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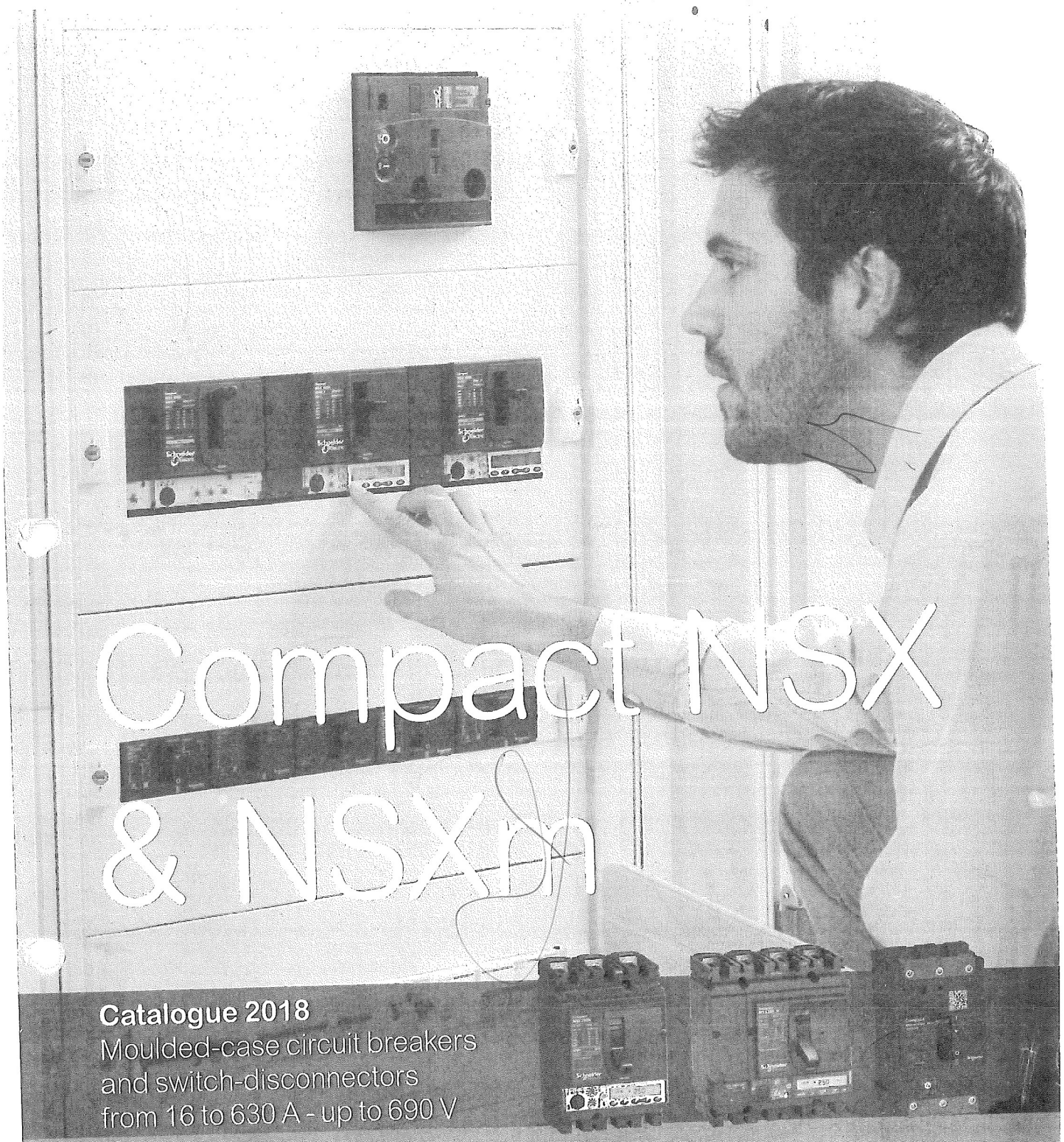
Приложение 2 към Техническо предложение

„Доставка на електромерни табла НН, за индиректно измерване“

ИЗИСКВАНИ ДОКУМЕНТИ ОТ ТЕХНИЧЕСКИ

ИЗИСКВАНИЯ И СПЕЦИФИКАЦИИ

Приложение 15



Compact NSX & NSXm

Catalogue 2018
Moulded-case circuit breakers
and switch-disconnectors
from 16 to 630 A - up to 690 V

• WEB3 cat.2018

schneider-electric.com

Life Is On | Schneider Electric

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Green Premium™

Endorsing eco-friendly products in the industry

Green Premium™
Product

Green Premium is the only label that allows you to effectively develop and promote an environmental policy whilst preserving your business efficiency. This ecolabel guarantees compliance with up-to-date environmental regulations, but it does more than this.

Schneider Electric's Green Premium ecolabel is committed to offering transparency, by disclosing extensive and reliable information related to the environmental impact of its products:

RoHS
Schneider Electric products are subject to RoHS requirements at a worldwide level, even for the many products that are not required to comply with the terms of the regulation. Compliance certificates are available for products that fulfil the criteria of this European initiative, which aims to eliminate hazardous substances.

REACh
Schneider Electric applies the strict REACh regulation on its products at a worldwide level, and discloses extensive information concerning the presence of SVHC (Substances of Very High Concern) in all of its products.

PEP: Product Environmental Profile
Schneider Electric publishes complete set of environmental data, including carbon footprint and energy consumption data for each of the lifecycle phases on all of its products, in compliance with the ISO 14025 PEP ecopassport program. PEP is especially useful for monitoring, controlling, saving energy, and/or reducing carbon emissions.

EoLI: End of Life Instructions
Available at the click of a button, these instructions provide:
- Recyclability rates for Schneider Electric products.
- Guidance to mitigate personnel hazards during the dismantling of products and before recycling operations.
- Parts identification for recycling or for selective treatment, to mitigate environmental hazards/ incompatibility with standard recycling processes.

Over 75% of Schneider Electric manufactured products have been awarded the Green Premium ecolabel

Discover what we mean by green ...

Check your products!

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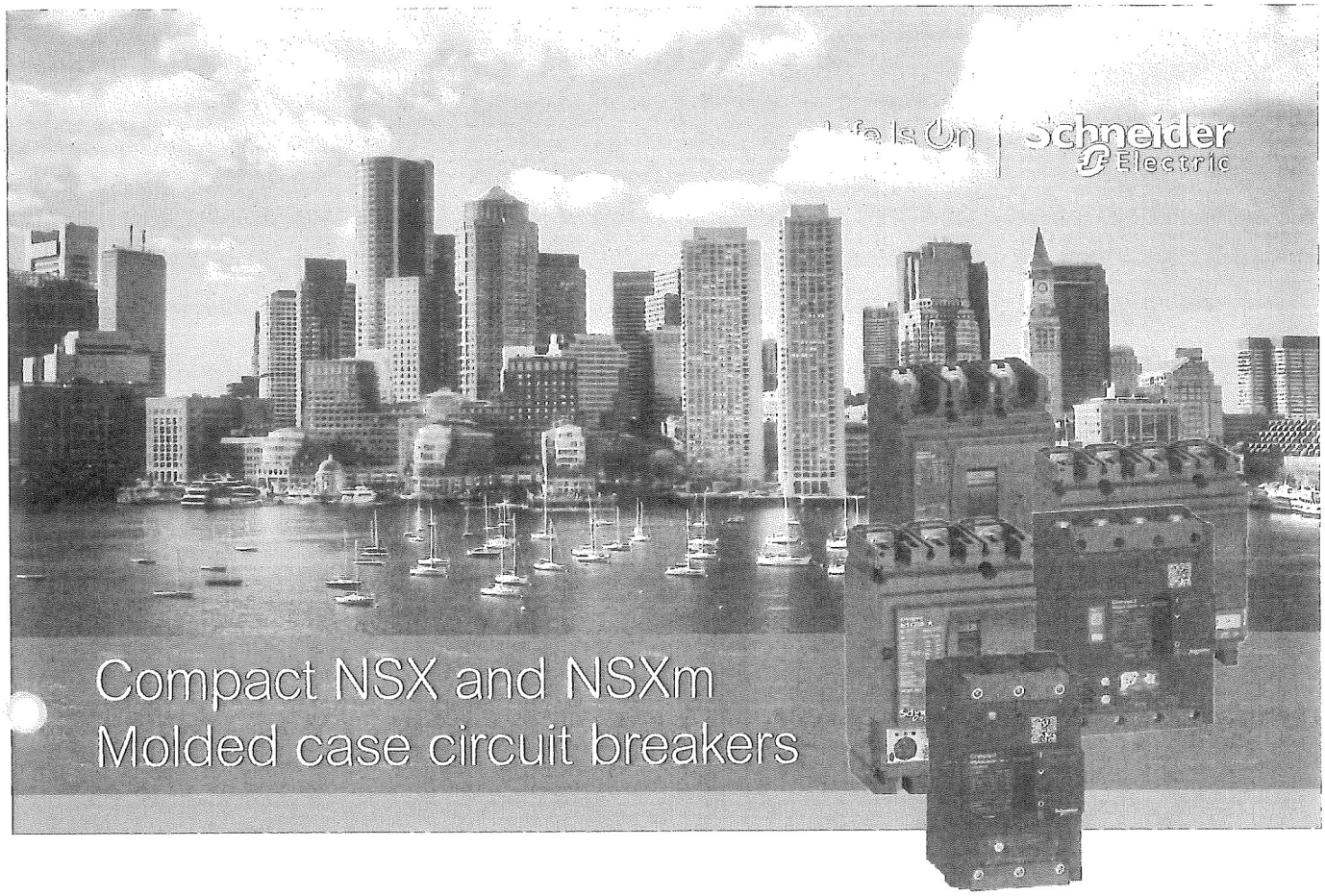
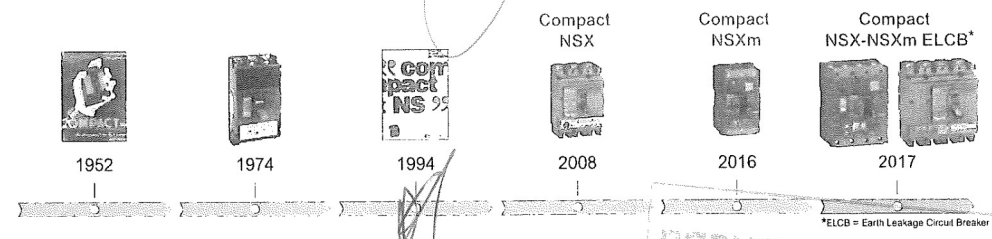


The world is becoming more electric, digitized, decarbonized and decentralized. Our digitized LV products are powered by innovation at every level enabling enhanced connectivity, real-time operations and smart analytics. They bring improved safety and security. They help you to improve reliability and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

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

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



schneider-electric.com/compact-nsx

Watch the video

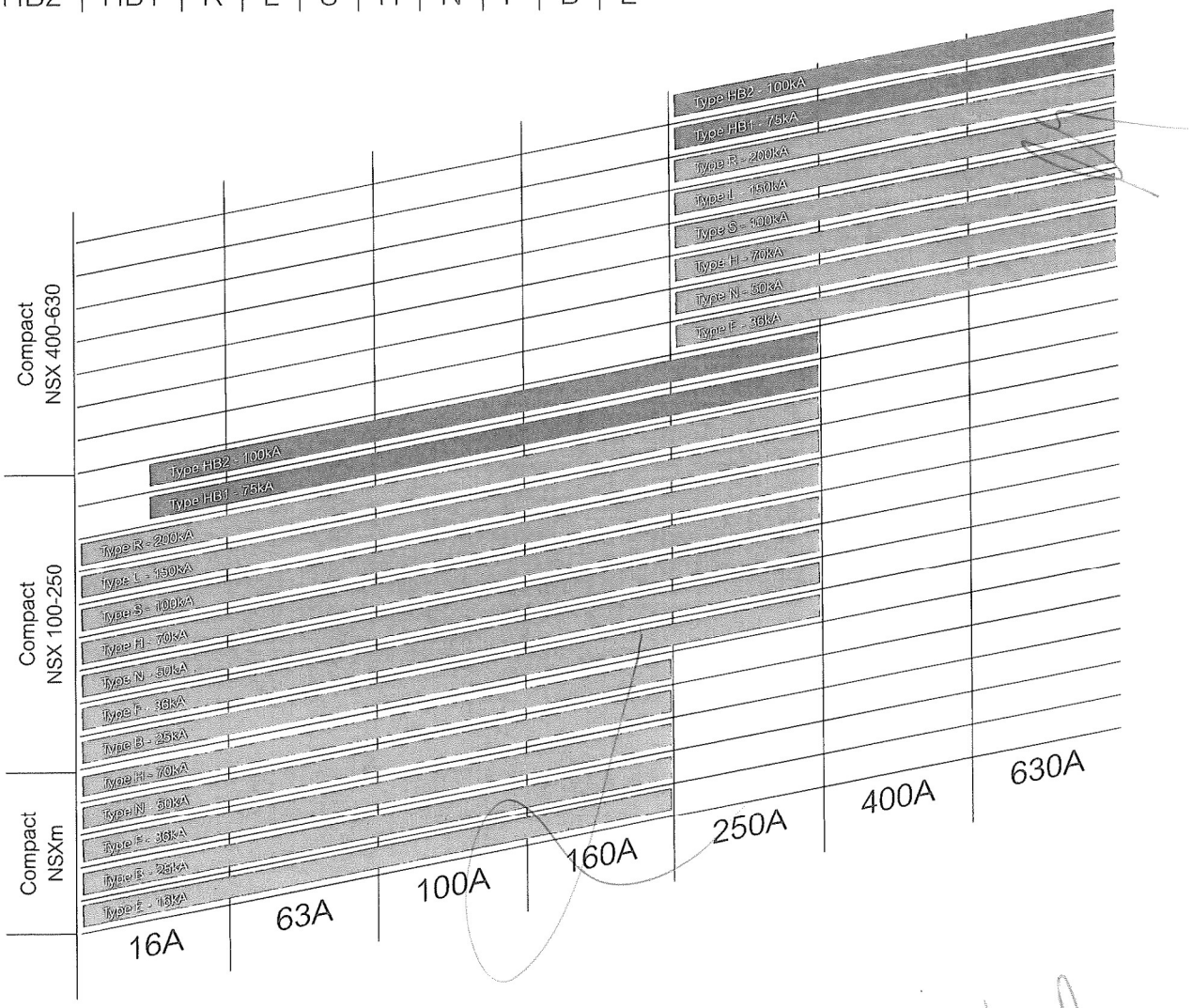
Compact NSX and NSXm, even more innovative and efficient

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

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

Ten performance levels

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



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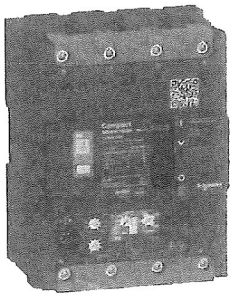
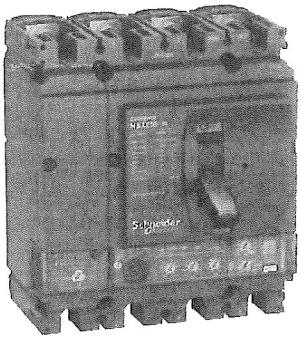
Brand new innovation: add functions to your panel with the same footprint

The smallest earth leakage circuit breaker*:



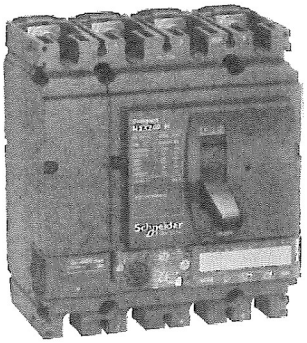
Compact NSXm with Micrologic Vigi 4.1 embedded:

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



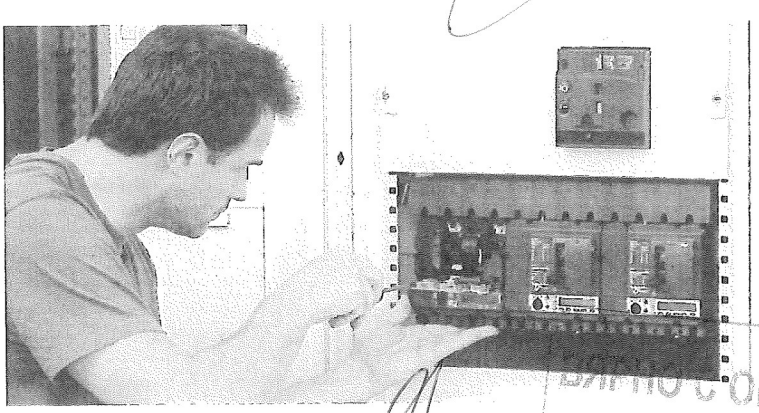
Compact NSX with Micrologic Vigi 4:

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



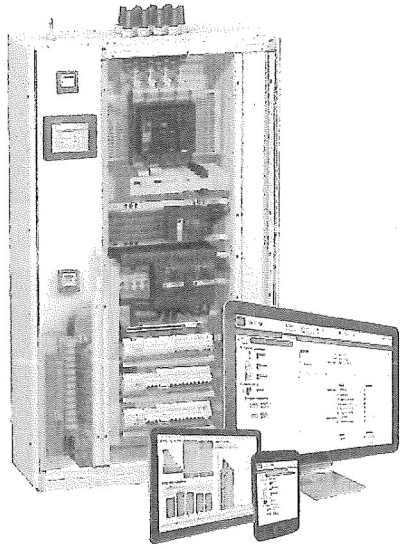
Compact NSX with Micrologic Vigi 7 E:

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



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

With EcoStruxure Power, your electrical system has something to say



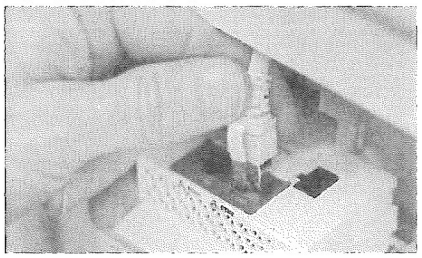
Give it a voice with Smart Panels, an EcoStruxure Power solution. Improve uptime with our integrated energy and asset-monitoring technologies. By combining cutting-edge hardware and software with unparalleled connectivity, Smart Panels enable you to pinpoint overloads and inefficiencies proactively,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

Compact NSX with Micrologic 5, 6 and 7 E contributes to energy efficiency.

1. Measure

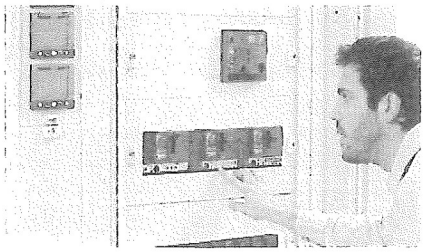
Monitor power usage, power quality, and asset status, and discover opportunities to save energy.

2. Connect



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

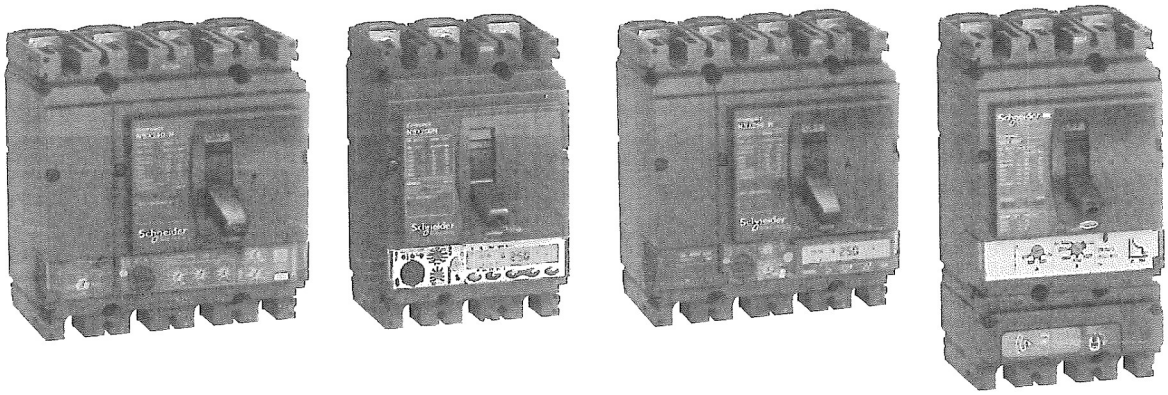
3. Act



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

With Compact NSX, upgrade quickly to smarter functions

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



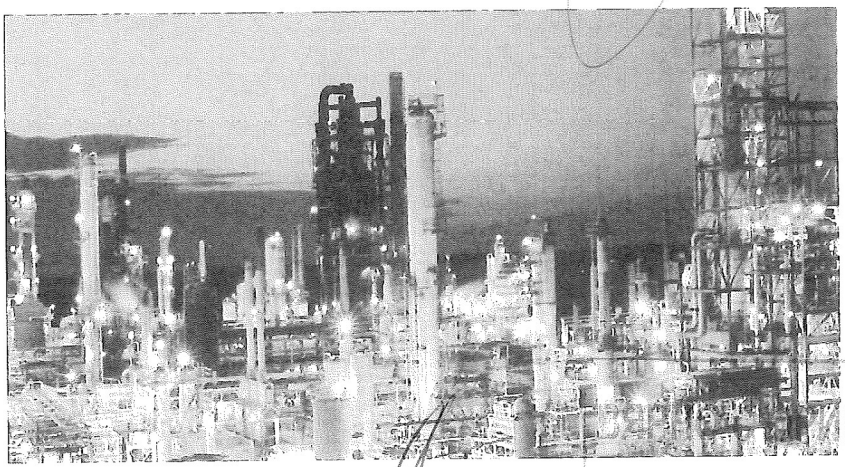
As Compact NSX is part of the Smart Panels system, all measurement provided by Compact NSX can be digitized for transmission to local and remote management software and solutions.

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

With Compact NSX, address high-demanding applications

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

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



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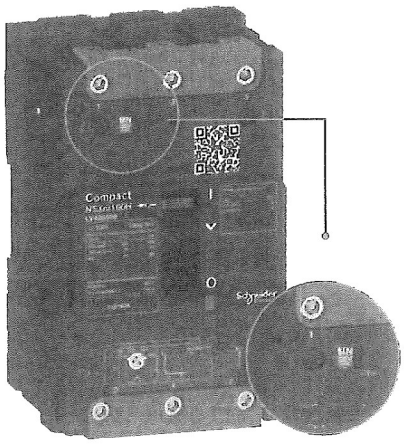
With Compact NSXm, experience efficiency that clicks

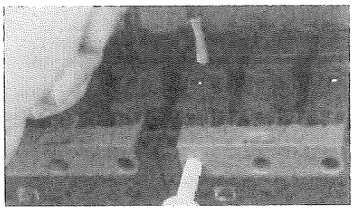
Compact NSXm, optimized for your needs:

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

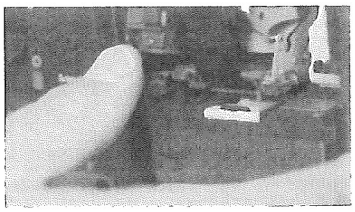


It features:

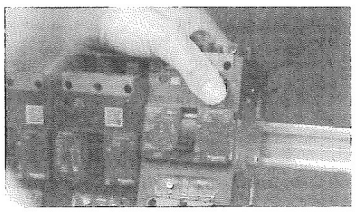
- EverLink connectors
- Spring type auxiliaries externally visible
- Built-in DIN rail and plate mount capability



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



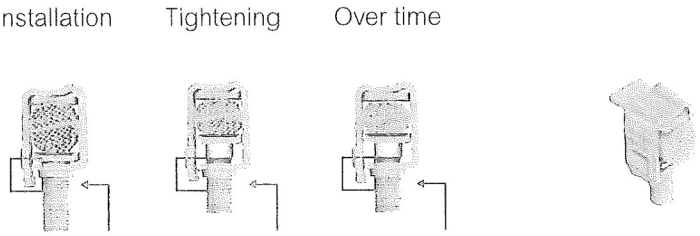
One-click auxiliaries
Field-installable, externally visible, and easy to wire.



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

EverLink Patented Technology

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



Space for spring effect
Untightened

In contact
Tightened

Creep-compensating effect

Spring maintains contact pressure:
Creep compensation

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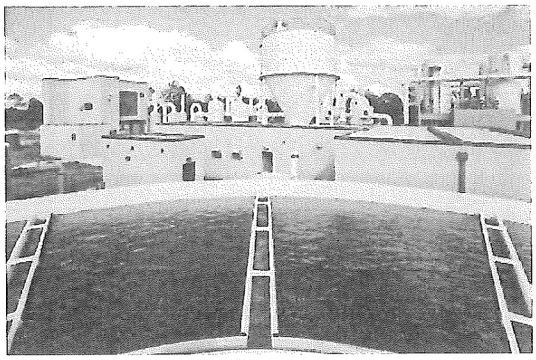
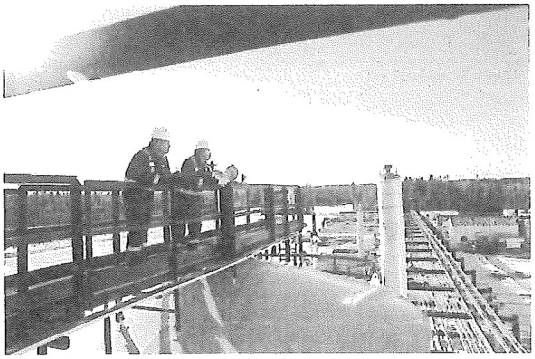
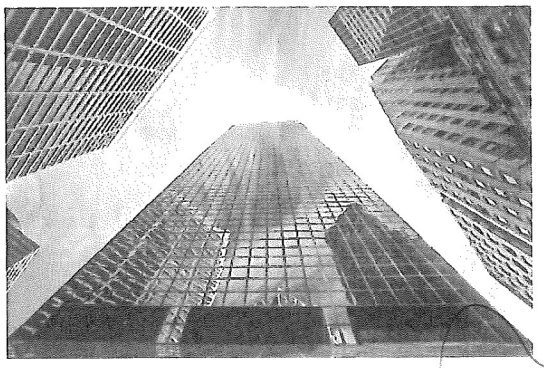
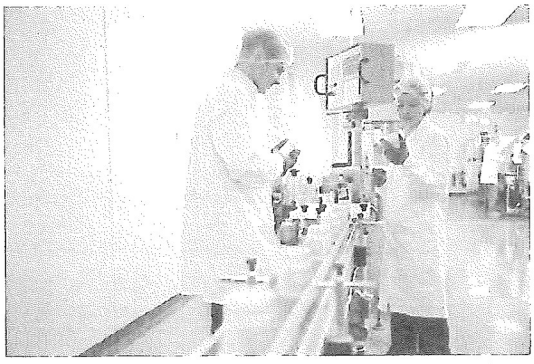
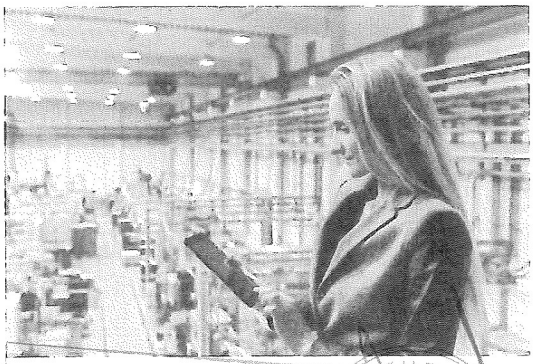
With Compact NSX and NSXm, cover all standard and specific applications











Schneider Electric helps on your work every step of the way

1 Design

Ecodial software

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

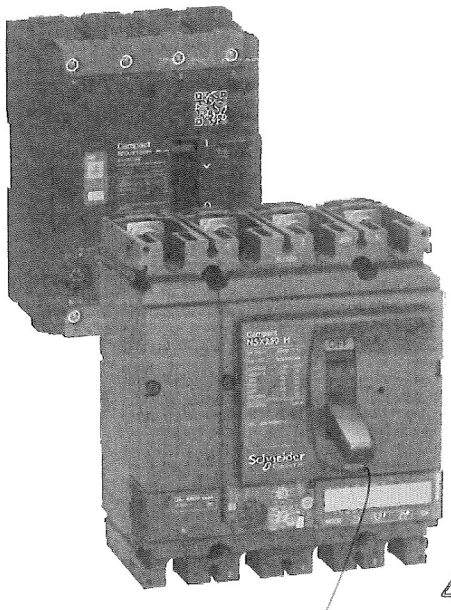
Ecoreal software

Quick configuration and quotation tool for switchboards.

3 Build

Build faster

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



2 Configure and order

MyPact

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

4 Operate and maintain

Upgrade and support

Upgrade your installation with smarter functions.

Quick access to customer care center and expert support.

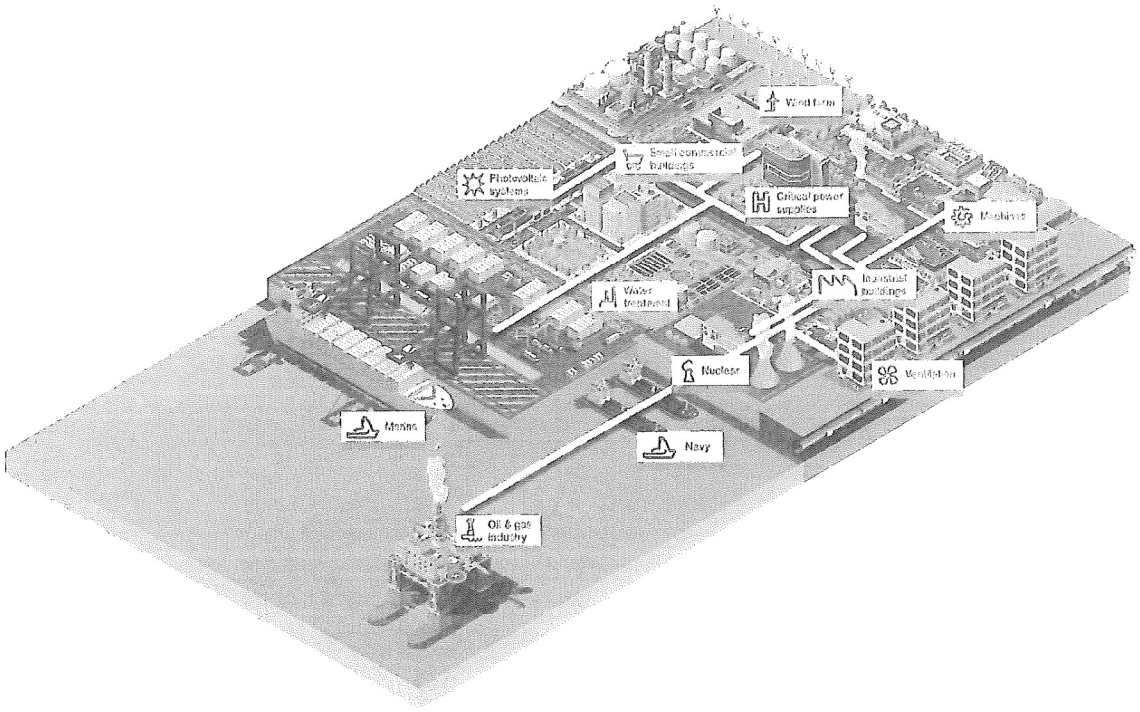
Continuity of service

Bring the best solution to your customer.

General contents

Compact NSXm & NSX
Overview of applications

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



> Compact INS/INV [a]

LVPED213024EN

> Fupact [a]

LVPED216031EN

> Substitution and technical guide Compact NSX high performances [b]

LVPED508025EN

> Compact NSX, Compact INS/INV, Masterpact NW DC - DC PV [c]

LVPED208006EN

> Transferpact (source-changeover systems [d]

LVPED216028EN

> Complementary technical information

LVPED308005EN

Buildings

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

Industrial buildings, Machines, Ventilation and Water Treatment

The Compact NSX range includes a number of versions to protect motor applications:
- basic short-circuit protection with MA magnetic trip units or the electronic Micrologic 1-M version, combined with an external relay to provide thermal protection
- protection against overloads, short-circuits with additional motor-specific protection (phase unbalance, locked rotor, underload and long start) with Micrologic 6 E-M trip units.

These versions also offer communication, metering and operating assistance.
The exceptional limiting capacity of Compact NSX circuit breakers automatically provides type-2 coordination with the motor starter, in compliance with standard IEC 60947-4-1.

Buildings and Industrial buildings

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

Marine

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

Special applications

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

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

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

Photovoltaic

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

Oil & Gas

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

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

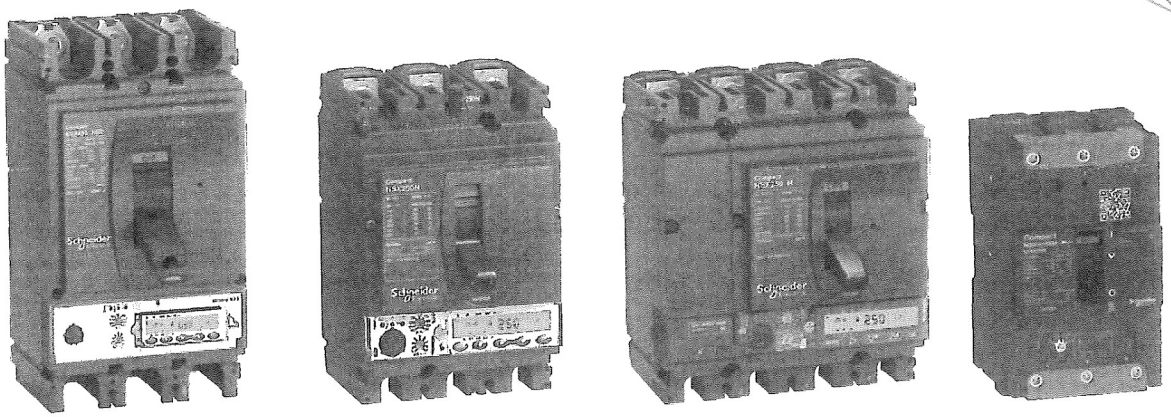
Critical Power Supplies

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

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

To ensure a continuous supply of power, some electrical installations are connected to two power sources [d]:
- a normal source
- a replacement source to supply the installation when the normal source is not available.

A mechanical and/or electrical interlocking system between two circuit breakers or switch-disconnectors avoids all risk of parallel connection of the sources during switching.
A source-changeover system can be:
- manual with mechanical device interlocking
- remote controlled with mechnaical and/or electrical device interlocking
- automatic by adding a controller to manage switching from one source to the other on the basis of external parameters.



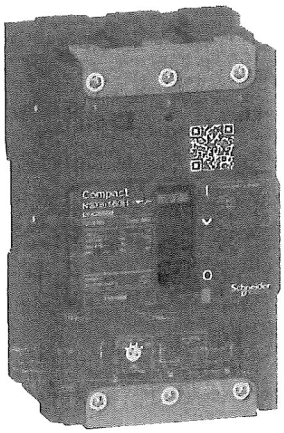
400

Select your circuit breakers and switch-disconnectors

A

Characteristics and performance

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



Compact NSXm.

Common characteristics

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

Circuit breakers

Breaking capacity levels

Breaking capacity (kA rms)

Icu	AC 50/60 Hz	220...240 V	
		380...415 V	
		440 V	
		500 V	
		525 V	
		660...690 V	

Service breaking capacity (kA rms)

Ics	AC 50/60 Hz	220...240 V	
		380...415 V	
		440 V	
		500 V	
		525 V	
		660...690 V	

Durability (C-O cycles)	Mechanical		
	Electrical	440 V	In/2
			In
		690 V	In/2
			In

Protection and measurements

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

Installation / connections

Dimensions and weights

Dimensions (mm) W x H x D		3P
		4P
		ELCB [1]
Weight (kg)		3P
		4P
		ELCB [1]

Connections

Pitch (mm)		Standard
		With spreaders
EverLink lug Cu or Al [2] cables	Cross-section (mm²)	Rigid
		Flexible
Crimp lugs Cu or Al	Cross-section (mm²)	Rigid
		Flexible

Source changeover system

Manual mechanical interlocking

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

Characteristics and performance

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

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

A

	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	-	-	-	-	-
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						◎				
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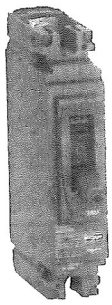
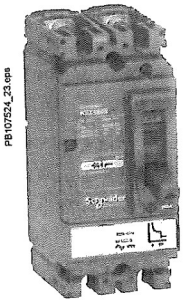
	◎									
	81 x 137 x 80									
	108 x 137 x 80									
	108 x 144 x 80									
	1.06									
	1.42									
	1.63									
	27									
	35									
	95									
	70									
	120									
	95									
	◎					◎				

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



Compact NSX single-pole.



Compact NSX two-pole.

Compact circuit breakers

Number of poles			
Control	manual		toggle
			direct or extended rotary handle
	electric		
Connections	fixed		front connection
			rear connection
	withdrawable		front connection
			rear connection

Electrical characteristics as per IEC/EN 60947-2

Rated current (A)	**In**	40 °C	
Rated insulation voltage (V)	**Ui**		
Rated impulse withstand voltage kV)	**Uimp**		
Rated operational voltage (V)	**Ue**	AC 50/60 Hz	
		DC	

Type of circuit breaker

Ultimate breaking capacity (kA rms)	**Icu**	AC 50/60 Hz	220/240 V
			380/415 V
			440 V
			500/525 V
			660/690 V
		DC	250 V (1P)
			500 V (2P)
Service breaking capacity (kA rms)	**Ics**	% Icu	
Suitability for isolation			
Utilisation category			
Durability (C-O cycles)	mechanical		
	electrical	277 V	In/2
			In

Protection and measurements

Type of trip units			
Ratings		**In**	
Overload protection (thermal)	long time threshold	**Ir**	
Short-circuit protection (magnetic)	instantaneous pickup	**Im**	value indicated for AC [1] real value for DC
Add-on earth-leakage protection	Vigi add-on combination with Vigirex relay		

Additional indication and control auxiliaries

Indication contacts	
Voltages releases	MX shunt release
	MN undervoltage release

Installation

Accessories	terminal extensions and spreaders
	terminal shields and interphase barriers
	escutcheons
Dimensions (mm)	W x H x D
Weight (kg)	

Source changeover system

Manual mechanical interlocking

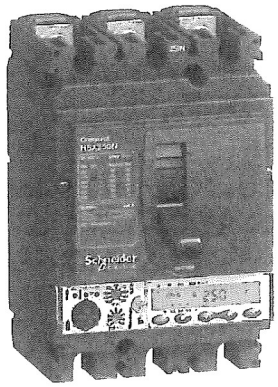
[1] The thresholds for TMD and TMG 1-pole and 2-pole magnetic trip units up to 63 A are indicated for AC. The real DC thresholds are indicated on the following line.

Characteristics and performance

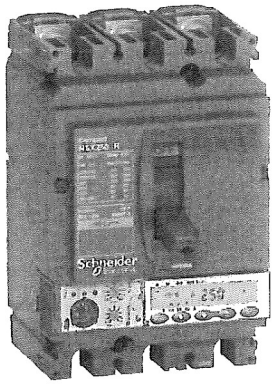
Compact NSX circuit breakers from 100 to 250 A up to 690 V

	NSX100		NSX160		NSX250
	1	2	1	2	1
	◎	◎	◎	◎	◎
	-	-	-	-	-
	-	-	-	-	-
	◎	◎	◎	◎	◎
	◎	◎	◎	◎	◎
	-	-	-	-	-
	-	-	-	-	-
	100	100	160	160	250
	750	750	750	750	750
	8	8	8	8	8
	277	690	277	690	277
	250	500	250	500	-
	F N M	F M S	F N M	F M S	N
	18 25 40	36 85 100	18 25 40	36 85 100	25
	- - -	18 25 70	- - -	18 25 70	-
	- - -	15 25 65	- - -	15 25 65	-
	- - -	10 18 35	- - -	10 18 35	-
	- - -	5 8 10	- - -	5 8 10	-
	36 50 85	36 85 100	36 50 85	36 85 100	-
	- - -	36 85 100	- - -	36 85 100	-
	100 %	100 %	100 %	100 %	100 %
	◎	◎	◎	◎	◎
	A	A	A	A	A
	20000	20000	20000	20000	10000
	20000	20000	20000	20000	10000
	10000	10000	10000	10000	5000
	built-in thermal-magnetic		built-in thermal-magnetic		built-in thermal-magnetic
	16 20 25 30 40	50 63 80 100	125 160		160 200 250
	fixed		fixed		fixed
	16 20 25 30 40	50 63 80 100	125 160		160 200 250
	fixed		fixed		fixed
	190 190 300 300 500	500 500 640 800	1000 1250		850 850 850
	260 260 400 400 700	700 700 800 1000	1200 1250		- - -
	-	-	-	-	-
	-	◎	-	◎	-
	-	◎	-	◎	-
	-	◎	-	◎	-
	-	◎	-	◎	-
	◎	◎	◎	◎	◎
	◎	◎	◎	◎	◎
	◎	◎	◎	◎	◎
	35 x 161 x 86	70 x 161 x 86	35 x 161 x 86	70 x 161 x 86	35 x 161 x 86
	0.7	1.2	0.7	1.2	0.7
	◎	◎	◎	◎	◎

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



Compact NSX100/160/250.



Compact NSX250 R.

Compact NSX250 HB2.

Common characteristics

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

Circuit breakers

Breaking capacity levels

Electrical characteristics as per IEC/EN 60947-2				
Rated current (A)	In	40 °C		
Number of poles				
Breaking capacity (kA rms)				
	Icu	AC 50/60 Hz	220/240 V	
			380/415 V	
			440 V	
			500 V	
			525 V	
			660/690 V	
Service breaking capacity (kA rms)				
	Ics	AC 50/60 Hz	220/240 V	
			380/415 V	
			440 V	
			500 V	
			525 V	
			660/690 V	
Durability (C-O cycles)		Mechanical		
		Electrical	440 V	In/2
				In
			690 V	In/2
				In
Characteristics as per UL 508				
Breaking capacity (kA rms)		AC 50/60 Hz	240 V	
			480 V	
			600 V	

Protection and measurements

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

Installation / connections

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

Source-changeover system

Manual mechanical interlocking	
Automatic source-changeover	

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

Characteristics and performance

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

Common characteristics

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

NSX100									NSX160 [4]						NSX250								
B	F	N	H	S	L	R	HB1	HB2	B	F	N	H	S	L	B	F	N	H	S	L	R	HB1	HB2
100						100			160						250						250		
2 [5], 3, 4						3, 4			2 [5], 3, 4						2 [5], 3, 4						3, 4		
40	85	90	100	120	150	200	-	-	40	85	90	100	120	150	40	85	90	100	120	150	200	-	-
25	36	50	70	100	150	200	-	-	25	36	50	70	100	150	25	36	50	70	100	150	200	-	-
20	35	50	65	90	130	200	-	-	20	35	50	65	90	130	20	35	50	65	90	130	200	-	-
15	25	36	50	65	70	80	85	100	15	30	36	50	65	70	15	30	36	50	65	70	80	85	100
-	22	35	35	40	50	65	80	100	-	22	35	35	40	50	-	22	35	35	40	50	65	80	100
-	8	10	10	15	20	45	75	100	-	8	10	10	15	20	-	8	10	10	15	20	45	75	100
40	85	90	100	120	150	200	-	-	40	85	90	100	120	150	40	85	90	100	120	150	200	-	-
25	36	50	70	100	150	200	-	-	25	36	50	70	100	150	25	36	50	70	100	150	200	-	-
20	35	50	65	90	130	200	-	-	20	35	50	65	90	130	20	35	50	65	90	130	200	-	-
7	12	36	50	65	70	80	85	100	15	30	36	50	65	70	15	30	36	50	65	70	80	85	100
-	11	35	35	40	50	65	80	100	-	22	35	35	40	50	-	22	35	35	40	50	65	80	100
-	4	10	10	15	20	45	75	100	-	8	10	10	15	20	-	8	10	10	15	20	45	75	100
50000						20000			40000						20000						20000		
50000						20000			40000						20000						20000		
30000						10000			20000						10000						10000		
20000						10000			15000						10000						10000		
10000						5000			7500						5000						5000		
-	85	85	85	-	-	-	-	-	-	85	85	85	-	-	-	85	85	85	-	-	-	-	-
-	25	50	65	-	-	-	-	-	-	35	50	65	-	-	-	35	50	65	-	-	-	-	-
-	10	10	10	-	-	-	-	-	-	10	10	10	-	-	-	15	15	15	-	-	-	-	-
◎									◎						◎								
◎									◎						◎								
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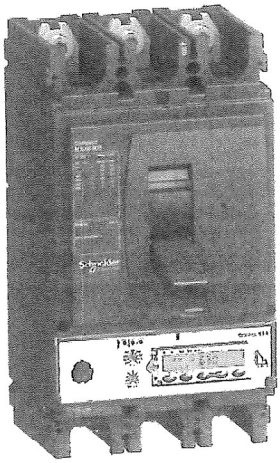
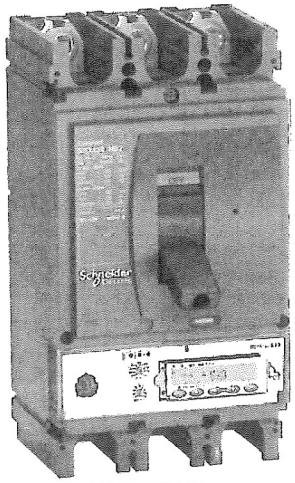
◎									◎						◎								
◎									◎						◎								
105 x 161 x 86						105 x 161 x 86			105 x 161 x 86						105 x 161 x 86								
140 x 161 x 86						140 x 161 x 86			140 x 161 x 86						140 x 161 x 86								
2.05						2.4			2.2						2.4								
2.4						2.8			2.6						2.8								
35/45 mm						35/45 mm			35/45 mm						35/45 mm								
300						300			300						300								
◎									◎						◎								
◎									◎						◎								

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



Compact NSX400/630.

Compact NSX630 R.



Compact NSX630 HB2.

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

Common characteristics

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

Circuit breakers

Breaking capacity levels

Electrical characteristics as per IEC/EN 60947-2

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

Characteristics as per UL 508

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

Protection and measurements

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

Installation / connections

Dimensions and weights

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

Connections

Connection terminals	Pitch	With/without spreaders
Large Cu or Al cables	Cross-section	mm²

Source-changeover system

Manual mechanical interlocking	
Automatic source-changeover	

Characteristics and performance

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

A

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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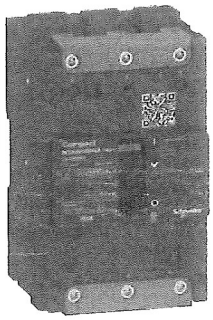
◎								◎										
140 x 255 x 110								140 x 255 x 110										
185 x 255 x 110								185 x 255 x 110										
6.05								6.2										
7.90								8.13										
45/52.5 mm								45/52.5 mm										
45/70 mm								45/70 mm										
4 x 240								4 x 240										
◎								◎										
◎								◎										

ВЯРНО С ОРИГИНАЛА

709

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.



Compact NSXm switch-disconnectors.

Common characteristics

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

Switch-disconnectors

Electrical characteristics as per IEC/EN 60947-3

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

Additional indication and control auxiliaries

Indication contacts	
Voltage releases	MX shunt trip release
	MN undervoltage release

Installation / connections

Dimensions and weights

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

Connections

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

Source-changeover systems

Manual mechanical interlocking

[1] Al up to 100 A.

Characteristics and performance

Compact NSXm switch-disconnectors from 50 to 160 A NA

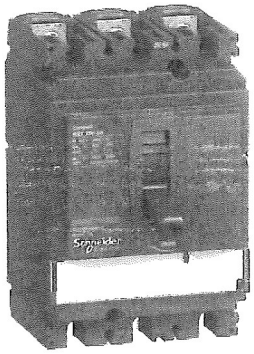
Common characteristics			
Control	Manual	With toggle	◎
		With direct or extended rotary handle	◎
		With side rotary handle	◎
Versions	Fixed		◎

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

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

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

A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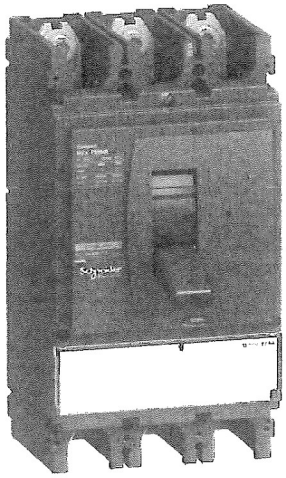
Compact NSX100 to 250 NA.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Compact NSX400 to 630 NA.

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

LVPED213024EN

[1] 2P in 3P case.

Common characteristics

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

Switch-disconnectors

Electrical characteristics as per IEC/EN 60947-3

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

Protection

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

Additional indication and control auxiliaries

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

Remote communication by bus

Device-status indication		
Device remote operation		
Operation counter		

Installation / connections

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

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

Manual mechanical interlocking	
Automatic source-changeover	

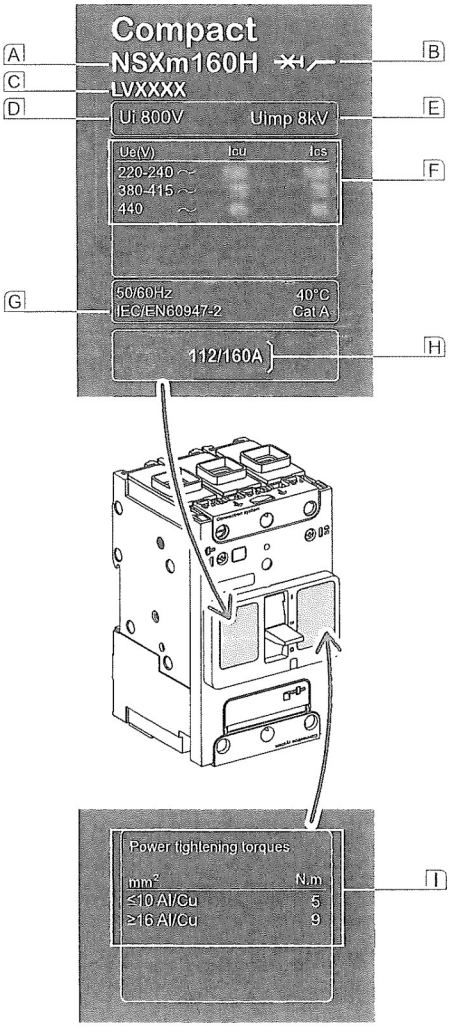
Characteristics and performance

Compact NSX switch-disconnectors from 100 to 630 A NA

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

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

General characteristics of the Compact range



Standardised characteristics indicated on the rating plate:

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

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

Compliance with standards

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

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

Pollution degree

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

Climatic withstand

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

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

Damp heat (tropicalization)

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

Environment

Compact NSX and NSXm respects the European environment directive EC/2002/95 concerning the restriction of hazardous substances (RoHS) and is Green Premium.
Product environment profiles (PEP) have been prepared, describing the environmental impact of every product throughout its life cycle, from production to the end of its service life.
All Compact production sites have set up an environmental management system certified ISO 14001.
Each factory monitors the impact of its production processes. Every effort is made to prevent pollution and to reduce consumption of natural resources.

Ambient temperature

■ Compact NSX and NSXm circuit breakers may be used between -25 °C and +70 °C. For temperatures higher than 40 °C, (For Compact NSX: +65 °C for circuit breakers used to protect motor feeders) devices must be derated (pages E-8 to E-9 and E-14 to E-17).

■ Circuit breakers should be put into service under normal ambient, operating-temperature conditions. Exceptionally, the circuit breaker may be put into service when the ambient temperature is between -35 °C and -25 °C.

■ The permissible storage temperature range for Compact NSX and NSXm circuit breakers in the original packing is -50 °C [2] [3] and +85 °C.

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

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Green Premium™ Product

General characteristics of the Compact range

Electromagnetic compatibility

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

Immunity levels for Compact NSXm comply with the standards below.
- IEC/EN 60947-2: Low-voltage switchgear and controlgear, part 2: Circuit breakers:
  - Annex F: Immunity tests for circuit breakers with electronic protection
  - Annex B: Immunity tests for residual current protection
- IEC/EN 61000-4-2: Electrostatic-discharge immunity tests
- IEC/EN 61000-4-3: Radiated, radio-frequency, electromagnetic-field immunity tests
- IEC/EN 61000-4-4: Electrical fast transient/burst immunity tests
- IEC/EN 61000-4-5: Surge immunity tests
- IEC/EN 61000-4-6: Immunity tests for conducted disturbances induced by radio-frequency fields
- IEC/EN 61000-4-8: Power frequency magnetic field immunity test
- IEC/EN 61000-4-11: Voltage dips, short interruptions and voltage variations immunity tests
- CISPR 11: Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement.

Suitable for isolation with positive contact indication

All Compact NSX and NSXm devices are suitable for isolation as defined in IEC standard 60947-2:
- The isolation position corresponds to the O (OFF) position.
- The operating handle cannot indicate the OFF position unless the contacts are effectively open.
- Padlocks may not be installed unless the contacts are open.

Installation of a rotary handle or a motor mechanism does not alter the reliability of the position-indication system.
The isolation function is certified by tests guaranteeing:
- the mechanical reliability of the position-indication system
- the absence of leakage currents
- overvoltage withstand capacity between upstream and downstream connections.

The tripped position does not insure isolation with positive contact indication.
Only the OFF position guarantees isolation.

Installation in class II switchboards

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

Degree of protection

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

Bare circuit breaker with terminal shields

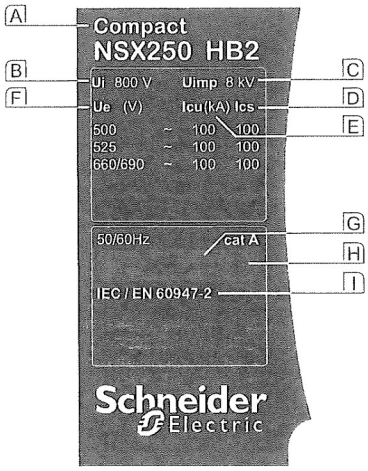
- With toggle: IP40, IK07.
- With direct rotary handle: IP40 IK07.

Circuit breaker installed in a switchboard

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

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

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



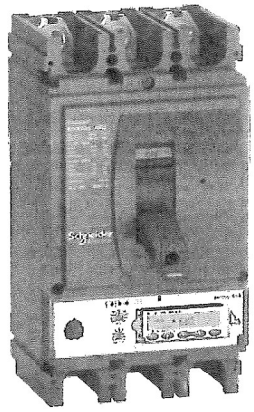
Standardised characteristics indicated on the rating plate:
- A Type of device: frame size and breaking capacity class
- B Ui: rated insulation voltage.
- C Uimp: rated impulse withstand voltage.
- D Ics: service breaking capacity.
- E Icu: ultimate breaking capacity for various values of the rated operational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

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

Compact NSX special applications
High performances at 690 V

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

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 organisation for the protection of machine tools.

Compact NSX special applications
High performances at 690 V

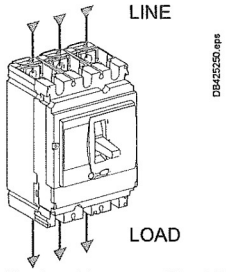
Circuit breakers		NSX100-250 [1]			NSX400			NSX630					
Breaking capacity levels		R	HB1	HB2	R	HB1	HB2	R	HB1	HB2	R	HB1	HB2
Electrical characteristics													
Breaking capacity (kA rms)								Ir < 500 A			Ir > 501 A		
Icu	AC 50/60 Hz 220/240 V	200	-	-	200	-	-	200	-	-	200	-	-
	380/415 V	200	-	-	200	-	-	200	-	-	200	-	-
	440 V	200	-	-	200	-	-	200	-	-	200	-	-
	500 V	80	85	100	80	85	100	80	85	100	80	85	100
	525 V	65	80	100	65	80	100	65	80	100	65	80	100
	690 V	45	75	100	45	75	100	45	75	100	45	75	100
Service breaking capacity (kA rms)								Ir < 500 A			Ir > 501 A		
Ics	AC 50/60 Hz 220/240 V	200	-	-	200	-	-	200	-	-	200	-	-
	380/415 V	200	-	-	200	-	-	200	-	-	200	-	-
	440 V	200	-	-	200	-	-	200	-	-	200	-	-
	500 V	80	85	100	80	85	100	80	85	100	80	85	100
	525 V	65	80	100	65	80	100	65	80	100	-	-	-
	690 V	45	75	100	45	75	100	45	75	100	-	-	-

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

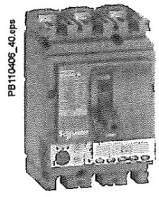
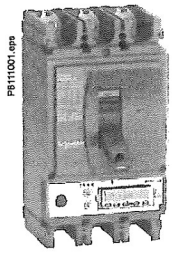
Offer structure

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

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



For breaking capacities R/HB1/HB2.

Type of protection		Distribution protection		Motor protection	
		TMD	Micrologic	MA	Micrologic
 PB110402_40.eps	Compact NSX100	40-100	2.2: 40-100 5.2 E: 40-100 6.2 E: 40-100	12.5-100	2.2 M: 25, 50, 100 6.2 E-M: 25, 50, 100
	Compact NSX250	125-250	2.2: 100, 160, 250 5.2 E: 100, 160, 250 6.2 E: 100, 160, 250	150, 220	2.2 M: 150, 220 6.2 E-M: 150, 220
 PB111001.eps	Compact NSX400	-	2.3: 250, 400 5.3 E: 250, 400 6.3 E: 250, 400	-	1.3 M: 320 2.3 M: 320 6.3 M: 320
	Compact NSX630		2.3: 630 5.3 E: 630 6.3 E: 630		1.3 M: 500 2.3 M: 500 6.3 M: 500

> Substitution and technical guide
Compact NSX high performances
LVPED508025EN

ВЯРНО С ОРИГИНАЛА

418

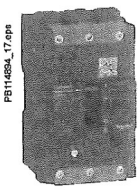
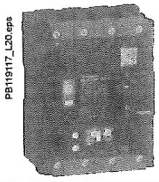
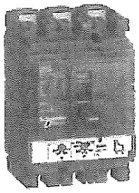
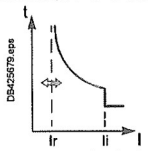
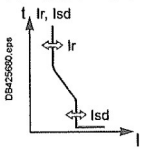
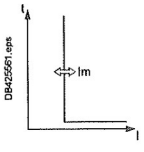
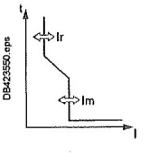
Select your protection

B

419

Overview of trip units

Compact NSXm has a built-in trip unit.

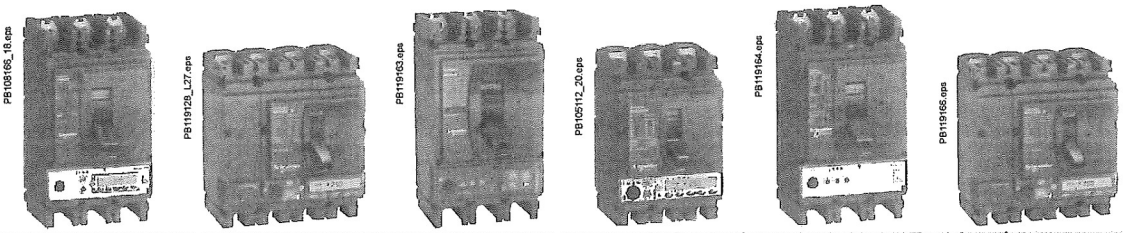
	Compact NSXm up to 160 A		Compact NSX up to 250 A	
				
	TM-D distribution	**Micrologic Vigi 4.1 Distribution and earth leakage protection**	**MA Distribution and motors**	**TM-D distribution TM-G generators**
				
Settings & indications	Pick-up set in amps using dials Non-adjustable time delay			
Front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

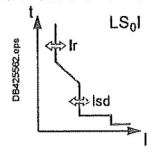
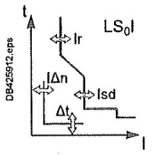
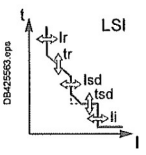
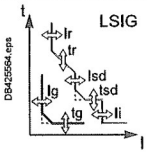
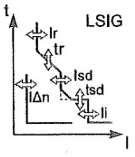
[1] Only for Micrologic 6 electronic.
[2] Only for Micrologic E.

Overview of trip units

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

Compact NSX up to 630 A



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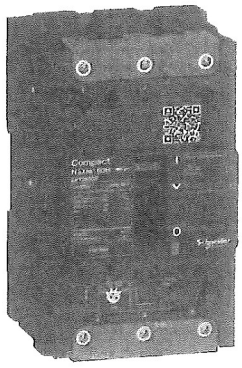
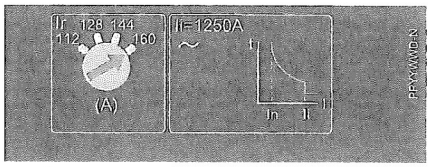
	◎	◎	◎	◎	◎
		◎			◎
	◎		◎	◎	
	◎		◎	◎	

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

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



Compact NSXm 160.



TM-D thermal-magnetic trip units

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

Protection

Thermal protection (Ir)

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

Magnetic protection (Im)

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

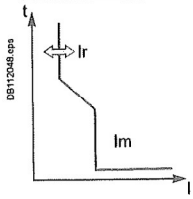
Protection versions

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

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

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

Thermal-magnetic trip units TM16D to 160D



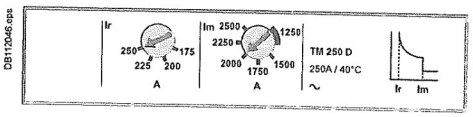
Ratings (A)	In at 40 °C [1]	16	25	32	40	50	63	80	100	125	160
Circuit breaker	Compact NSXm	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
Thermal protection											
Pick-up (A) tripping between 1.05 and 1.20 Ir	Ir = In x ...	adjustable in amps from 0.7 to 1 x In									
Time delay (s)	tr	non-adjustable									
Magnetic protection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

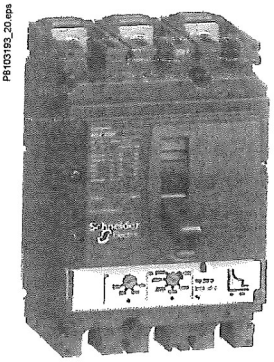
[1] If the circuit breakers are used in high-temperature environments, the setting must take into account the thermal limitations of the circuit breaker. See the temperature derating table.

B

Protection of distribution systems
Compact NSX TM thermal-magnetic and MA magnetic trip units

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





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

Thermal protection (Ir)

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

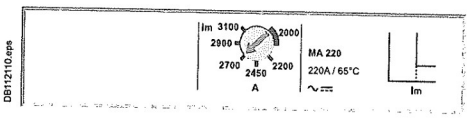
Magnetic protection (Im)

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

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

Protection versions

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



MA magnetic trip units

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

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

Protection

Magnetic protection (Im)

Short-circuit protection with an adjustable pick-up Im that initiates instantaneous tripping if exceeded.
- **Im = In x ...** set in amps on an adjustment dial covering the range 6 to 14 x In for 2.5 to 100 A ratings or 9 to 14 In for 150 to 220 A ratings.

Protection versions

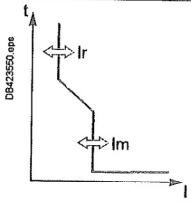
- 3-pole (3P 3D): 3-pole frame (3P) with detection on all 3 poles (3D).
- 4-pole (4P 3D): 4-pole frame (4P) with detection on 3 poles (3D).

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

Protection of distribution systems

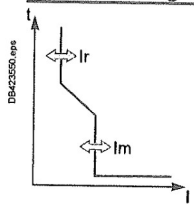
Compact NSX TM thermal-magnetic and MA magnetic trip units

Thermal-magnetic trip units TM16D to 250D



Ratings (A)	In at 40 °C [1]	16	25	32	40	50	63	80	100	125	160	200	250
Circuit breaker	Compact NSX100	◎	◎	◎	◎	◎	◎	◎	◎	-	-	-	-
	Compact NSX160	-	-	◎	◎	◎	◎	◎	◎	◎	◎	-	-
	Compact NSX250	-	-	-	-	-	◎	◎	◎	◎	◎	◎	◎
Thermal protection													
Pick-up (A) tripping between 1.05 and 1.20 Ir	Ir = In x ...	adjustable in amps from 0.7 to 1 x In											
Time delay (s)	tr	non-adjustable											
	tr at 1.5 x In	120 to 400											
	tr at 6 x Ir	15											
Magnetic protection													
Pick-up (A) accuracy ±20 %	Im	fixed											adjustable
	Compact NSX100	190	300	400	500	500	500	640	800				
	Compact NSX160/250	190	300	400	500	500	500	640	800	1250	1250		5 to 10xIn
Time delay	tm	fixed											
Neutral protection													
Unprotected neutral	4P 3D	no detection											
Fully protected neutral	4P 4D	1 x Ir											

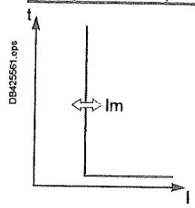
Thermal-magnetic trip units TM16G to 250G



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

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

Magnetic trip units MA 2.5 to 220



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

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

Protection of distribution systems
Overview of functions

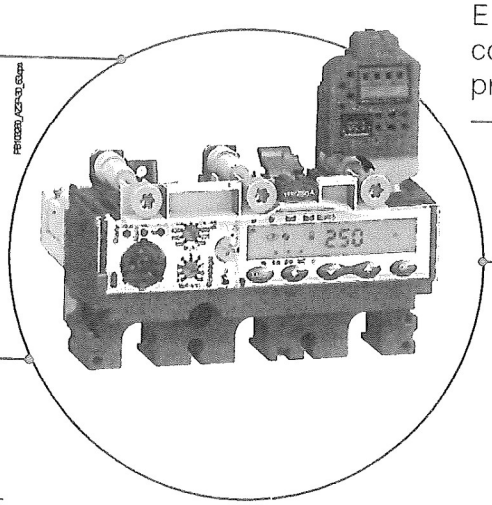
B

Measurement

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

Diagnostics & Maintenance

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



Protection

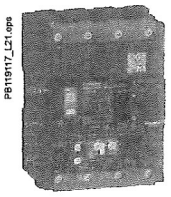
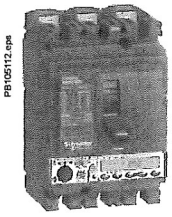
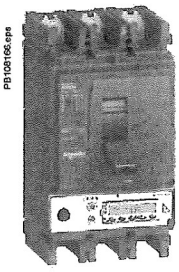
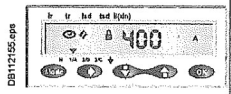
Micrologic 5 (LSI), 6 (LSIG) and 7 (LSIR) offer a large long time delay setting range (0.4 to 1 xIn) and protection accuracy for a wide temperature range (-25 to +70 C).

Communication

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

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

Understanding the names of Micrologic electronic trip units

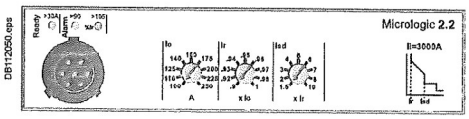
Example: Micrologic 6.3 E-M	6	3	E	M
	Protection	Frame	Measurements	Applications
	1: I 2: LS_0I 4: LS_0IR 5: LSI 6: LSIG **I**: Instantaneous **L**: Long time **R**: Residual current **S_0**: Short time [2] (fixed delay) **S**: Short time **G**: Ground fault	1: NSXm 16 to 160  2: NSX 100/160/250  3: NSX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

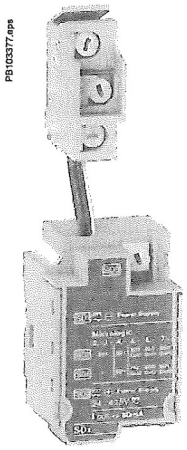
Examples				
Micrologic 1.3	Instantaneous only	400 or 630 A	-	Distribution
Micrologic 2.3	LS_0I	400 or 630 A	-	Distribution
Micrologic Vigi 4.1	LS_0IR	16 to 160 A	-	Distribution
Micrologic 5.2 A	LSI	100, 160 or 250 A	Ammeter	Distribution
Micrologic 6.3 E-M	LSIG	400 or 630 A	Energy	Motor

[1] AB-Z: except NSXm and NSX R, HB1, HB2.
[2] LS_0I protection is standard on Micrologic 2. To ensure selectivity, it offers short-time protection S_0 with a non-adjustable delay and instantaneous protection.

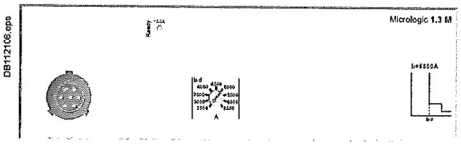
Protection of distribution systems
Compact NSX Micrologic 2 and 1.3 trip units

Micrologic 2 trip units can be used on Compact NSX100 to 630 circuit breakers with performance levels B/F/H/N/S/L/R/ HB1/HB2.
They provide:
- ■ standard protection of distribution cables
- ■ indication of:
- □ overloads (via LEDs)
- □ overload tripping (via the SDx relay module).





SDx remote indication relay module with its terminal block.



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

Micrologic 2

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

Protection

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

Overloads: Long time protection (Ir)

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

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

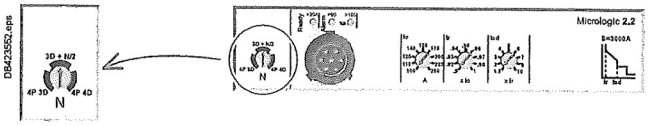
Protection with an adjustable pick-up Isd. Tripping takes place after a very short delay used to allow selectivity with the downstream device.

Short-circuits: Non-adjustable instantaneous protection

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

Neutral protection

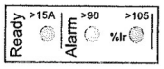
- ■ On 3-pole circuit breakers, neutral protection is not possible.
- ■ On four-pole circuit breakers, neutral protection may be set using a three-position switch:
- □ 4P 3D: neutral unprotected
- □ 4P 3D + N/2: neutral protection at half the value of the phase pick-up, i.e. 0.5 x Ir
- □ 4P 4D: neutral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



Indications

Front indications

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



Remote indications

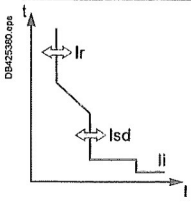
An overload trip signal can be remoted by installing an SDx relay module inside the circuit breaker.
This module receives the signal from the Micrologic electronic trip unit via an optical link and makes it available on the terminal block. The signal is cleared when the circuit breaker is reclosed. For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

Micrologic 1.3 M for magnetic protection only

Micrologic 1.3 M trip units provide magnetic protection only, using electronic technology. They are dedicated to 400/630 A 3-poles (3P 3D) circuit breakers or 4-pole circuit breakers with detection on 3 poles (4P, 3D) and are used in certain applications to replace switch-disconnectors at the head of switchboards. They are especially used in 3-poles versions for motor protection, see page B-30.

Protection of distribution systems
Compact NSX Micrologic 2 and 1.3 trip units

Micrologic 2



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

L Long-time protection

Pick-up (A) tripping between 1.05 and 1.20 Ir		Io	value depending on trip unit rating (In) and setting on dial							
	In = 40 A	Io =	18	18	20	23	25	28	32	36	40
	In = 100 A	Io =	40	45	50	55	63	70	80	90	100
	In = 160 A	Io =	63	70	80	90	100	110	125	150	160
	In = 250 A (NSX250)	Io =	100	110	125	140	160	175	200	225	250
	In = 250 A (NSX400)	Io =	70	100	125	140	160	175	200	225	250
	In = 400 A	Io =	160	180	200	230	250	280	320	360	400
	In = 630 A	Io =	250	280	320	350	400	450	500	570	630
	Ir = Io x ...		9 fine adjustment settings from 0.9 to 1 (0.9 - 0.92 - 0.93 - 0.94 - 0.95 - 0.96 - 0.97 - 0.98 - 1) for each value of Io							
Time delay (s) accuracy 0 to -20%	**tr**		non-adjustable							
		1.5 x Ir	400							
		6 x Ir	16							
		7.2 x Ir	11							
Thermal memory			20 minutes before and after tripping							

S Short-time protection with fixed time delay

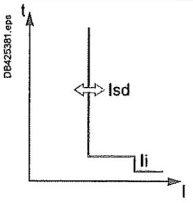
Pick-up (A) accuracy ±10 %	**Isd** = Ir x ...	1.5	2	3	4	5	6	7	8	10
Time delay (ms)	**tsd**	non-adjustable								
	Non-tripping time	20								
	Maximum break time	80								

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 for I > 1.5 Ii					

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

Micrologic 1.3 M



Ratings (A)	In at 65 °C [1]	320	500
Circuit breaker	Compact NSX400	◎	-
	Compact NSX630	◎	◎

S Short-time protection

Pick-up (A) accuracy ±15 %	**Isd**	Adjustable directly in amps	
		9 settings: 1600, 1920, 2240, 2560, 2880, 3200, 3520, 3840, 4160 A	9 settings: 2500, 3000, 3500, 4000, 4500, 5000, 5500, 6000, 6500 A
Time delay (ms)	**tsd**	Non-adjustable	
	Non-tripping time	10	
	Maximum break time	60	

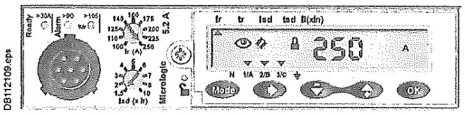
I Instantaneous protection

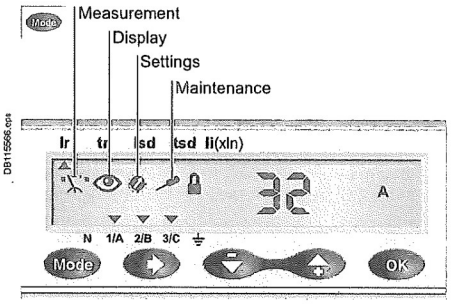
Pick-up (A) accuracy ±15 %	**Ii** non-adjustable	4800	6500
	Non-tripping time	0	
	Maximum break time	30 ms	

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

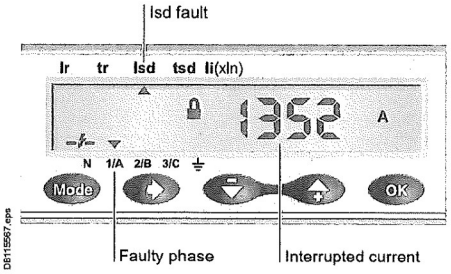
Protection of distribution systems
Compact NSX Micrologic 5 / 6 A or E trip units

Micrologic 5 / 6 A (Ammeter) or E (Energy) trip units can be used on Compact NSX100 to 630 circuit breakers with performance levels B/F/H/N/S/L/R/HB1/HB2. They all have a display unit.
They offer basic LSI protection (Micrologic 5) or LSI and ground-fault protection G (Micrologic 6).
They also offer measurement, alarm and communication functions.





Trip unit menus.



Display of interrupted current.

Protection

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

Overloads: Long time protection (Ir)

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

Short-circuits: Short-time protection (Isd)

Short-circuit protection with an adjustable pick-up **Isd** and adjustable time delay **tsd**, with the possibility of including a portion of an inverse time curve (I^2t On).

Short-circuits: Instantaneous protection (Ii)

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

Additional ground fault protection (Ig) on Micrologic 6

Residual type ground-fault protection with an adjustable pick-up **Ig** (with Off position) and adjustable time delay **tg**. Possibility of including a portion of an inverse time curve (I^2t On).

Neutral protection

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

Zone selective interlocking (ZSI)

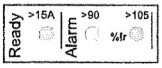
A ZSI terminal block may be used to interconnect a number of Micrologic control units to provide zone selective interlocking for short-time (Isd) and ground-fault (Ig) protection, without a time delay. For Compact NSX 100 to 250, the ZSI function is available only in relation to the upstream circuit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

Display of type of fault

On a fault trip, the type of fault (Ir, Isd, Ii, Ig), the phase concerned and the interrupted current are displayed. An external power supply is required.

Indications

Front indications



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

Remote indications

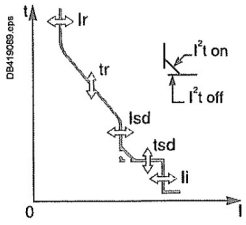
An SDx relay module installed inside the circuit breaker can be used to remotely access to the following information:
- overload trip
- overload prealarm (Micrologic 5) or ground fault trip (Micrologic 6).

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

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

Protection of distribution systems
Compact NSX Micrologic 5 / 6 A or E trip units

Protection Micrologic 5 / 6 A or E trip units



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

L Long-time protection

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

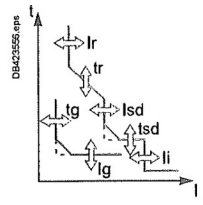
S Short-time protection with adjustable time delay

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

I Instantaneous protection

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

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

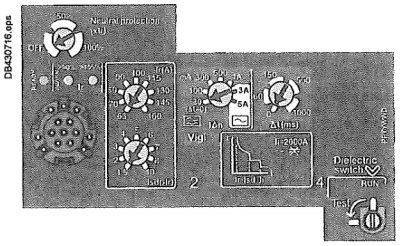


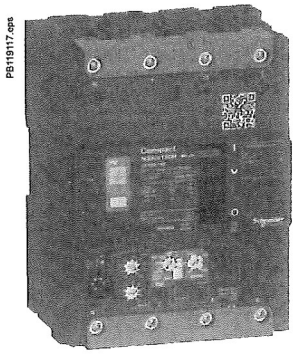
Pick-up (A) accuracy ±10 %	Ig = In x	dial setting										
		In = 40 A		0.4	0.4	0.5	0.6	0.7	0.8	0.9	1	Off
		In > 40 A		0.2	0.3	0.4	0.5	0.6	0.7	0.8	1	Off
				Fine adjustment in 0.05 A steps using the keypad								
Time delay (s)	tg = ...	keypad setting	I²Off	0	0.1	0.2	0.3	0.4				
			I²On	-	0.1	0.2	0.3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

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

Protection of distribution systems
Compact NSXm Micrologic Vigi 4.1 trip unit
with integrated earth leakage protection

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





Compact NSXm Micrologic Vgi 4.1.

Micrologic Vigi 4.1

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

Short-circuit and overload protection

Settings are made using the adjustment dials.

Overloads: Long time protection (Ir)

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

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

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

Short-circuits: Non-adjustable instantaneous protection

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

Neutral protection

- ■ On 3-pole circuit breakers, neutral protection is not possible.
- ■ On 4-pole circuit breakers, neutral protection may be set using a three-position switch:
- □ OFF: neutral unprotected
- □ 50 % [1]: neutral protection at half the value of the phase pick-up, i.e. 0.5 x Ir
- □ 100 %: neutral fully protected at Ir.

Earth leakage protection

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

Compliance with standards

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

Power supply

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

Sensitivity IΔn (A)

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

Intentional delay Δt (ms)

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

Operated voltage

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

Operating safety

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

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

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

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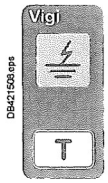
Protection of distribution systems
Compact NSXm Micrologic Vigi 4.1 trip unit
with integratedd earth leakage protection

Indications

Front indications

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



Alarming and fault differentiation

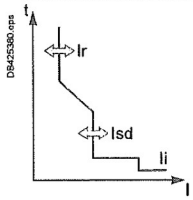
A side module SDx can be installed to provide alarming and fault differenciation:

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

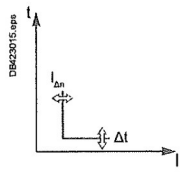
This module receives the signal from the Micrologic electronic trip unit via an optical link and makes it available on the terminal block through NO/NC dry contacts.
The signal is cleared when the circuit breaker is restarted.
For description, see page C-11.

B

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 for I > 1.5 Ii								
R Earth leakage protection											
Sensitivity $I_{\Delta n}$ (A)	Adjustable	$I_{\Delta n}$ =	0.03	0.1	0.3	0.5	1	3	5		
	Type		A and AC					AC			
Time delay Δt (ms)	Adjustable	Δt =	0	60 [2]	150 [2]	500 [2]	1000 [2]				
	Maximum break time (ms)		< 40	< 140	< 300	< 800	< 1500				



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

Protection of distribution systems
Compact NSX Micrologic Vigi 4 trip unit
with integrated earth leakage protection

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

B

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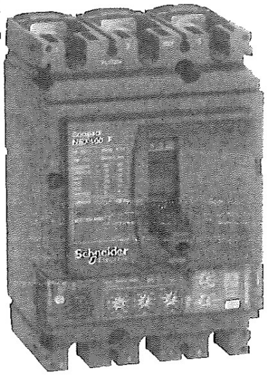
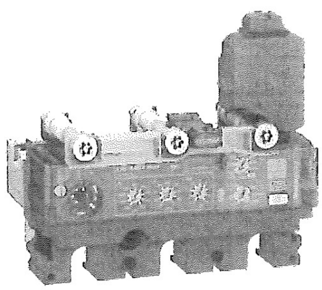


LV433803.eps



Micrologic Vigi 4 (LS$_0$IR).

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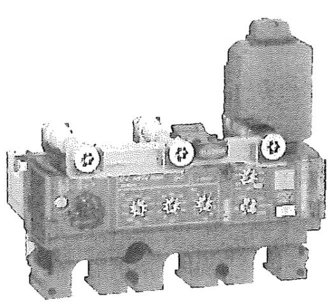


Micrologic Vigi 4 AL (LS$_0$I + Earth Leakage Alarm).

Micrologic Vigi 4
There are two versions of Micrologic Vigi 4:
- distribution protection including Earth Leakage Protection (LS$_0$IR)
- distribution protection including Earth Leakage Alarm (LS$_0$I + Earth Leakage Alarm).

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

Short circuit and overload protections
Overload: long-time protection (Ir)
Inverse time protection against overload with an adjustable current pick-up Ir set using a dial and a non-adjustable time delay tr.
Short-circuit: short-time protection with fixed time delay (Isd)
That protection is set with an adjustable pick-up Isd. The tripping takes place after a very short time used to allow selectivity with downstream devices.
Short circuit: non-adjustable instantaneous protection (with a fix pick-up)
Neutral protection
- On a 3-pole device, neutral protection is not possible
- On a 4-pole device, neutral protection may be set using the dedicated coding wheel to meet the following configurations: 4P 3D, 4P 3D + N/2 or 4P 4D (same as for Micrologic 2).

Earth leakage protections
Adjustable leakage threshold (IΔn) and adjustable time delay threshold (Dt) by using the two dials on the green area of the trip unit.
Power supply
The trip unit is self supplied, and so does not need any external source. It works even when fed by 2 phases only.
Sensitivity IΔn (A)
- Type A: 30mA - 100mA - 300mA - 500mA - 1A - 3A - 5A (for the ratings 40 to 250A)
- Type A: 300mA - 500mA - 1A - 3A - 5A - 10A (for the ratings 400 to 570A).

Caution: "OFF" setting of IΔn is possible. It cancels the earth leakage protection, in that case, the circuit breaker with Micrologic Vigi 4 behaves as a standard circuit breaker. That "OFF" position is located on the highest side of the coding wheel.
Intentional delay IΔt (s)
Case IΔn = 30mA: Δt 0 sec (whatever the setting)
Case IΔn > 30mA: Δt 0 – 60ms – 150ms – 500ms – 1sec (by setting)
Operated voltage
200 to 440 VAC (only) – 50/60 Hz
Operating safety
The earth leakage protection is a user safety device. It must be regularly tested using the test button (T) that simulates a real current leakage within the toroid. When IΔn is set on the OFF position, press the T will cancel any test.
As for standard circuit breaker, the circuit breaker with Micrologic Vigi 4 can be reset after any fault by operating an OFF/ON procedure.
Specific for the circuit breaker with Micrologic Vigi 4 Alarm (AL), after testing as well as after a real leakage fault, it can be reset by pressing more than 3 seconds the test button (T), to avoid switching OFF the device.

Protection of distribution systems
Compact NSX Micrologic Vigi 4 trip unit
with integrated earth leakage protection

Indications

Front indications

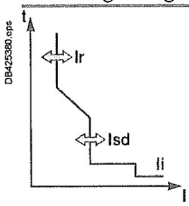
- Green "Ready" LED: flashes slowly when the circuit breaker is ready to trip in case of a fault.
- Orange overload pre-alarm LED: steady ON when I > 90% Ir.
- Red overload LED: steady ON when I > 105% Ir.
- Yellow Screen: indicates an earth leakage fault (reset when operating OFF/ON for the "trip" or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

Alarming and fault differentiation

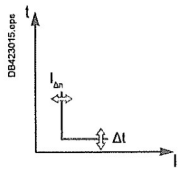
- An overload trip signal can be remotely available by installing an SDx relay module inside the circuit breaker on both "trip" and "alarm" versions.
- An earth leakage trip signal can be remotely available by installing an SDx module, only on the "trip" version.
- An earth leakage alarm signal (Micrologic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

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

Micrologic Vigi 4



Ratings (A)	In at 40 °C [1]		40	100	160	250	400	570			
Circuit breaker	Compact NSX100		◎	◎							
	Compact NSX160		◎	◎	◎						
	Compact NSX250		◎	◎	◎	◎					
	Compact NSX400						◎				
	Compact NSX630						◎	◎			
L Long-time protection											
Pick-up (A)		Io	value depending on the rating (In) and the dial setting								
tripping between 1.05 and 1.20 Ir	In = 40 A	Io =	18	18	20	23	25	28	32	36	40
	In = 100 A	Io =	40	45	50	55	63	70	80	90	100
	In = 160 A	Io =	63	70	80	90	100	110	125	150	160
	In = 250 A	Io =	100	110	125	140	160	175	200	225	250
	In = 400 A	Io =	160	180	200	230	250	280	320	360	400
	In = 570 A	Io =	250	280	320	350	400	450	500	570	570
	Ir = Io x		9 fine adjustment settings from 0.9 to 1 (0.9 – 0.92 ... 0.98 - 1)								
Time delay (s) accuracy 0 to -20%	tr		non-adjustable								
	at	1.5 x Ir	tr = 400 s								
	at	6 x Ir	tr = 16 s								
	at	7.2 x Ir	tr = 11 s								
Thermal memory			20 minutes before and after tripping								
S_D 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 for I > 1.5 x Ii								

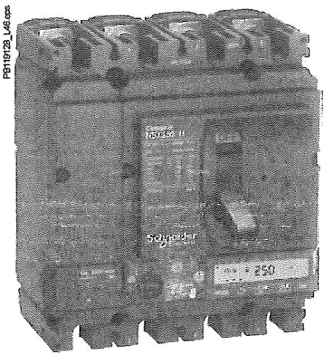


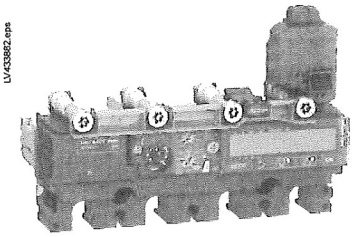
Earth leakage protection / Earth leakage alarm											
Sensitivity (A)	Type A, adjustable (9 positions)										
	In = 40 A	IΔn =	0.03	0.03	0.1	0.3	0.5	1	3	5	OFF
	In = 100 A	IΔn =	0.03	0.03	0.1	0.3	0.5	1	3	5	OFF
	In = 160 A	IΔn =	0.03	0.03	0.1	0.3	0.5	1	3	5	OFF
	In = 250 A	IΔn =	0.03	0.03	0.1	0.3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

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

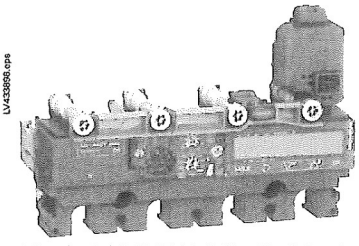
Protection of distribution systems
Compact NSX Micrologic Vigi 7 E trip unit
with integrated earth leakage protection

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





Micrologic Vigi 7 E (LSIR).



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

Micrologic Vigi 7 E

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

Locking Protection - Parameter Settings

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

Short circuit and overload protections

Overload: long time protection (Ir)

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

Short-circuit: short circuit protection (Isd)

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

Short circuit: Instantaneous protection (Ii)

Instantaneous protection with an adjustable protection pick-up Ii.

Neutral protection

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

Earth leakage protections

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

Power supply

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

Sensitivity IΔn (A)

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

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

Intentional delay IΔt (s)

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

Operated voltage

200 to 440 VAC (only) – 50/60 Hz

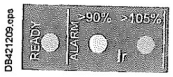
Operating safety

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

Display of the type of fault

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

Protection of distribution systems
Compact NSX Micrologic Vigi 7 E trip unit
with integrated earth leakage protection



Indications

Front indication

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

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

Alarming and fault differentiation

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

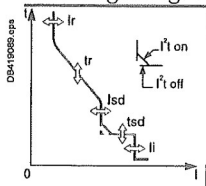
- Overload pre-Alarm
- Overload trip
- Earth leakage pre-alarm (useful for the "trip" version of the circuit breaker with Micrologic Vigi 7 E only)
- Earth leakage trip (exist for the "trip" version of thecircuit breaker with Micrologic Vigi 7 E only)
- Earth leakage Alarm without "trip" (circuit breaker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

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

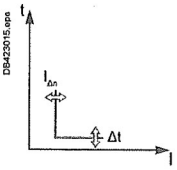
Protection of distribution systems

Compact NSX Micrologic Vigi 7 E trip unit with integrated earth leakage protection

Micrologic Vigi 7 E



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



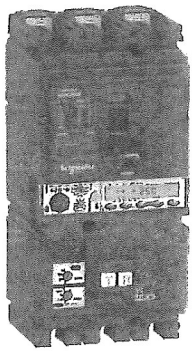
[1] For the use in high temperature environment, take into account the thermal limitation of the breaker.
[2] For the rating 40A, the N/2 adjustment is not possible
[3] The time delay (Δt) is mandatory and designed "Δt = 0" when the IΔn dial is set on 30mA (0.03). The time delay has no effect when the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

B

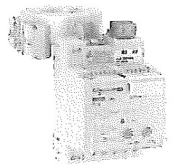
Protection of distribution systems
Compact NSX Vigi add-on protection against insulation faults

There are two ways to add earth-leakage protection to any three or four-pole Compact NSX100 to 630 circuit breaker equipped with a magnetic, thermal-magnetic or Micrologic 2, 5 or 6 trip unit:
- by adding a Vigi add-on to the circuit breaker
- by using a Vigirex relay and separate toroids.

B


PB105113.eps

Compact NSX Vigi add-on.


PB100436_SE.eps

Earth-leakage relay.


PB119226.eps

Separate toroids.

Circuit breaker with Vigi add-on

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

Circuit breaker combined with a Vigirex relay

Compact NSX circuit breaker + Vigirex relay

Vigirex relays may be used to add external earth-leakage protection to Compact NSX circuit breakers. The circuit breakers must be equipped with an MN or MX voltage release. The Vigirex relays add special tripping thresholds and time delays for earth-leakage protection.
Vigirex relays are very useful when faced with major installation constraints (circuit breaker already installed and connected, limited space available, etc.).

Vigirex-relay characteristics
- Sensitivity adjustable from 30 mA to 30 A and time-delay settings (0 to 4.5 seconds).
- Closed toroids up to 630 A (30 to 300 mm in diameter), opened toroids up to 250 A (80 to 120 mm in diameter) or rectangular sensors up to 630 A.
- 50/60 Hz distribution systems.

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

Compliance with standards
- IEC 60947-2, annex M.
- IEC/EN 60755: general requirements for residual-current operated protective devices.
- IEC/EN 61000-4-2 to 4-6: immunity tests.
- CISPR 11: Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement.
- UL1053 and CSA22.2 No. 144 for RH10, RH21 and RH99 relays at supply voltages up to and including 220/240 V.

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

Compact NSX Vigi add-on

Addition of the Vigi add-on does not modify circuit-breaker characteristics:
- compliance with standards
- degree of protection, class II front-face insulation
- positive contact indication
- electrical characteristics
- trip-unit characteristics
- installation and connection modes
- indication, measurement and control auxiliaries
- installation and connection accessories.

Dimensions and weights		NSX100/160/250	NSX400/630
Dimensions	3 poles	105 x 236 x 86	140 x 355 x 110
W x H x D (mm)	4 poles	140 x 236 x 86	185 x 355 x 110
Weight (kg)	3 poles	2.5	6.8
	4 poles	3.2	10.8

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

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

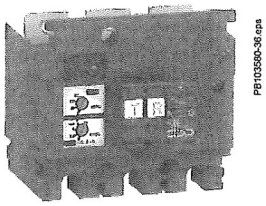
Use of 4-pole Vigi add-on with a 3-pole Compact NSX
In a 3-phase installation with an uninterrupted neutral, an accessory makes it possible to use a 4-pole Vigi add-on with connection of the neutral cable.

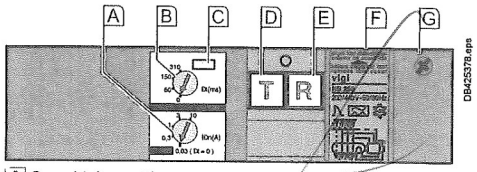
Power supply
Vigi add-on are self-powered internally by the distribution-system voltage and therefore do not require any external source. They continue to function even when supplied by only two phases.

Vigi add-on selection

Type	Vigi ME	Vigi MH	Vigi MB
Number of poles	3, 4 [1]	3, 4 [1]	3, 4 [1]
NSX100	◎	◎	-
NXS160	◎	◎	-
NSX250	-	◎	-
NSX400	-	-	◎
NSX630	-	-	◎
Protection characteristics			
Sensitivity	fixed	adjustable	adjustable
IΔn (A)	0.3	0.03 - 0.3 - 1 - 3 - 10	0.3 - 1 - 3 - 10 - 30
Time delay	fixed	adjustable	adjustable
Intentional delay (ms)	< 40	0 - 60 [2] - 150 [2] - 310 [2]	0 - 60 - 150 - 310
Max. break time (ms)	< 40	< 40 < 140 < 300 < 800	< 40 < 140 < 300 < 800
Rated voltage V AC 50/60 Hz	200...440	200... 440 - 440...550	200...440 - 440...550

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





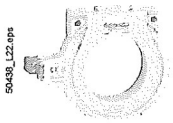
A Sensitivity setting
B Time-delay setting (for selective earth-leakage protection).
C Lead-seal fixture for controlled access to settings.
D Test button simulating an earth-fault for regular checks on the tripping function
E Reset button (reset required after earth-fault tripping).
F Rating plate
G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

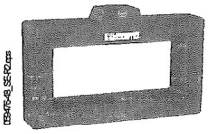
Plug-in devices
The Vigi add-on can be installed on a plug-in base. Special accessories are required (see catalogue number chapter).

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

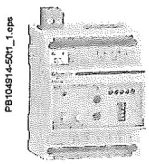
Protection of distribution systems
Compact NSX and NSXm add-on protection against insulation faults using a Vigirex relay

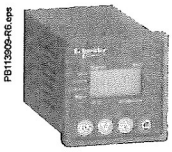
Detection
with associated toroid



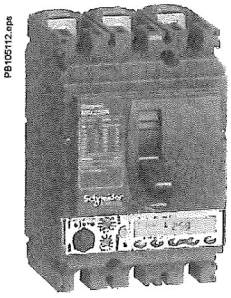


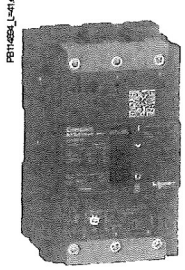
Alarm
with the Vigirex relay





Protection
with the circuit breaker





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

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

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

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

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

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

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

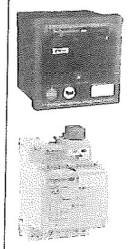
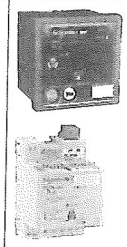
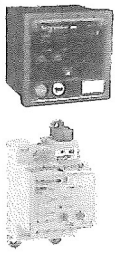
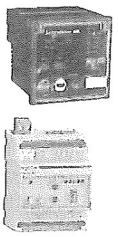
742

Protection of distribution systems
Compact NSX and NSXm add-on protection against insulation faults using a Vigirex relay

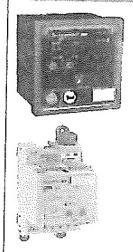
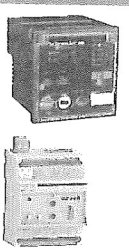
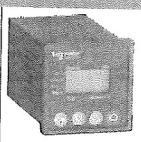
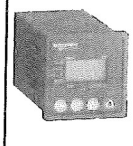
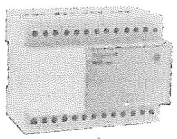
Developed to be suitable for all installation systems, the Vigirex range provides real simplicity of choice and assembly.

Overview of the Vigirex range

Protection relays

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

Monitoring relays | **Centralised monitoring relay**

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

Formats for all installation systems

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

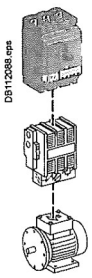
Installation system		Suitable format	
		Front-panel mount	**DIN rail**
Main LV switchboard		◎	
Power distribution switchboard	instrument zone	◎	
	modular-device zone		◎
Motor Control Centre (MCC)			◎ with clip-in toroid
Automatic control panel or machine panel			◎ with mounting lugs
Final distribution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

Compact NSX motor protection
General information on motor feeders

The parameters to be considered for motor-feeder protection depend on:
- the application (type of machine driven, operating safety, frequency of operation, etc.)
- the level of continuity of service required by the load or the application
- the applicable standards for the protection of life and property.

The required electrical functions are:
- isolation
- switching, generally at high endurance levels
- protection against overloads and short-circuits, adapted to the motor
- additional special protection.

A motor feeder must comply with the requirements of standard IEC 60947-4-1 concerning contactors and their protection:
- coordination of feeder components
- thermal-relay trip classes
- contactor utilisation categories
- coordination of insulation.



Motor-feeder function

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

Isolation

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

Switching

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

Basic protection

- Short-circuit protection

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

- Overload protection

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

Overloads: I < 10 x In
They are caused by:
- an electrical problem, related to an anomaly in the distribution system (e.g. phase failure, voltage outside tolerances, etc.)
- a mechanical problem, related to a process malfunction (e.g. excessive torque) or damage to the motor (e.g. bearing vibrations).

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

Impedant short-circuits: 10 x In < I < 50 x In
This type of short-circuit is generally due to deteriorated insulation of motor windings or damaged supply cables.

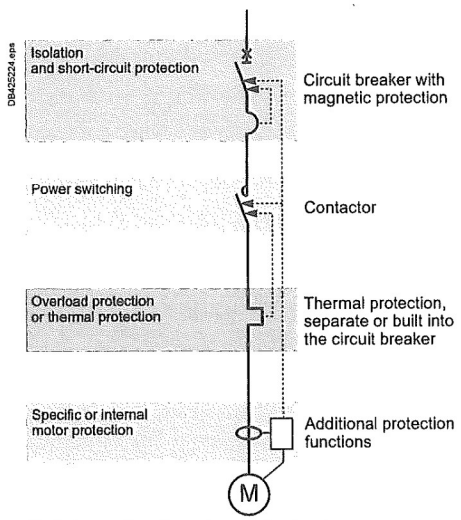
Short-circuits: I > 50 x In
This relatively rare type of fault may be caused by a connection error during maintenance.

- Phase unbalance or phase loss protection

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

Additional electronic protection

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



Switchgear functions in a motor feeder.

Motor-feeder solutions

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

Three devices
- Magnetic circuit breaker + contactor + thermal relay.

Two devices
- Thermal-magnetic circuit breaker + contactor.

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

Device coordination

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

Type 1 coordination
- No danger to life or property.
- The contactor and/or the thermal relay may be damaged.
- Repair and replacement of parts may be required prior to further service.

Type 2 coordination
- No danger to life or property.
- No damage or adjustments are allowed. The risk of contact welding is accepted as long as they can be easily separated.
- Isolation must be maintained after the incident, the motor feeder must be suitable for further use without repair or replacement of parts.
- A rapid inspection is sufficient before return to service.

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

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

Contactor utilisation categories

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

Contactor utilisation categories (AC current)

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

Utilisation category AC-3 - common coordination tables for circuit breakers and contactors

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

The circuit breaker-contactor coordination tables for Compact NSX are for use with contactors in the AC-3 utilisation category, in which case they ensure type 2 coordination.

Utilisation category AC-4 - possible oversizing

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

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

These difficult conditions make it necessary to oversize the contactor and, in general, the protective circuit breaker with respect to category AC-3.

Select your protection

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.

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 Ir [1]	1.2 Ir [1]	1.5 Ir [2]	7.2 Ir [1]
5	t > 2 h	t < 2h	t < 2 mn	2 s < t ≤ 5 s
10	t > 2 h	t < 2h	t < 4 mn	4 s < t ≤ 10 s
20	t > 2 h	t < 2h	t < 8 mn	6 s < t ≤ 20 s
30	t > 2 h	t < 2h	t < 12 mn	9 s < t ≤ 30 s

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

Currents of squirrel-cage motors at full rated load

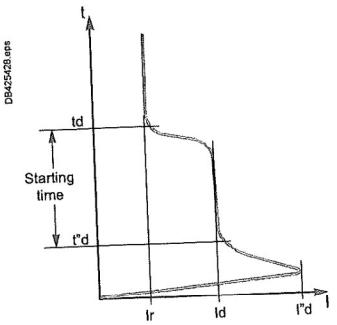
Standardised values in kW

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

Standardised values in HP

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

Note: 1 hp = 0.7457 kW.



Typical motor-starting curve

Asynchronous-motor starting parameters

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

- **Ir**: rated current
This is the current drawn by the motor at full rated load (e.g. approximately 100 A rms for 55 kW at 400 V).
- **Id**: starting current
This is the current drawn by the motor during starting, on average 7.2 In for a duration td of 5 to 30 seconds depending on the application (e.g. 720 A rms for 10 seconds). These values determine the trip class and any additional "long-start" protection devices that may be needed.
- **I"d**: peak starting current
This is the subtransient current during the first two half-waves when the system is energised, on the average 14 In for 10 to 15 ms (e.g. 1840 A peak).

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

Compact NSX motor circuit breakers are designed for motor-feeder solutions using:
- three devices, including an MA or 1.3 M magnetic-only trip unit
- two devices including a 2 M or 6 E-M electronic trip units.

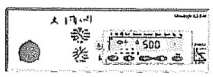
They are designed for use with contactors in the AC-3 utilisation category (80 % of all cases) and they ensure type 2 coordination with the contactor.
For the AC-4 utilisation category, the difficult conditions generally make it necessary to oversize the protection circuit breaker with respect to the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

Compact NSX motor-protection range

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

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

Two-device solutions
- 1 Compact NSX circuit breaker
- with a Micrologic 2.2 M or 2.3 M electronic trip unit
- with a Micrologic 6 E-M electronic trip unit. This version offers additional protection and Power Meter functions.
- 1 contactor.

Type of motor protection			3 devices		2 devices	
Compact NSX circuit breaker			**NSX100/160/250**	**NSX400/630**	**NSX100 to 630**	
	Type 2 coordination with		Contactor + thermal relay		Contactor	
Trip unit	Type		**MA**	**Micrologic 1.3 M**	**Micrologic 2 M**	**Micrologic 6 E-M**
	Technology		Magnetic	Electronic	Electronic	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					◎

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