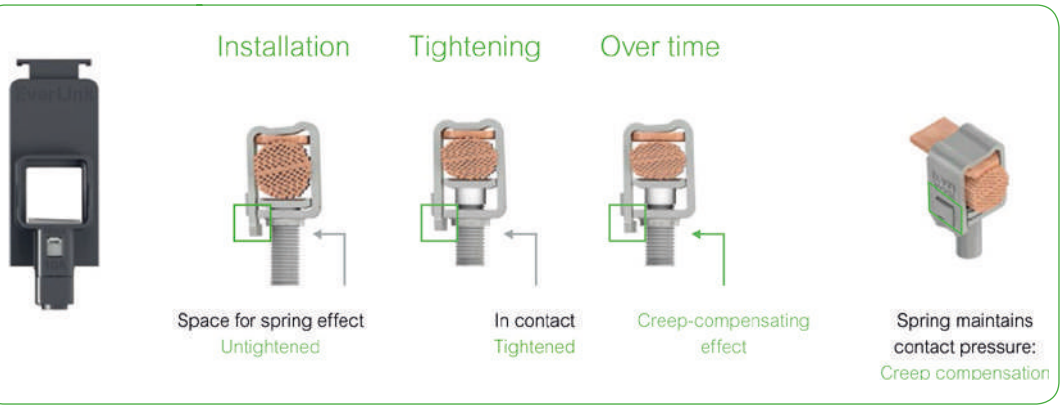
Com**PacT** NSXm

The Com**PacT** 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



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 significantly reduce power outage duration.

Example: In case of a tripped breaker, the system automatically sends email alerts. Facility managers 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, ensuring all points are verified regularly and providing access to all information, including event logs, in case of 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

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 strengthens and simplifies the entire project path by shaping a unique ecosystem of specifiers, contractors, panel builders, integrators, distributors and facility managers serving end users.

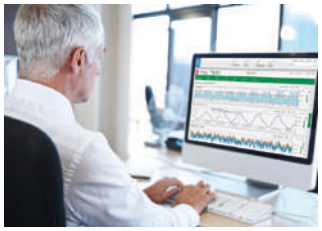
450,000+
EcoStruxure installations

1 billion
connected devices

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

Apps, Analytics & Services



Actionable predictive maintenance information that helps protect your customers, safeguard your reputation and minimize 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

IoT-enabled low and medium voltage offers to seamlessly fit into EcoStruxure architectures.

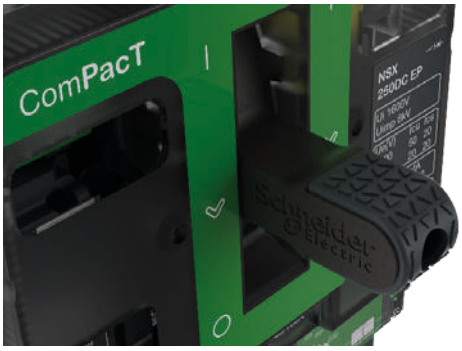
Contribute to a better world. Enhance sustainability with Com**PacT** range

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 contribute 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.

New Packaging

- The Com**PacT** range comes in plastic-less packaging: not only to reduce our carbon footprint, but it also means less waste in the workshop
- Simplified instruction sheets included in all packaging
- 100% recycled carton
- Scan QR codes for access to digital documentation
- This product is REACH and RoHS compliant

New generation, simpler commercial references

New meaningful references to make your life easier

We know any change in commercial references will be an adjustement, but in the long run we believe this change is needed, and will make your life easier.

Type (1)	Frame rating (2)	Breaking capacity (1)	Num Poles (2)	Trip Unit (2)	Trip Unit Ratings (3)	Suffix (1)
NSX = C	100m = 11	16kA = E	1P = 1	**TMD = TM**	16 = 016	EverLink = L
NSXm = C	160m = 12	25kA = B	2P = 2	MA = MA	20 = 020	Busbar = B
	100 = 10	**36kA = F**	**3P3D = 3**	TMG = MG	25 = 025	Fixed = F
	160 = 16	50kA = N	4P4D = 4	1.3 M = 1M	30 = 030	DC = D
	250 = 25	70kA = H	3P2D = 5	2.2 = 2D	40 = 040	Switch = S
	400 = 40	100kA = S	4P3D = 6	2.3 = 2D	50 = 050	DC PV = DP
	630 = 63	150kA = L		4.1 = 4V	63 = 063	
		...		4.2 = 4V	80 = 080	Acc with ID
				...	**100 = 100**	change = T
					...	

For instance LV429630 will become C10F3TM100
ComPacT Breaker NSX100F 36kA AC 3P3D 100A TMD

Scan QR code for breaker updates

Each breaker is equipped with a QR code that allows you to get the latest information on your breaker.

Simpler names for our offers

We are 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 6300 A.

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

General contents

ComPacT NSXm & NSX
Application Overview

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

ComPacT™ NSX & NSXm

> 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 - DC EP [c]

LVPED221002EN

> 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 (200 kA/415 V) 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 and 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 and 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 may be used on 400 Hz systems.

Photovoltaic

ComPacT NSX DC PV range up to 500 A (1000V DC), and range from 250 A to 400 A (800 to 1000 V AC), equipped with electronic trip unit MicroLogic 2 is the appropriate 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 and Gas

ComPacT NSX up to 630 A offers the Highest breaking capacity in its class mainly required in Oil and 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) 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 allow 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
Schneider Electric
OFF


ComPacT
OFF


1
3
5
LINE
ComPacT
Schneider Electric
OFF
MODE
OK
2
4
6
LOAD


ComPacT
OFF
Schneider Electric


ComPacT
OFF
Schneider Electric

Select Circuit Breakers and Switch-Disconnectors

A

Characteristics and Performance

ComPacT NSXm Circuit Breakers from 16 to 160 A up to 690 V

ComPacT™ NSXm Molded Case Circuit Breaker (MCCB)

A

C12H3TM160L.eps

ComPacT NSXm

Common Characteristics

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

C25NTM250.eps

ComPacT NSX single-pole

C16S2TM160.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 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			
Utilization 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	**Ii**	value indicated for AC [1] real value for DC
Add-on earth-leakage protection	VigiPacT add-on combination with VigiPacT 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"

C25V35E250.eps

ComPacT NSX250 HB2

Common Characteristics

Rated voltages	Insulation voltage (V)	Ui		800
	Insulation voltage for ELCB [6]	Ui		500
	Impulse withstand voltage (kV)	Uimp		8
	Operational voltage (V)	Ue	AC 50/60 Hz	690
	Operation voltage for ELCB [6]	Ue	AC 50/60 Hz	440
Suitability for isolation			IEC/EN 60947-2	yes
Utilization 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 VigiPacT add-on [3]	
	By VigiPacT relay	

Installation/Connections

Dimensions and weights		
Dimensions (mm) W x H x D	Fixed, front connections	2/3P
		4P
Weight (kg)	Fixed, front connections	2/3P
		4P
Connections		
Connection terminals	Pitch	With/without spreaders
Large Cu or Al cables	Cross-section	mm²

Source-Changeover System

Manual mechanical interlocking	
Automatic source-changeover	

[1] OSN: Over Sized Neutral protection for neutrals carrying high currents (e.g. 3rd harmonics).
[2] ZSI: Zone Selective Interlocking using pilot wires.
[3] VigiPacT add-on is not available for breaking capacity levels HB1/HB2.
[4] There is no 160 A frame, use 250 A frame with lower rating trip units for R, HB1, HB2.
[5] 2P circuit breaker in 3P case for B and F types, only with thermal-magnetic trip unit.
[6] Earth Leakage Circuit Breaker (MicroLogic Vigi 4.2 and 7.2 E).

Characteristics and Performance

ComPacT NSX Circuit Breakers from 100 to 250 A up to 690 V

Common Characteristics

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

A

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	50	50	15	30	36	50	65	70	80	85	100
-	11	35	35	40	50	65	80	100	-	22	35	35	35	35	-	22	35	35	40	50	65	80	100
-	4	10	10	10	10	45	75	100	-	8	10	10	10	10	-	8	10	10	10	10	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

ComPacT NSX630 HB2

Common Characteristics

Rated voltages	Insulation voltage (V)	Ui		800
	Insulation voltage for ELCB [4]			500
	Impulse withstand voltage (kV)	Uimp		8
	Operational voltage (V)	Ue	AC 50/60 Hz	690
	Operation voltage for ELCB [4]	Ue	AC 50/60 Hz	440
Suitability for isolation			IEC/EN 60947-2	yes
Utilization 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 VigiPacT add-on [3]	
	By VigiPacT relay	

Installation/Connections

Dimensions and weights		
Dimensions (mm) W x H x D	Fixed, front connections	2/3P
		4P
Weight (kg)	Fixed, front connections	2/3P
		4P
Connections		
Connection terminals	Pitch	With/without spreaders
Large Cu or Al cables	Cross-section	mm²

Source-Changeover System

Manual mechanical interlocking
Automatic source-changeover

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

Characteristics and Performance

ComPacT NSX Circuit Breakers from 400 to 630 A up to 690 V

Common Characteristics

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

	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
Utilization 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 utilization 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.

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ComPacT NSX100 to 250 NA

C2532505.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
Utilization 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 40 °C			
Number of poles				
Operational current (A) depending on the utilization 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 VigiPacT add-on	
	By VigiPacT relay	

Additional indication and control auxiliaries

Indication contacts		
Voltages releases	MX shunt release	
	MN undervoltage release	
Current-transformer 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

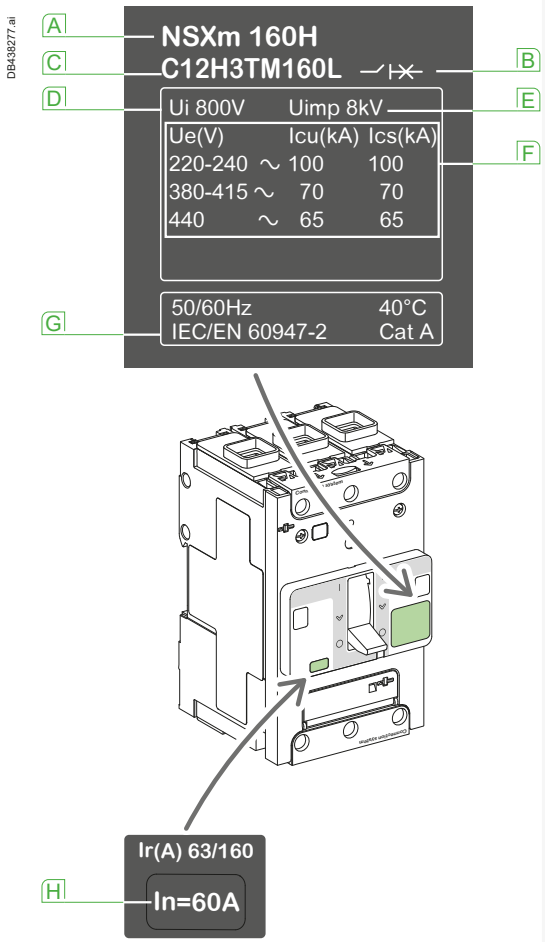
ComPacT NSX Switch-Disconnectors from 100 to 630 A NA

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



Standardized 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

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

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Green Premium™ Product

Compliance with Standards

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

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

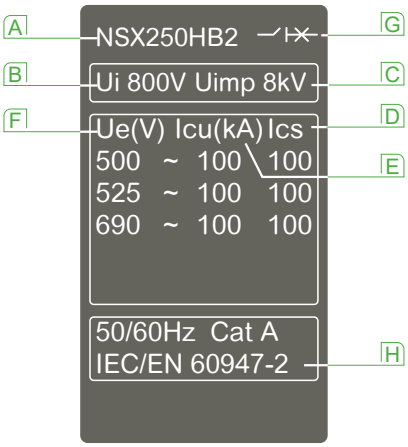
- With toggle: IP40, IK07
- With direct rotary handle: IP40 IK07

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.



Standardized 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 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.

ComPacT NSX100 to 250

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 organization for the protection of machine tools.

ComPacT NSX Special Applications

High Performances at 690 V

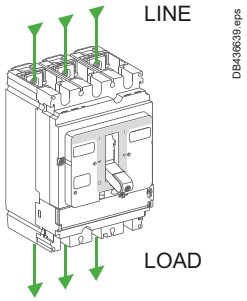
Circuit Breakers (Fed from Bottom)			NSX100-250 [1]			NSX400			NSX630					
Breaking Capacity Levels			R	HB1	HB2	R	HB1	HB2	R	HB1	HB2	R	HB1	HB2
Electrical characteristics														
Breaking capacity (kA rms)									Ir < 500 A			Ir > 501 A		
Icu	AC 50/60 Hz	220/240 V	150	-	-	150	-	-	150	-	-	150	-	-
		380/415 V	150	-	-	150	-	-	150	-	-	150	-	-
		440 V	130	-	-	130	-	-	130	-	-	130	-	-
		500 V	70	70	70	40	40	50	40	40	50	40	40	50
		525 V	50	50	50	35	35	40	35	35	40	-	-	-
		690 V	20	20	20	30	30	35	30	30	35	-	-	-
Service breaking capacity (kA rms)									Ir < 500 A			Ir > 501 A		
Ics	AC 50/60 Hz	220/240 V	150	-	-	150	-	-	150	-	-	150	-	-
		380/415 V	150	-	-	150	-	-	150	-	-	150	-	-
		440 V	130	-	-	130	-	-	130	-	-	130	-	-
		500 V	70	70	70	40	40	50	40	40	50	40	40	50
		525 V	50	50	50	10	10	12	10	10	12	-	-	-
		690 V	10	10	10	10	10	10	10	10	10	-	-	-

[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 can be fed from top and bottom of the circuit breaker.
  [2] Check the remark: check both tables from performances of each supply.
- ComPacT NSX400-630 R/HB1/HB2, U > 440 V, Icu 20 kA, Line/Load connection possible with insulation screen.
- All trip units are assembled in factory.



For breaking capacities R/HB1/HB2

Type of protection	Distribution protection		Motor protection	
	TMD	MicroLogic	MA	MicroLogic
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
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


ComPacT

Select Protection

Trip Unit Overview

Protection of Distribution Systems

ComPacT NSX Motor Protection

ComPacT NSX Measurement

ComPacT NSX Diagnostics & Maintenance

ComPacT NSX Special Applications

ComPacT NSX Special Applications B-59

Other Chapters

Trip Unit Overview

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
Protections				
Standard protections	LI	LS_0IR	I	LI
Settings and indications	Pick-up set in amps using dials Non-adjustable time delay			
Front indication	●	●	●	●
Test connector		●		
Self test	●	●	●	●
Measurements				
Embedded measurements [1]				
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				
Embedded protection		●		
VigiPacT add-on module			●	●
VigiPacT relay	●		●	●

[1] For more details, refer to page B-43.

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 optimize energy use.

ComPacT NSX up to 630 A

MicroLogic 2 and 1.3		MicroLogic 4		MicroLogic 5 and 6		MicroLogic 7	
100-250 A	400-630 A	100-250 A	400-630 A	100-250 A	400-630 A	100-250 A	400-630 A
Distribution		**Distribution and earth-leakage protection**		**Distribution and generators**		**Distribution and earth-leakage protection**	
2.2	2.3	2.2	2.3	5.2 E/6.2 E	5.3 E/6.3 E	7.2 E	7.3 E
Service connection utilities		**Service connection utilities**		**Motors**		7.2 E AL	7.3 E AL
2.2 AB	2.3 AB	4.2 AB	4.3 AB	6.2 E-M	6.3 E-M		
Motors		4.2 AL	4.3 AL				
2.2 M	1.3 M/2.3 M						
Generators							
2.2 G	2.3 G						
2.2 G	2.3 G						
LS_0I		LS_0I		LSI, LSIG		LSIG	
Pick-up set in amps using dials Non-adjustable time delay							
◉		◉		◉		◉	
◉		◉		◉		◉	
◉		◉		◉		◉	
				◉		◉	
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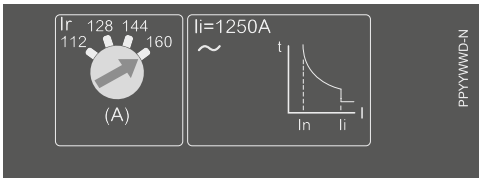
Protection of Distribution Systems
ComPacT NSXm TM Thermal-Magnetic Trip Units

ComPacT NSXm has a built-in thermal magnetic trip unit.

C12H3TM160L.eps

ComPacT NSXm 160

DB436752.eps



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

L 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 for cable protection.

I Magnetic Protection (Ii)

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

Protection Versions

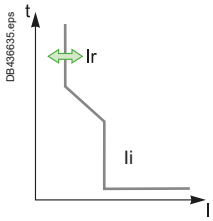
- 3-pole:
  - 3P 3D: 3-pole frame (3P) with detection on all 3 poles (3D)
- 4-pole:
  - 4P 3D: 4-pole frame (4P) with detection on 3 poles (3D)
  - 4P 4D: 4-pole frame (4P) with detection on all 4 poles (same threshold for phases and neutral).

Note: All the circuit breakers have a transparent lead-sealable cover that avoids 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	◉	◉	◉	◉	◉	◉	◉	◉	◉	◉
L 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									
I Magnetic protection											
Pick-up (A)	Ii	Fixed									
accuracy ±20 %	ComPacT NSXm	500	600	600	600	600	800	1000	1250	1250	1250
Time delay	tm	Fixed									
Neutral protection											
Unprotected neutral	4P 3D	No detection									
Fully protected neutral	4P 4D	1 x Ir									

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

B

Protection of Distribution Systems

ComPacT NSX TM Thermal-Magnetic and MA Magnetic Trip Units

TM thermal-magnetic and MA magnetic trip units can be used on ComPacT NSX100/160/250 circuit breakers with performance levels B/F/H/N/S/L. TM trip units are available in 2 versions:
- TM-D, for the protection of distribution cables
- TM-G, with a low threshold, for the protection of generators or long cable lengths

ComPacT NSX250 F

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

L 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 for cable protection.

I Magnetic Protection (Ii)

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

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

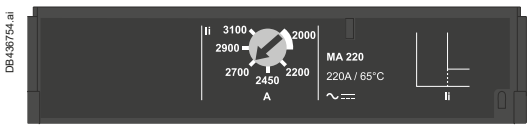
Protection Versions

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

I Magnetic Protection (Ii)

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

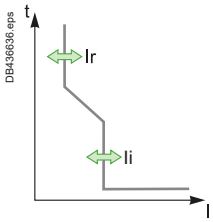
- 3-pole (3P 3D): 3-pole frame (3P) with detection on all 3 poles (3D)
- 4-pole (4P 3D): 4-pole frame (4P) with detection on 3 poles (3D)

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

Protection of Distribution Systems

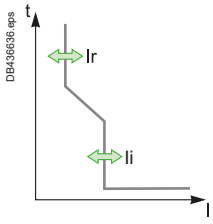
ComPacT NSX TM Thermal-Magnetic and MA Magnetic Trip Units

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	-	-	-	-	-	◉	◉	◉	◉	◉	◉	◉
L 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											
I Magnetic protection													
Pick-up (A) accuracy ±20 %	**Ii**	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											

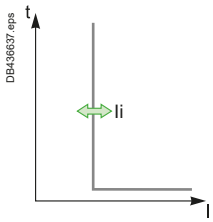
Thermal-Magnetic Trip Units TM16G to 250G



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	-	-	-	-	-	-	-	◉	◉	◉
L 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	-									
I Magnetic protection											
Pick-up (A) accuracy ±20 %	**Ii**	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	-	-	-	-	-	◉	◉	◉
I Instantaneous magnetic protection									
Pick-up (A) accuracy ±20 %	**Ii** = 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 avoids access to the adjustment dials.

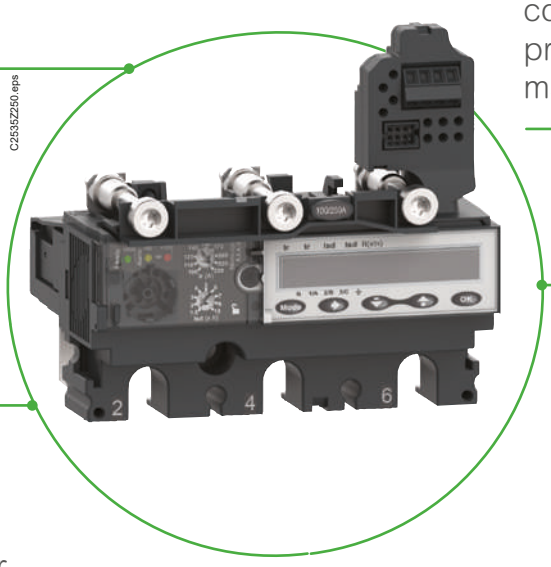
Protection of Distribution Systems
Function Overview

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 and Maintenance

Optimal continuity of services as well as extended life of equipment is one of customer main concerns. For that purpose MicroLogic 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.

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 	**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 E	LSI	100, 160 or 250 A	Energy	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 allow selectivity, it offers short-time protection S_0 with a non-adjustable delay and instantaneous protection.

Protection of Distribution Systems
ComPacT NSX MicroLogic 2 and 1.3 Trip Units

MicroLogic 2 trip units can be used on ComPacT NSX100 to 630 circuit breakers with performance levels B/F/H/N/S/L/R/HB1/HB2.
They provide:
- Standard protection of distribution cables
- Indication of:
  - Overloads (via LEDs)
  - Overload tripping (via the SDx relay module).

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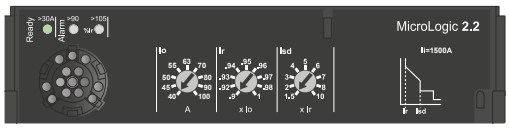

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SDx remote indication relay module with its terminal block

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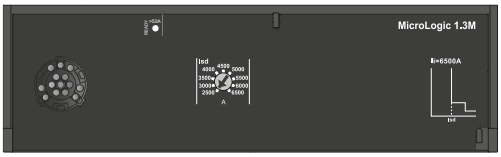

MicroLogic 2
Circuit breakers equipped with MicroLogic 2 trip units can be used to protect distribution systems supplied by transformers. For generators and long cables, MicroLogic 2 G trip units offer better suited low pick-up solutions (see page B-50).

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

L 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.

S 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.

I 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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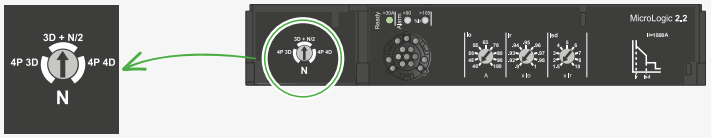


Indications

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.

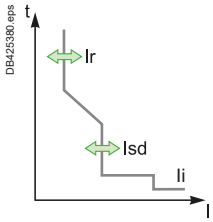
Remote Indications
An overload trip signal can be remoted by installing an SDx relay module inside the circuit breaker.
This module receives the signal from the MicroLogic electronic trip unit via an optical link and makes it available on the terminal block. The signal is cleared when the circuit breaker 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 avoids 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

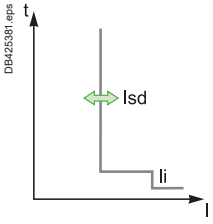
Pick-up (A) accuracy ±10 %	**Isd** = Ir x ...	1.5	2	3	4	5	6	7	8	10
Time delay (ms)	**tsd**	Non-adjustable								
	Non-tripping time	20								
	Maximum break time	80								

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	

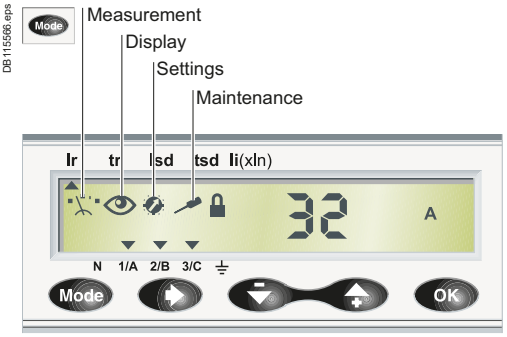
I Instantaneous protection

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

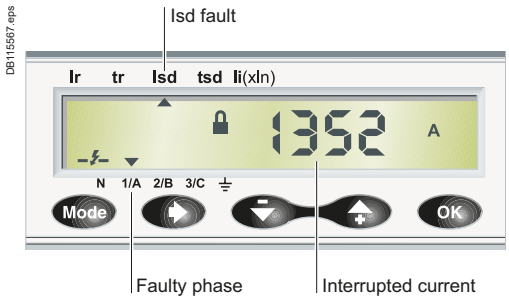
[1] Motor standards require operation at 65 °C. Circuit-breaker ratings are derated to take this requirement into account.

Protection of Distribution Systems
ComPacT NSX MicroLogic 5/6 E Trip Units

MicroLogic 5/6 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 avoids 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.

L 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.

S 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).

I Short-Circuits: Instantaneous Protection (Ii)

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

G 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 as an option 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

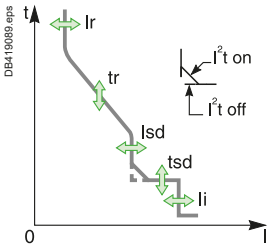
An SDx relay module installed inside the circuit breaker can be used to remotely access to the following information:

- 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 E Trip Units

MicroLogic 5/6 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								

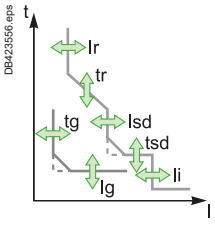
S Short-time protection with adjustable time delay

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 E



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

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

B

Protection of Distribution Systems

ComPacT NSXm MicroLogic Vigi 4.1 Trip Unit

with Integrated Earth Leakage Protection

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

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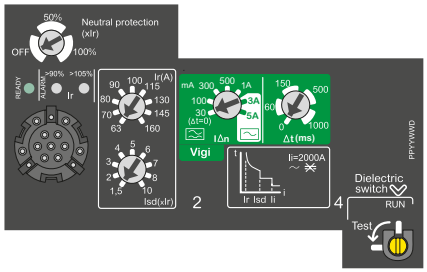

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ComPacT NSXm MicroLogic Vigi 4.1

MicroLogic Vigi 4.1

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

Short-Circuit and Overload Protection

Settings are made using the adjustment dials.

L 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.

S 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.

I 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

R 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) using the 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 avoids access to the adjustment dials.

Protection of Distribution Systems
ComPacT NSXm MicroLogic Vigi 4.1 Trip Unit
with Integrated Earth Leakage Protection

Indications

Front Indications

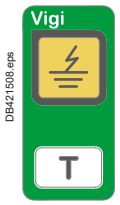
- Green “Ready” LED: flashes slowly when the circuit breaker is ready to trip in the event of an overload or short-circuit fault.
- Orange overload pre-alarm LED: steady on when I > 90 % Ir.
- Red overload LED: steady on when I > 105 % Ir.
- Screen that indicate an earth leakage fault trip - reset when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

Alarming and Fault Differentiation

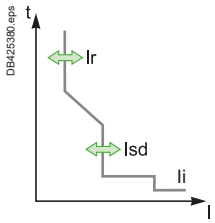
A side module SDx can be installed to provide alarming and fault differenciation:

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

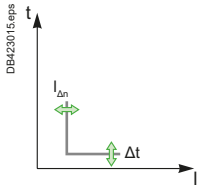
This module receives the signal from the MicroLogic electronic trip unit via an optical link and makes it available on the terminal block through NO/NC dry contacts.
The signal is cleared when the circuit breaker is restarted.
For description, see page C-11.



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 VigiPacT 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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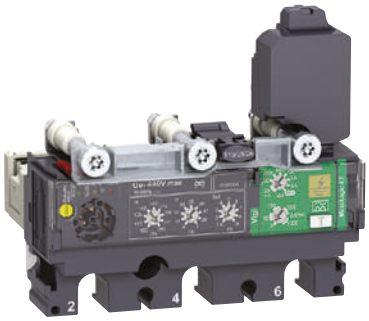

MicroLogic Vigi 4 (LS_oIR)

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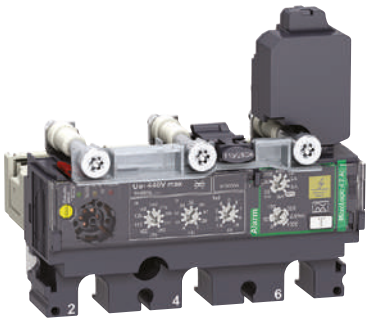


MicroLogic Vigi 4 AL (LS_oI + Earth Leakage Alarm)

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

L 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.

S 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.

I Short Circuit: Non-Adjustable Instantaneous Protection

Instantaneous Short-Circuit Protection with a Fixed 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).

R Earth Leakage Protections

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

Power Supply

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

Sensitivity IΔn (A)

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

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

Intentional Delay IΔt (S)

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

Operated Voltage

200 to 440 VAC (only) – 50/60 Hz

Operating Safety

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

Protection of Distribution Systems
ComPacT NSX MicroLogic Vigi 4 Trip Unit
with Integrated Earth Leakage Protection

Indications

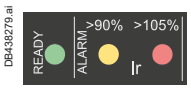
Front Indications

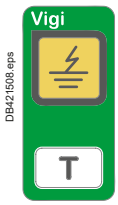
- Green "Ready" LED: flashes slowly when the circuit breaker is ready to trip in case of a fault.
- Orange overload pre-alarm LED: steady ON when I > 90% Ir.
- Red overload LED: steady ON when I > 105% Ir.
- Yellow Screen: indicates an earth leakage fault (reset when operating OFF/ON for the "trip" or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

Alarming and Fault Differentiation

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

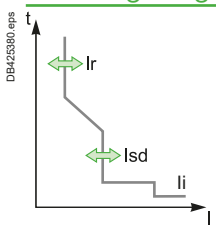
This module receives the signal from the MicroLogic trip unit via an optical link and makes it available on the terminal block. The signal is reset when the breaker is operated.



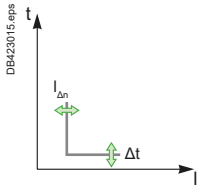


B

MicroLogic Vigi 4



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



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

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

Protection of Distribution Systems

ComPacT NSX MicroLogic Vigi 7 E Trip Unit

with Integrated Earth Leakage Protection

The ComPacT NSX range is now complemented with a new type of MicroLogic trip unit including circuit protection, metering and earth leakage protection. It means that the earth leakage protection, previously located within the VigiPacT 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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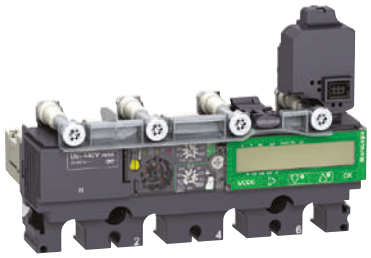

MicroLogic Vigi 7 E (LSIR)

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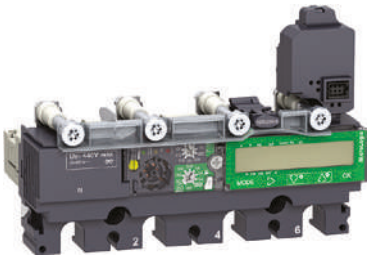

MicroLogic Vigi 7 E AL (LSI + Earth Leakage Alarm)

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 avoid 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

L 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.

S 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).

I 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.

R 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 for continuous 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 for this function.

Protection of Distribution Systems

ComPacT NSX MicroLogic Vigi 7 E Trip Unit

with Integrated Earth Leakage Protection

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B

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" and "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).

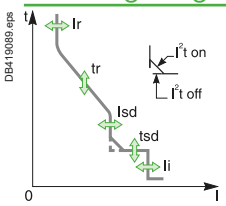
This module receives the signal from the MicroLogic electronic trip unit via an optical link and makes it available on the terminal block. The signal is reset when the breaker is operated.
These outputs can be reprogrammed to be assigned to other types of tripping or alarm. The module is deeper described in the section dealing with accessories.

Protection of Distribution Systems

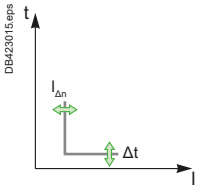
ComPacT NSX MicroLogic Vigi 7 E Trip Unit

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 VigiPacT Add-on
Protection Against Insulation Faults

There are three ways to add earth-leakage protection and alarm to any three pole or four pole ComPacT NSX circuit breaker equipped with magnetic, thermal-magnetic or Micrologic 2, 5, 6 trip units:
- Upgrade the existing trip unit without changing the basic frame to embedded earth-leakage protection by using Micrologic 4 or 7 trip units.
- Add a VigiPacT add-on to the circuit breaker.
- Use an external VigiPacT relay and separate toroids.

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ComPacT NSX and MicroLogic 4 and 7

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ComPacT NSX and VigiPacT add-on

See page D-11

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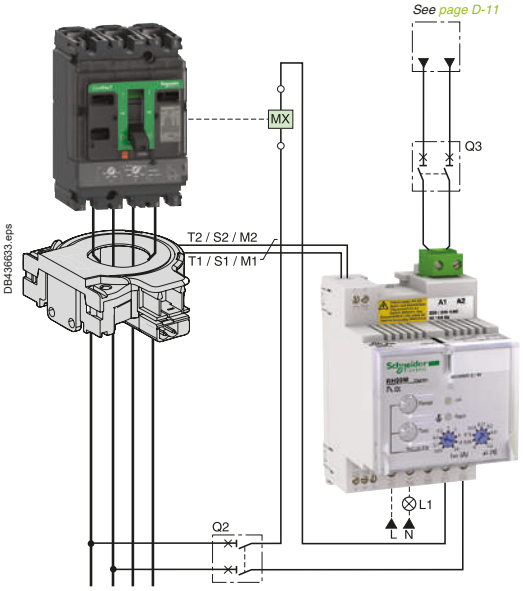


ComPacT NSX with VigiPacT external relay and toroid

Circuit Breaker with Embedded Earth-Leakage Protection Micrologic 4&7

Earth leakage protection integrated within the existing size of the Micrologic trip unit and compliant with IEC 60947-2 annex B.

Circuit Breaker with VigiPacT Add-on

- For general characteristics of circuit breakers, see pages A-6 and A-7
- VigiPacT add-on
  Earth-leakage protection is achieved by installing a VigiPacT 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).

ComPacT NSX Circuit Breaker with a VigiPacT Relay

VigiPacT 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 VigiPacT relays add special tripping thresholds and time delays for earth-leakage protection.
VigiPacT relays are very useful when faced with major installation constraints (circuit breaker already installed and connected, limited space available, etc.).

VigiPacT 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 VigiPacT Add-on

Addition of the VigiPacT 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 W x H x D (mm)	3 poles	105 x 236 x 86	140 x 355 x 110
	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

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

Use of 4-pole VigiPacT add-on with a 3-pole ComPacT NSX

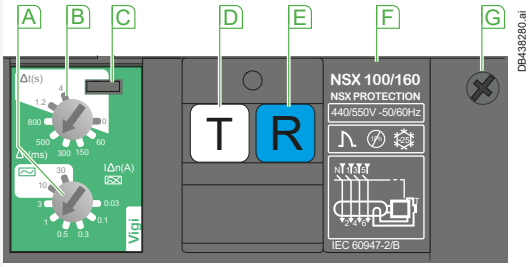
In a 3-phase installation with an uninterrupted neutral, an accessory makes it possible to use a 4-pole VigiPacT add-on with connection of the neutral cable.

Power supply

VigiPacT 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.

ComPacT NSX VigiPacT Add-on		
Type	**Protection**	**Alarm**
Number of poles	3, 4	3, 4
Ratings (A)	100, 160, 250, 400, 630	100, 160, 250, 400, 630
IΔn (A) Class A	0.03, 0.1, 0.3, 0.5, 1, 3 (0.03, 0.06, 0.25, 0.375, 0.5, 3)[1]	0.03, 0.1, 0.3, 0.5, 1, 3 -
IΔn (A) Class AC	10, 30	10, 30
Time delay (ms)	0, 60, 150, 300, 500, 800, 1.2s, 4s	no settings 0 ms
Max break time (ms)	<40[2] <150[2] <500 <800 <1.2s <5s	-
Rated voltages V AC 50/60Hz	200 - 550	200 - 440

[1] Special settings for South Africa.
[2] Max break time according to IEC 60947-2 Annex B Clause B.4.2.4.
Longer time (<+20ms) may be experienced in case of closing on residual current (Clause B.8.2.4.5).



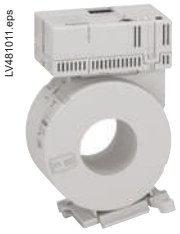
A Sensitivity setting
B Time-delay setting (for selective earth-leakage protection)
C Lead-seal fixture for controlled access to settings
D Test button simulating an earth-fault for regular checks on the tripping function
E Reset button (reset required after earth-fault tripping)
F Rating plate
G Housing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

Plug-in devices
The VigiPacT add-on can be installed on a plug-in base. Special accessories are required (see Catalog Numbers chapter).

Protection of Distribution Systems
ComPacT NSX and NSXm
Protection Against Insulation Faults Using a VigiPacT Relay

Detection
with Associated Toroid

Alarm
with the VigiPacT Relay



Function

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

Residual-Current Protection Relay

Protection relays control the interruption of the supply of power to the monitored systems to help 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

VigiPacT 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.
VigiPacT protection relays are suitable for use with all electrical switchgear devices available on the market.

Protection of Distribution Systems
ComPacT NSX and NSXm
Protection Against Insulation Faults Using a VigiPacT Relay

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

Overview of the VigiPacT Range

Protection and Monitoring Relays

Device		 RH10M&P	 RH21M&P	 RH68M&P	 RH86M&P	 RHUs/RHU
Functions						
Protection		◉	◉	◉	◉	◉
Monitoring		-	-	-	-	◉
Local indications		◉	◉	◉	◉	◉
Type	A	up to 5 A	up to 5 A	up to 5 A	up to 5 A	up to 5 A
	AC	◉	◉	◉	◉	◉
Remote indications	Hard-wired	◉	◉	◉	◉	◉
	Via com Modbus SL	-	-	-	-	◉ Except RHUs
Display of measurement		◉	◉	◉	◉	◉

Protection and Monitoring Relays / Centralized Monitoring Relay

Device		 RH99M&P	 RH197M&P	 RHB	 RMH / RM12T
Functions					
Protection		-	◉	◉	-
Monitoring		◉	◉	-	◉
Local indications		◉	◉	◉	◉
Type	A	up to 5 A	up to 5 A	up to 5 A	up to 5 A
	AC	◉	◉	◉	◉
	B	-	-	◉	-
Remote indications	Hard-wired	◉	◉	-	◉
	Via communication			◉ Except RHUs	◉
Display of measurement		◉	◉	◉	◉ 12 measurement channels

Formats for All Installation Systems

Schneider MCB format devices in the VigiPacT 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.

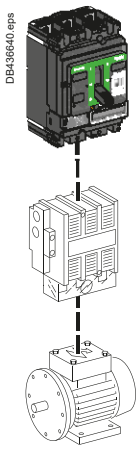
Installation System		Suitable Format	
		Front-panel mount	**DIN rail**
Main LV switchboard		◉	
Power distribution switchboard	Instrument zone	◉	
	Modular-device zone		◉
Motor Control Centre (MCC)			◉ With clip-in toroid
Automatic control panel or machine panel			◉ With mounting lugs
Final distribution enclosures			◉

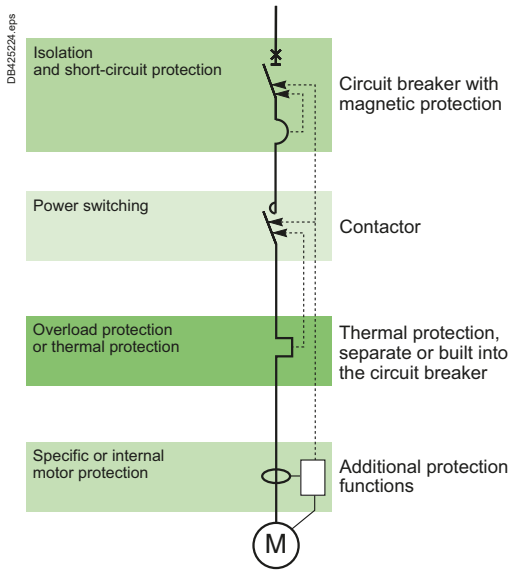
ComPacT NSX Motor Protection
General Information on Motor Feeders

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 utilization 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 energized, 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 standardized 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 Utilization Categories

For a given motor-feeder solution, the utilization 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 utilization categories.

Contactor utilization categories (AC current)

Contactor utilization categories	Type of load	Control function	Typical applications
AC-1	Non-inductive (cos φ ≥ 0.8)	Energizing	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

Utilization 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 utilization category, in which case they ensure type 2 coordination.

Utilization 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

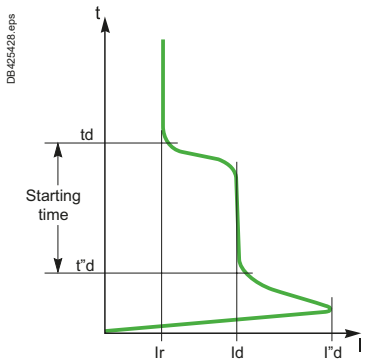
The trip class determines the trip curve of the thermal protection device (inverse-time curve) for a motor feeder.
Standard IEC 60947-4-1 defines trip classes 5, 10, 20 and 30.
These classes are the maximum durations, in seconds, for motor starting with a starting current of 7.2 Ir, where Ir is the thermal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

Standardized values in kW

Rated operational power	Standardized 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

Standardized 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 energized, 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 utilization category (80 % of all cases) and they ensure type 2 coordination with the contactor.
For the AC-4 utilization 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

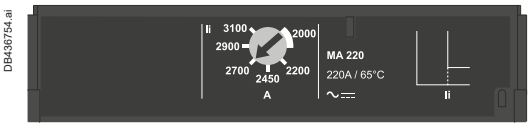
Type of Motor Protection			3 Devices		2 Devices	
ComPacT NSX circuit breaker			**NSX100/160/250**	**NSX400/630**	**NSX100 to 630**	
	Type 2 coordination with		Contactor + thermal relay		Contactor	
Trip unit	Type Technology		**MA** Magnetic	**MicroLogic 1.3 M** Electronic	**MicroLogic 2 M** Electronic	**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.



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

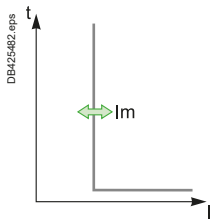
Magnetic Protection (Ii)

Short-circuit protection with an adjustable pick-up Ii that initiates instantaneous tripping if exceeded.
- **Ii = 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 %	**Ii** = 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							

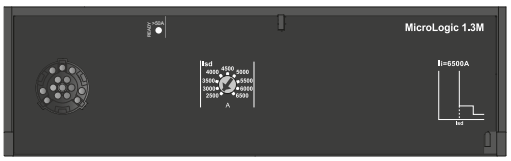
[1] MA100 3P adjustable from 6 to 14 x In.
MA100 4P adjustable from 9 to 14 x In.
Note: All the trip units have a transparent lead-sealable cover that avoids access to the adjustment dials.

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.



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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 (Li)

Instantaneous protection with non-adjustable pick-up Ii.

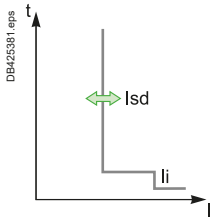
Protection Version

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

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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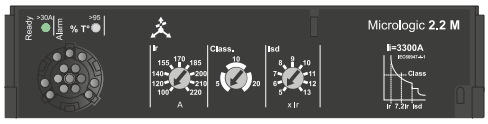

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SDTAM remote indication relay module with its terminal block

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.

L 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.

S 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.

I 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

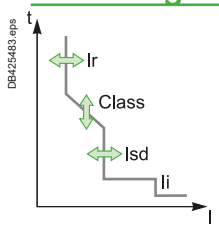
Front indications
- Green “Ready” LED: flashes slowly when the circuit breaker is ready to trip in the event of a fault.
- Red alarm LED for motor operation: goes ON when the thermal image of the rotor and stator is greater than 95 % of the permissible temperature rise.

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 avoids access to the adjustment dials.

MicroLogic 2.2/2.3 M



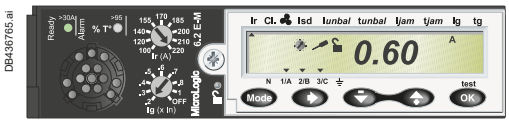
Ratings (A)	In at 65 °C [1]		25	50	100	150	220	320	500		
Circuit breaker	ComPacT NSX100		◉	◉	◉	-	-	-	-		
	ComPacT NSX160		◉	◉	◉	◉	-	-	-		
	ComPacT NSX250		◉	◉	◉	◉	◉	-	-		
	ComPacT NSX400		-	-	-	-	-	◉	-		
	ComPacT NSX630		-	-	-	-	-	◉	◉		
L Overloads (or thermal protection): Long-time protection and trip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

This function opens the circuit breaker if a phase unbalance occurs:
- That is greater than the **I-unbal** 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 (I-jam)

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 **I-jam** 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 (I-und)

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 **I-und** 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 (I-long)

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 avoids 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

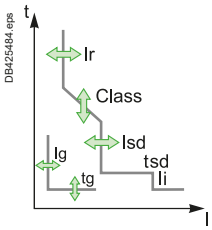
Front indications

- 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 E M/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.

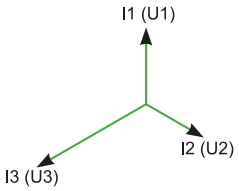
When it is activated, this protection supplements thermal protection (class).

A long start causes tripping and is characterized by:

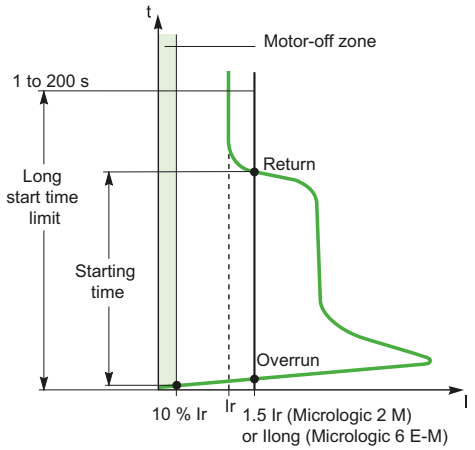
- Current > 10 % x Ir (motor-off limit) with:
- Either overrun of the long-time pick-up (1 to 8 x Ir) without return below the pick-up before the end of the long-time time delay (1 to 200 s)
- Or no overrun of the long-time pick-up (1 to 8 x Ir) before the end of the long-time time delay (1 to 200 s).

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

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

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

PMD-D 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.

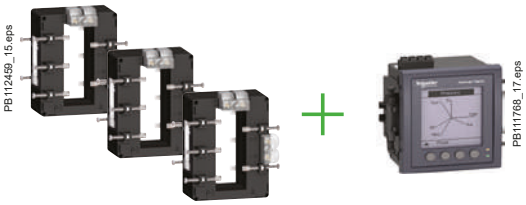
PMD-D - Embedded Sensors

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

B

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

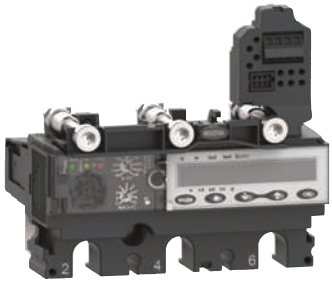
MicroLogic 5/6/7 Integrated Power Meter Functions			Type	Display	
			E	MicroLogic LCD	FDM display
Display of protection settings					
Pick-ups (A) and delays	Settings MicroLogic 5/6	Ir, tr, Isd, tsd, Ii, Ig, tg	●	●	-
	Settings MicroLogic Vigi 7 E [4]	Ir, tr, Isd, tsd, Ii,IΔn, Δt, IΔn % pre-alarm	●	●	
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-synchronized	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

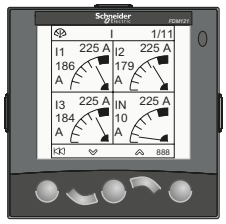
Measurement accuracy
Accuracies are those of the entire measurement system, including the sensors:
- Current: Class 1 as per IEC 61557-12
- Voltage: 0.5 %
- Power and energy: Class 2 as per IEC 61557-12
- Frequency: 0.1 %.

ComPacT NSX Diagnostics & Maintenance
MicroLogic 5/6/7 E Electronic Trip Units

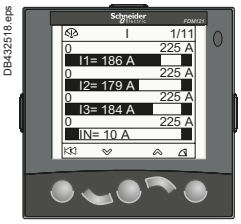


MicroLogic built-in LCD display

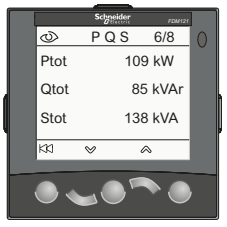
FDM121 display: navigation



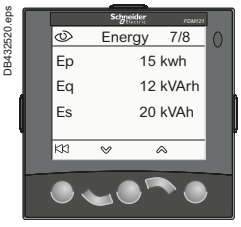
FDM121 display: current



FDM121 display: voltage



FDM121 display: power



FDM121 display: consumption

Examples of operating-assistance screens on the FDM121 display unit

Personalized Alarms with Time-Stamping

Alarm types
The user can assign an alarm to all MicroLogic 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 E has 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 E has a non-volatile memory that registers all data on alarms, histories, event tables, counters and maintenance indicators even if power is lost.

Maintenance Indicators

MicroLogic E has 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 E Electronic Trip Units

MicroLogic 5/6/7 Operating Assistance Functions			Type	Display	
			E	MicroLogic LCD	FDM display
Operating assistance					
Personalized 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.

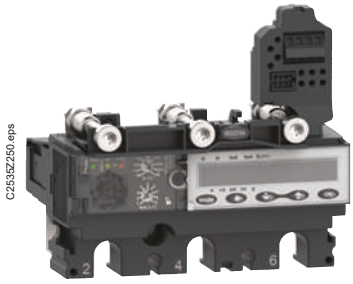
Circuit breaker load profile

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 optimize use of the protected equipment or to plan ahead for extensions.

ComPacT NSX Diagnostics & Maintenance
MicroLogic 5/6/7 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 faults.



MicroLogic built-in LCD display

The MicroLogic 5/6/7 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, to preserve the asset from any damage and to support people safety.
- 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 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.

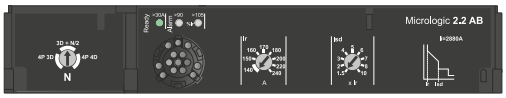
ComPacT NSX circuit breakers equipped with MicroLogic AB trip units are installed as incoming devices for consumer installations connected to the public LV distribution system.
With respect to the utility, they have two functions.

- 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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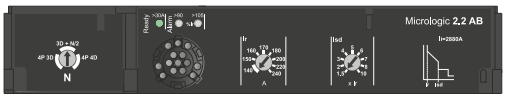

B

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

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

Remote indications
An SDx relay module installed inside the circuit breaker can be used to remote the 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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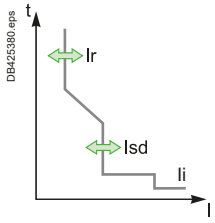
SDx remote indication relay module with its terminal block

ComPacT NSX Special Applications

Protection of Public Distribution Systems with MicroLogic 2-AB

MicroLogic 2.2/2.3 AB



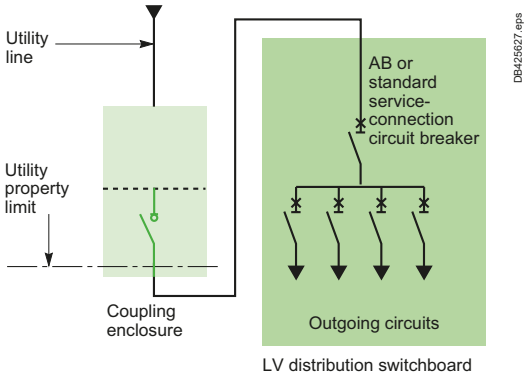
Ratings (A)	In at 40 °C [1]		100	160	240	400
Circuit breaker	ComPacT NSX100		◉	-	-	-
	ComPacT NSX160		◉	◉	-	-
	ComPacT NSX250		◉	◉	◉	-
	ComPacT NSX400		-	-	-	◉
	ComPacT NSX630		-	-	-	◉
L Long-time protection						
Pick-up (A) tripping between 1.05 and 1.20 Ir	**Ir**		Value depending on trip unit rating (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 VigiPacT add-on, will be embedded within the existing size of the MicroLogic AB trip unit.

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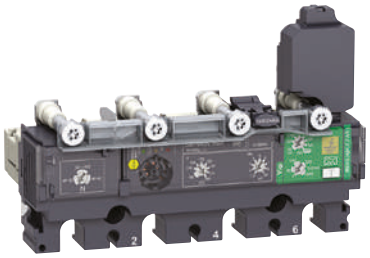


MicroLogic Vigi 4.2-AB trip unit

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 a 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

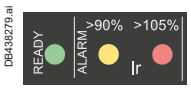
Front Indications

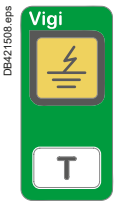
- Green "Ready" LED: flashes slowly when the circuit breaker is ready to trip in case of a fault.
- Orange overload pre-alarm LED: steady ON when I > 90% Ir.
- Red overload LED: steady ON when I > 105% Ir.
- Yellow Screen: indicates an earth leakage fault (reset when the device is operated OFF/ON).

Alarming and Fault Differentiation

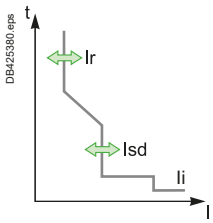
- An overload trip signal can be remotely available by installing an SDx relay module inside the circuit breaker.
- An earth leakage pre-alarm can be remotely available by installing an SDx module, only on the ComPacT NSX MicroLogic Vigi 4-AB.

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.

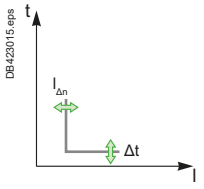




MicroLogic Vigi 4-AB (Earth Leakage "Trip" Version Only)



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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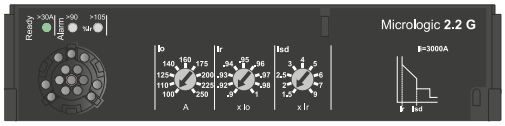

B

Circuit breakers equipped with MicroLogic G trip units help 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

DB436757.ai

- 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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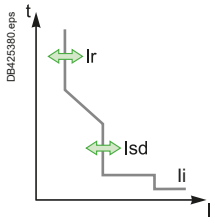
SDx remote indication relay module with its terminal block

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 60947-4/CSA 22-2 no. 14
- Overload and short-circuit protection
- Isolation with positive contact indication, making it possible to isolate machines from all power sources
- Installation in universal and functional type enclosures
- NA switch-disconnector version.

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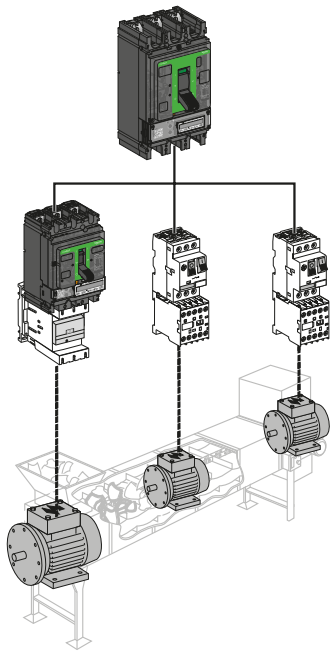

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Industrial Control Panels

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

Auxiliaries

All auxiliaries can be added to the circuit breaker by the user:
- Padlocking devices (in the OFF position)
- Rotary handle
- Status-indication auxiliary contacts (ON, OFF and tripped)
- Shunt (MX) or undervoltage (MN) releases
- Early-make or early-break contacts.

Rotary handle
Direct or extended versions for mounting up to 600 mm behind the front:
- Black front with black handle
- Yellow front with red handle (for machine tools or emergency off as per IEC 204/ VDE 0013).

All rotary handles can be padlocked in the OFF position. Optional door interlock, recommended for MCC panels (motor control centres).
When the device is equipped with an extended rotary handle, a control accessory mounted on the shaft makes it possible to operate the device with the door open. The device can be padlocked in the OFF position in compliance with UL508.

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

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

Installation in Enclosures

ComPacT circuit breakers can be installed in a metal enclosure together with other devices (contactors, motor-protection circuit breakers, LEDs, etc.).

B

Compliance with North American Industrial Control Equipment Standards

ComPacT NSX devices have received UL508/CSA 22-2 no. 14 approval for industrial control equipment of the "Manual Motor Controller", "Across the Line Starter", "General Use" and "Disconnecting Means" types.
Type NA devices are switch-disconnectors that must always be protected upstream.

UL508 approval

Circuit breakers	Trip units	Approvals
ComPacT NSX100 to 630 F/N/H	TMD, MicroLogic 2, 5 and 6	General Use Motor Disconnecting Means
	NA, MA, MicroLogic 1.3 M, 2.2 M, 2.3 M, MicroLogic 6.2 E-M and 6.3 E-M	Manual Motor Controller Across the Line Starter Motor Disconnecting Means

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

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

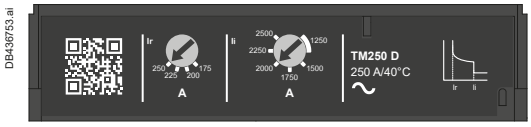
The deratings indicated on pages E-14 to E-17 apply to TMD, MicroLogic 2, 5 and 6 trip units, rated at 40 °C

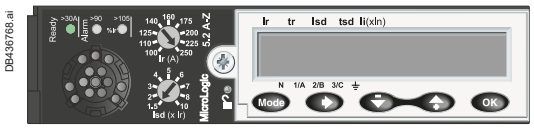
ComPacT NSX Special Applications

16 Hz 2/3 Network Protection - MicroLogic 5 A-Z Trip Unit

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

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 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) **Ii** 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

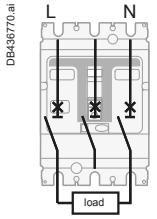
MicroLogic 5.2 A-Z and 5.3 A-Z are dedicated to 16 Hz 2/3 networks.
They use a suitable sampling frequency. The protection settings are identical to those of MicroLogic 5 A (see page B-12). They also offer a current-measurement function for this specific frequency.

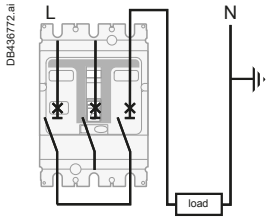
Trip-Unit Selection

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	**2 poles in series - Earthed neutral 250/500 V**
N and H (3P 3D version)	**N and H (3P 3D version)**





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 (Ii) to be increased.

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

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

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

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

C12H3TM160L_eps

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		Ii (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 Ii = 63 A.
400 Hz settings Ir = 16 x 0.95 = 15 A and Ii = 63 A x 1.6 = 100 A.

Protection

MicroLogic Electronic Trip Units

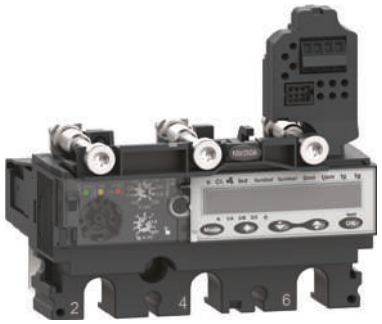
MicroLogic 2.2, 2.3 or 5.2, 5.3 with E measurement functions are suitable for 400 Hz. The use of electronics offers the advantage of greater operating stability when the frequency varies. However the units are still subject to temperature rise caused by the frequency.
The practical consequences are:

- 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	
Utilization 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

LV429454.eps

OF auxiliary contact

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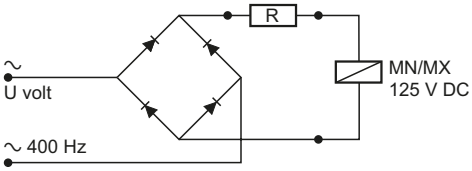
MX or MN voltage release

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

ComPacT NSX Special Applications
ComPacT NSX400K at 1000 V AC

The ComPacT NSX range includes the NSX400K 3P and 4P at 800 VAC and 1000 VAC models, with adjustable electronic trip unit Micrologic 2.3 rating 250A and 400A.

The ComPacT NSX400K offers the following features of the ComPacT NSX range:
- Compliance with most standards
- Service breaking capacity of 10 kA at 1000 VAC and 36 kA at 800 VAC
- Suitable for isolation with positive break indication
- Accessories, MN, MX, ON/OFF, auxiliary, motor mechanism, and rotary handles.

NSX400K.eps

Compliance with Standards
- International: IEC 60947-1 to 5
- Europe: EN 60947

Suitability for Isolation and People Safety
All Compact circuit-breakers are suitable for isolation as defined in IEC standard 60947-2. The operating handle cannot indicate the "off" position unless the contacts are actually open. Fitting a rotary handle or a motor mechanism does not alter the reliability of the position indication system.
For protection against direct contact with live parts, Compact circuit breakers may be installed through the door of Class II switchboards (as per IEC 60664).

Electrical Characteristics

Number of poles			3 & 4
IEC 60947-2 and EN 60947-2			
Rated insulation voltage	Ui (V AC)		1000
Rated impulse withstand voltage	Uimp (kV)		8
Rated operational voltage	Ue (V)	AC 50/60 Hz	1000
Ultimate breaking capacity	Icu (kA rms)	AC 1000 V	10
		AC 800 V	36
Service breaking capacity	Ics (% Icu)	AC 1000 V	10
		AC 800 V	10
Suitability for isolation			■
Utilization category			A
Pollution degree			3

Electronic Trip Unit

Factory mounted	Refer to Micrologic 2.3 section for trip settings

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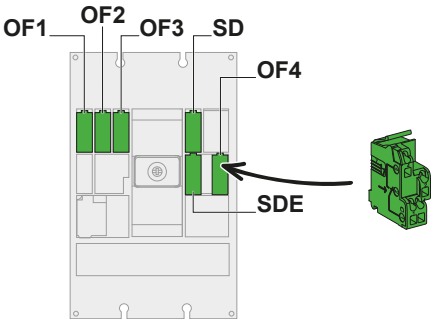
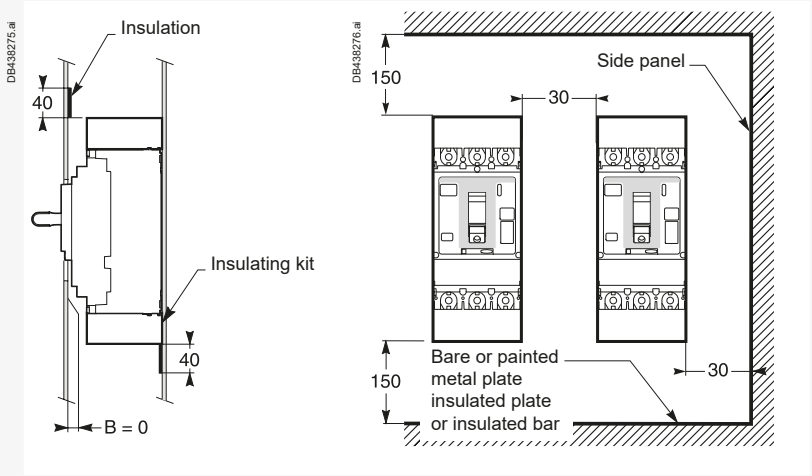


Auxiliaries for Indication, Measurement and Control
- Direct or extended rotary handles
- Padlocking and keylocking devices
- Motor mechanism featuring short closing time
- Status indication auxiliary contacts (contact positions, tripped, electrical fault, earth fault)
- Shunt and undervoltage auxiliary releases

Safety Parameters

Fixed front connection.
Supply by the top or the bottom. Connection by cables or busbars.

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TM 125 D
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