Low Voltage

Compact NS

Circuit breakers and switch-disconnectors
from 630b to 3200 A

Catalogue
2011

Schneider Electric

Compact NS

Setting the standard, once again...

The launch of Schneider Electric Compact NS in 1994 revolutionised the world of moulded-case circuit breakers. Innovative, flexible and attractive, Compact NS rapidly set the standard in its field.

Today, Schneider Electric continues to innovate, extending the Compact NS range to high power ratings to offer a comprehensive and consistent range from 630b to 3200 A.

Equipped with the new generation of Micrologic control units, Compact NS630b to 3200 circuit breakers now offer built-in power and energy metering in addition to electrical measurement and analysis functions.

The communications option makes it possible to control power consumption, simplify maintenance and improve operating comfort. A wide range of optimised auxiliaries and accessories is also available to meet the needs of even more applications.

Compact NS, simply a step ahead...

Compact NS range

More than 10 years of techniques and technologies...

Inventor of the unique system-block concept, Schneider Electric proposes a range of circuit breakers to meet the concerns of panel builders and contractors. The result of 30 years of experience in the field of electrical distribution, the Compact NS range is still today the international reference on the moulded case circuit breaker market.

Consistency

The Compact NS range is available in 2 sizes only in order to homogenise installation dimensions, thus reducing switchboard dimensions and facilitating their installation: volume, depth, pole pitch and fastening points are the same for each size.

Efficiency

The Compact NS technology satisfies all your needs from 630b to 3200 A, with a breaking capacity from 50 to 200 kA.

Equipped with electronic control units, the Compact NS circuit breakers guarantee protection and measurement of your electrical installation.

Flexibility

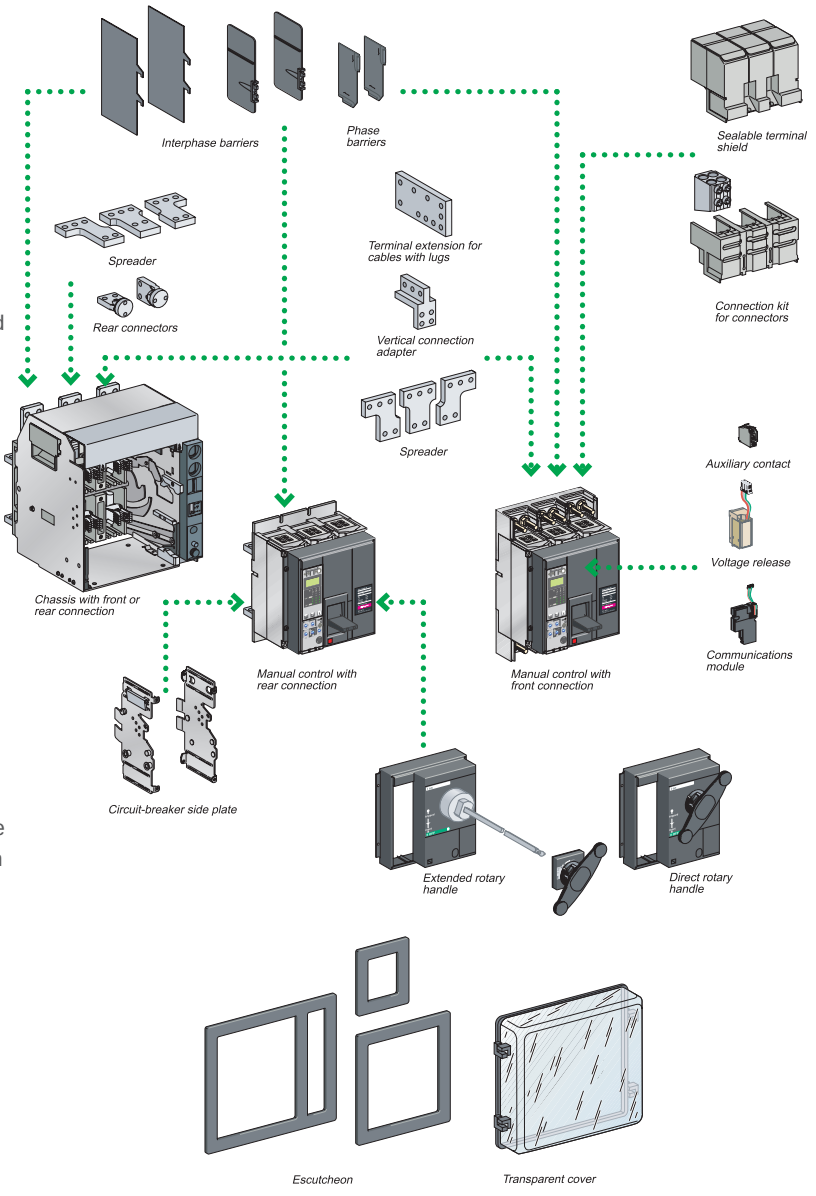
Compact NS adapts to all your applications: protection of AC installations, generator protection, motor protection, applications in 1000 V, switch-disconnectors, source changeover switches.

With Compact NS you have the choice.

Open-endedness

Compact NS evolves together with your installation: interchangeable trip units, standardised accessories, changing of rating without disassembling the device and addition of indication and control functions make Compact NS the most flexible solution on the market.

> Compact NS field installable devices



An answer for each type of solutions:

Marine

Airports

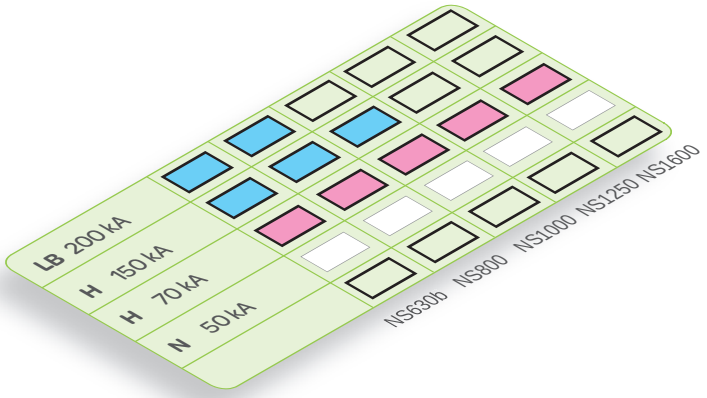
Oil and gas

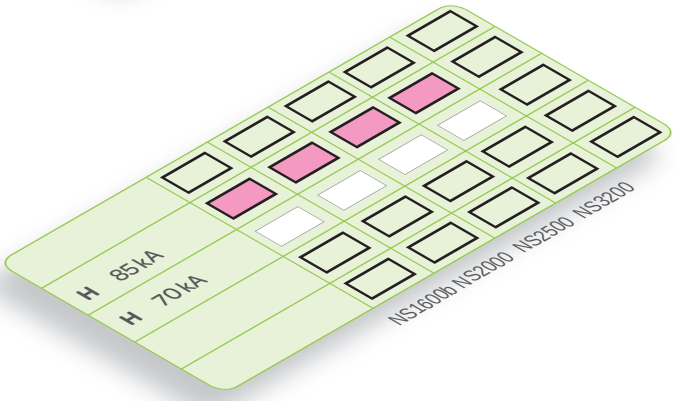
Wind mills

... ahead quite simply

The Compact NS range covers all ratings from 630b to 3200 A:

- Compact NS from 630b to 1600 A, fixed or withdrawable, front or rear connection, manual operating mechanism or motor mechanism.
  A new 200 kA performance now completes the Compact NS range.
- Compact NS from 1600 to 3200 A, fixed, front connection, with manual operating mechanism.





2 sizes:

from 630b to 3200 A

Compact NS630b to 1600

Compact NS1600b to 3200

Even in the hardest conditions,
Compact NS is the circuit breaker to choose





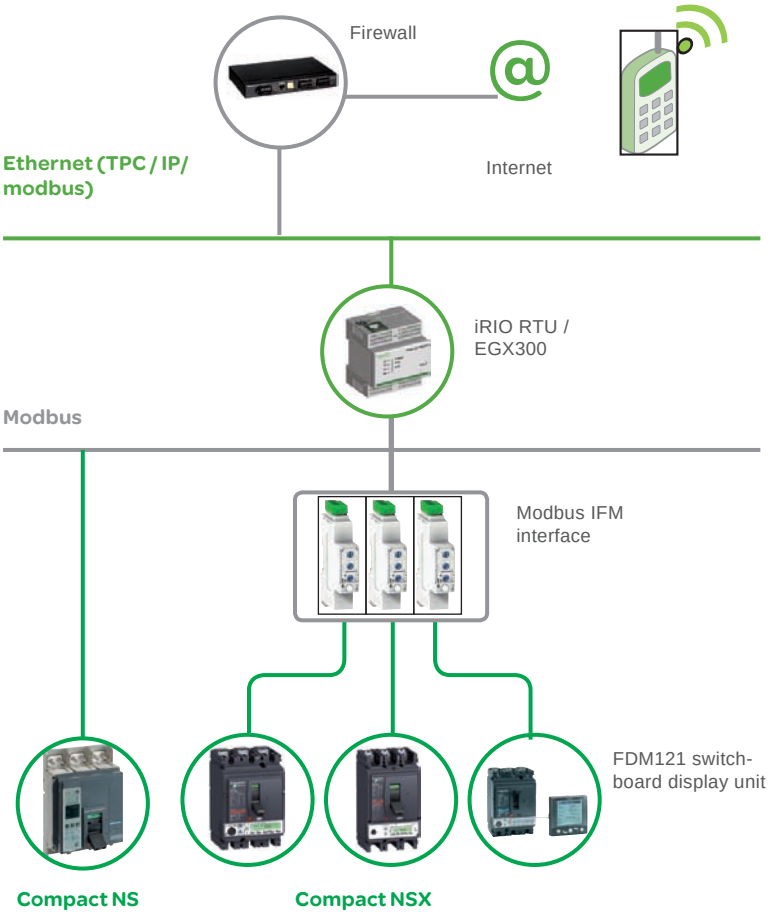
Compact NS range...

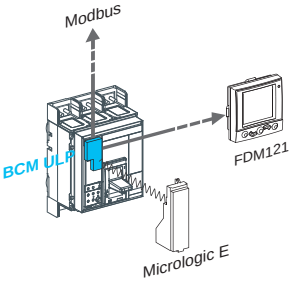
Optimising the management of your electrical installation

When equipped with a Micrologic types S, A, E or P, Compact NS can be integrated in a general supervision system to optimise installation operation and maintenance.

Alarms may be programmed for remote indications. Used with PowerLogic ION Enterprise software, you can exploit the electrical data (current, voltage, energy, frequency, power, and power quality) to optimise continuity of service and energy management:

- reduce energy and operations costs;
- improve power quality, reliability and uptime;
- optimise equipment use.





Module BCM ULP
Enables local and remote data access

EGX300 gateway-server or iRIO RTU
The EGX300 web-enabled gateway-server or the iRIO RTU (remote terminal unit) can both be used as Ethernet coupler for the PowerLogic System devices and for any other communicating devices operating under Modbus RS485 protocol. Data is viewable via a standard web browser.

PowerLogic ION Enterprise
PowerLogic ION Enterprise software is a complete power management solution for your facility or plant operations. It can be connected to Masterpact through Ethernet/Modbus protocol.

A solution for all application types: Compact NS and Compact NSX

Source changeover

The Compact range proposes interlocking solutions between two devices to perform the source changeover switch function.
As from 100 A, a motor mechanism ensures automatic replacement of the main source by a secondary source in order to ensure permanent availability of energy.

Applications are numerous: operating theatres, emergency lighting systems, computer rooms, bank security, etc.

Motor applications

Associated with specific control units, the Compact range ensures motor protection functions up to 750 kW, and includes a dedicated product, Compact NS80H-MA, for applications up to 37 kW.

DC applications

A specific range from 100 to 630 A with performance **up to 100 kA and 750 V** for battery or traction network type applications.

1000 V / 400 Hz applications

The Compact range **covers 1000 V / 400 Hz applications up to 630 A**: road and rail tunnels, mines, wind turbines (1000 V) and aircraft facilities (400 Hz).

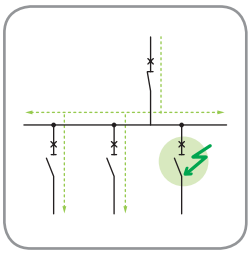
Building
- Hotels
- Hospitals
- Offices
- Retail

Data Centres and Networks

Industry
- Mining and minerals
- Automotive
- Food and beverage
- Chemical industry

Energy and Infrastructures
- Airports
- Oil and gas
- Water
- Electrical energy
- Marine

...for an installation with a longer service life



Total control of discrimination for optimum continuity of supply

The result of a technology that has since inspired all major manufacturers, Compact NS offers an unparalleled discrimination level on the electrical distribution market.

Fully incorporated in product design, discrimination is available as standard on all the range devices, without addition of any extra accessories.

Should a fault occur, only the circuit breaker placed immediately upstream from the fault trips.

Continuity of supply is thus guaranteed for the other feeders.

Highly immune protection system insensitive to disturbances for more reliable operation

Insensitive to external disturbances, the Compact NS range complies with the strictest requirements defined by standard IEC 60947-2 (Appendix F).

Devices are able to operate in their electromagnetic environment without generating disturbances that could result in loss of quality, create a malfunction or a failure in the electrical installation.

A comprehensive range of trip units and control units to combine measurement and protection

The trip unit becomes a genuine control unit for the Compact NS circuit breaker. It combines various types of measurement with various types of protection.

It measures accurately network parameters, immediately calculates values, memorises, logs, reports, communicates, acts, etc. It is both an extremely reliable protection device and an accurate measuring instrument.

With the Micrologic E, P and H power measurement and advanced protection functions are now available in the Compact NS range.

Electrical Energy

Industry

Building, shopping malls

Data centres and networks

Hospitals

All the guarantees of a leading brand

Certification

The reliability of the Compact NS range circuit breakers must be total.

Such reliability is obtained thanks to faultless quality at all stages, from design to operation, in complete compliance with international standards and local certification.

Tools for easy design

Full documentation, CAD software and a library are available to assist you in all stages of installation design.

Distribution and service network

With more than 5000 sales outlets in 130 countries, you are guaranteed to find world-wide the range of products complying with your needs and satisfying user country standards perfectly.

Environmentally friendly products

Schneider Electric commits itself to an environmental approach, manufacturing products in keeping with the requirements of European Directive RoHS (Restriction of Hazardous Substances) in non-polluting ISO 14001 certified manufacturing units.

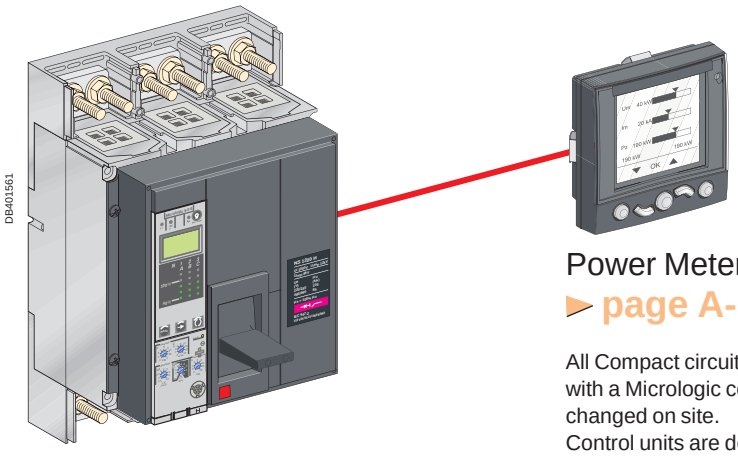

OFF
Quick View
Iavg 120 A
Uavg 374 V
Ptot 77 kW
Ep 14370 kWh
Esc
OFF
OFF
Quick View
Iavg 120 A
Uavg 374 V
Ptot 77 kW
Ep 14370 kWh
Esc

General contents

Compact NS, even more applications

Functions

They can be combined with the FDM121 switchboard display unit to provide all the functions of a Power Meter as well as operating assistance.



Power Meter
► page A-18

All Compact circuit breakers are equipped with a Micrologic control unit that can be changed on site.
Control units are designed to protect Power circuits and loads. Alarms may be programmed for remote indications.
In addition to protection functions, Micrologic S/A/E/P control units offer all the functions of Power Meter products as well as operating-assistance for the circuit breaker.

Operating assistance
► page A-20

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

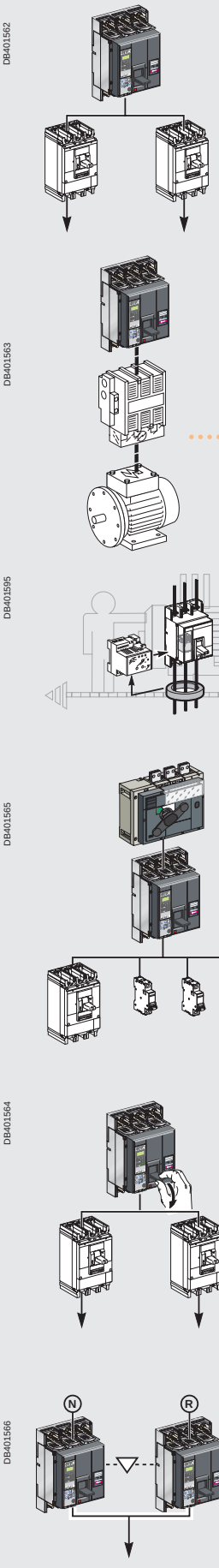
Switchboard display unit
► page A-21

The main measurements can be read on the built-in screen of Micrologic 2 / 5 / 6 trip units.
They can also be displayed on the FDM121 switchboard display unit along with pop-up windows signalling the main alarms.

Communication
► page A-28

Compact NS equipped with Micrologic 2 / 5 / 6 trip units provide communication capabilities. Breaker ULP cords connect to a Modbus interface module.

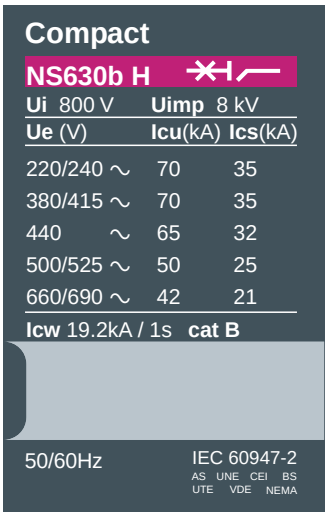
Applications



Protection of LV distribution systems ► page A-2	Protection for: ■ distribution systems supplied by transformers ■ distribution systems supplied by engine generator sets ■ long cables in IT and TN systems. Installation : ■ in power switchboards.	All circuit breakers in the Compact NS range offer positive contact indication and are suitable for isolation in compliance with standards IEC 60947-1 and 2.
Protection of motors feeders (AC 220/690 V) ► page A-35	When combined with a motor starter, Compact NS circuit breakers protect the cables and the starter against short-circuits. Equipped with an electronic trip unit, Compact NS circuit breakers also protect the cables, starter and motor against overloads.	The exceptional current-limiting capacity of Compact NS circuit breakers automatically ensures type-2 coordination with the motor starter, in compliance with standard IEC 60947-4-1.
Earth leakage ► page A-36	Additional earth-leakage protection protects life and property against the risks of faulty insulation in the installation.	Depending on the circuit breaker, earth-leakage protection is provided by: ■ using a specific Micrologic control unit ■ using a Vigirex relay and separate toroids.
Service connection	Compact NS service connection circuit breakers are specially designed for the service-connection function: ■ lead seals and locking systems ■ tripping curves certified by utilities ■ fast overload curves to limit the power supplied, etc.	Interpact INV switch-disconnectors offering visible break (see the corresponding catalogue) can be combined with Compact NS circuit breakers to constitute the various types of service connections and meet the needs of all installation configurations.
Control and isolation using switch-disconnectors ► page A-37	A switch-disconnector version of Compact NS circuit breakers exists for circuit control and isolation. All the additional functions may be combined with the basic switch-disconnector function, including: ■ earth-leakage protection ■ motor mechanism.	For information on other switch-disconnector ranges, see the Interpact (offering positive contact indication and visible break) and Fupact (fuse switch) catalogues.
Source changeover systems ► page A-44	To ensure a continuous supply of power, some electrical installations are connected to two power sources: ■ a normal source ■ a replacement source to supply the installation when the normal source is not available. A mechanical and/or electrical interlocking system between two circuit breakers or switch-disconnectors avoids all risk of parallel connection of the sources during switching.	A source-changeover system can be: ■ manual with mechanical device interlocking ■ remote controlled with mechanical and/or electrical device interlocking ■ automatic by adding a controller to manage switching from one source to the other on the basis of external parameters. *(See Source-changeover catalogue for dimensions, connections and electrical drawings).*

Introduction
General characteristics for NS630b to 3200 range

DB401560



Standardised characteristics indicated on the rating plate:

Ui:	*rated insulation voltage*
Uimp:	*rated impulse withstand voltage*
Icu:	*ultimate breaking capacity, for various values of the rated operational voltage Ue*
cat:	*utilisation category*
Icw:	*rated short-time withstand current*
Ics:	*service breaking capacity*
In:	*rated current*
	suitable for isolation

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

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

Pollution degree
Compact NS circuit breakers are certified for operation in pollution-degree 3 environments as defined by IEC standard 60947 (industrial environments).

Tropicalisation
Compact NS circuit breakers have successfully passed the tests prescribed by the following standards for extreme atmospheric conditions:
- ■ IEC 60068-2-1 - dry cold (-55 °C)
- ■ IEC 60068-2-2 - dry heat (+85 °C)
- ■ IEC 60068-2-30 - damp heat (95 % relative humidity at 55 °C)
- ■ IEC 60068-2-52 - salt mist (severity level 2).

Environmental protection
Compact NS circuit breakers take into account important concerns for environmental protection. Most components are recyclable and the parts of Compact NS630b to NS3200 circuit breakers are marked as specified in applicable standards.

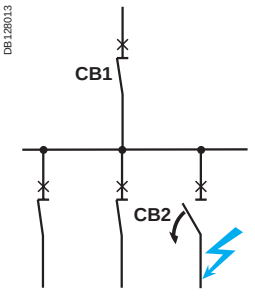
Ambient temperature
- ■ Compact NS circuit breakers may be used between -25 °C and +70 °C.

For temperatures higher than 40 °C (65 °C for circuit breakers used to protect motor feeders), devices must be derated as indicated in the documentation.
- ■ 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 NS circuit breakers in the original packing is -50 °C (1) to +85 °C.

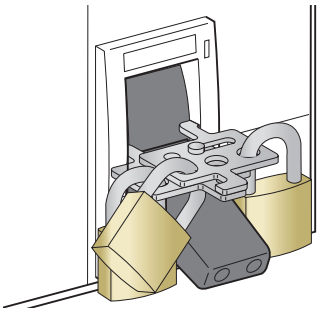
Discrimination
As standard, the Compact NS range ensures discrimination between two circuit breakers positioned in series in an installation.

DB128013



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

DB401831



Positive contact indication

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

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

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

The isolation function is certified by tests guaranteeing:

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

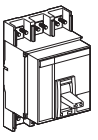
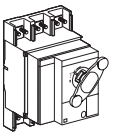
Installation in class II switchboards

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

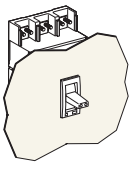
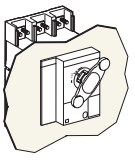
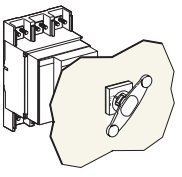
Degree of protection

As per standards IEC 60529 (IP degree of protection) and EN 50102 (IK degree of protection against external mechanical impacts).

Bare circuit breaker with terminal shields

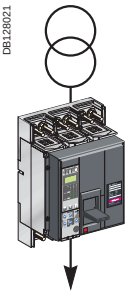
DB128015 	With toggle	IP40	IK07
DB128016 	With direct rotary handle standard / VDE	IP40	IK07

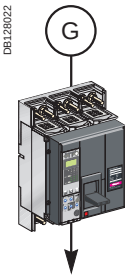
Circuit breaker installed in a switchboard

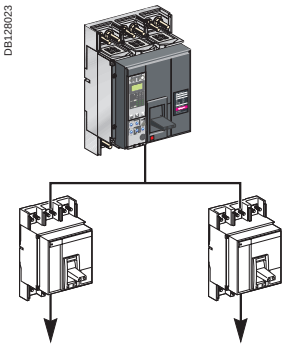
DB128017 	With toggle	IP40	IK07
DB128018 	With direct rotary handle standard / VDE MCC CNOMO	IP40 IP435 IP547	IK07
DB128019 	With extended rotary handle	IP55	IK08

Protection of distribution systems
Overview of solutions

Protection of distribution systems means protection of:
- systems supplied by a transformer
- systems supplied by an engine generator set
- long cables in IT and TN systems.







Power distribution

Selection of circuit breakers from 630 to 3200 A page A-2

Rated current (A)		250 … 630	320 … 800	400 … 1000	500… 1250	640… 1600
Compact		NS630b	NS800	NS1000	NS1250	NS1600
						
Breaking capacity (kA rms) 380/415 V	N	50	50	50	50	50
	H	70	70	70	70	70
	L	150	150	150	-	-
	LB	200	200	-	-	-

Rated current (A)		640 … 1600	800 ... 2000	1000 … 2500	1250 … 3200
Compact		NS1600b	NS2000	NS2500	NS3200
					
Breaking capacity (kA rms) 380/415 V	N	70	70	70	
	H	85	85	85	

Accompanying control units up to 3200 A page A-16

Micrologic electronic control units may be used on all Compact NS630b to NS3200 circuit breakers and can be changed on site.

Functions and characteristics
Contents

Protection of distribution systems

Compact NS circuit breakers from 630b up to 3200 A

PB104842

Compact NS800L.

PB104843

Compact NS2000H.

Compact circuit breakers

Number of poles				
Control	manual		toggle direct or extended rotary handle	
	electric			
Type of circuit breaker				
Connections	fixed		front connection rear connection front connection with bare cables	
	withdrawable (on chassis)		front connection rear connection	
Electrical characteristics as per Nema AB1				
Breaking capacity at 60 Hz (kA)				240 V 480 V 600 V
Electrical characteristics as per IEC 60947-2 and EN 60947-2				
Rated current (A)		**In**	50 °C 65 °C (1)	
Rated insulation voltage (V)		**Ui**		
Rated impulse withstand voltage (kV)		**Uimp**		
Rated operational voltage (V)		**Ue**	AC 50/60 Hz	
Type of circuit breaker				
Ultimate breaking capacity (kA rms)	**Manual**	**Icu**	AC 50/60 Hz	220/240 V 380/415 V 440 V 500/525 V 660/690 V
		Ics	AC 50/60 Hz	220/240 V 380/415 V 440 V 500/525 V 660/690 V
	Electrical	**Icu**	AC 50/60 Hz	220/240 V 380/415 V 440 V 500/525 V 660/690 V
		Ics	AC 50/60 Hz	220/240 V 380/415 V 440 V 500/525 V 660/690 V
Short-time withstand current (kA rms)		**Icw**	AC 50/60 Hz	1 s 3 s
Integrated instantaneous protection			kA peak ±10 %	
Suitability for isolation				
Utilisation category				
Durability (C-O cycles)	mechanical			
	electrical		440 V	In/2 In
			690 V	In/2 In
Pollution degree				

(1) 65 °C with vertical connections. See the temperature derating tables for other types of connections.
(2) Ics: 100 % Icu for breaking capacity 440V/500V/660V
Ics: 75 % Icu for breaking capacity 220V/380V.

	NS630b		NS800		NS1000			NS1250		NS1600		NS1600b		NS2000	NS2500	NS3200
	3, 4				3, 4			3, 4		3, 4		3, 4				
	■				■			■		■		■				
	■				■			■		■		-				
	■ (except LB)				■			■		■		-				
	N	**H**	**L**	**LB**	**N**	**H**	**L**	**N**	**H**	**N**	**H**	**N**	**H**			
	■	■	■	-	■	■	■	■	■	■	■	■	■			
	■	■	■	■	■	■	■	■	■	■	■	-	-			
	■	■	-	-	■	■	-	■	■	-	-	-	-			
	■	■	■	■	■	■	■	■	■	■	■	-	-			
	■	■	■	■	■	■	■	■	■	■	■	-	-			
	N	**H**	**L**	**LB**	**N**	**H**	**L**	**N**	**H**	**N**	**H**	**N**	**H**			
	50	65	125	200	50	65	125	50	65	50	65	85	125			
	35	50	100	200	35	50	100	35	50	35	50	65	85			
	25	50	-	100	25	50	-	25	50	25	50	50	-			
	630		800		1000			1250		1600		1600		2000	2500	3200
	630		800		1000			1250		1510		1550		1900	2500	2970
	800				800			800		800		800				
	8				8			8		8		8				
	690				690			690		690		690				
	N	**H**	**L**	**LB**	**N**	**H**	**L**	**N**	**H**	**N**	**H**	**N**	**H**			
	85	85	150	200	85	85	150	85	85	85	85	85	125			
	50	70	150	200	50	70	150	50	70	50	70	70	85			
	50	65	130	200	50	65	130	50	65	50	65	65	85			
	40	50	100	100	40	50	100	40	50	40	50	65	-			
	30	42	-	75	30	42	-	30	42	30	42	65	-			
	50	52	150	200	50	52	150	50	52	37	37	65	94			
	50	52	150	200	50	52	150	50	52	37	37	52	64			
	50	48	130	200	50	48	130	50	48	25	32	65	64			
	40	37	100	100	40	37	100	40	37	20	25	65	-			
	30	31	-	75	30	31	-	30	31	15	21	65	-			
	50	70	150	-	50	70	150	50	70	50	70	-				
	50	70	150	-	50	70	150	50	70	50	70					
	50	65	130	-	50	65	130	50	65	50	65					
	40	50	100	-	40	50	100	40	50	40	50					
	30	42	-	-	30	42	-	30	42	30	42					
	37	35	150	-	37	35	150	37	35	37	35	-				
	37	35	150	-	37	35	150	37	35	37	35					
	37	32	130	-	37	32	130	37	32	37	32					
	30	25	100	-	30	25	100	30	25	30	25					
	22	21	-	-	22	21	-	22	21	22	21					
	19.2	19.2	-	-	19.2	19.2	-	19.2	19.2	19.2	19.2	-				
	-	-	-	-	-	-	-	-	-	-	-	32				
	40	40	-	-	40	40	-	40	40	40	40	130				
	■				■			■		■		■				
	B	B	A	A	B	B	A	B	B	B	B	B				
	10000				10000			10000		10000		5000				
	6000	6000	4000	4000	6000	6000	4000	5000		5000		3000				
	5000	5000	3000	3000	5000	5000	3000	4000		2000		2000				
	4000	4000	3000	3000	4000	4000	3000	3000		2000		2000				
	2000	2000	2000	2000	2000	2000	2000	2000		1000		1000				
	3				3			3		3		3				

Protection of distribution systems

Compact NS circuit breakers from 630b up to 3200 A

Compact circuit breakers		
Protection and measurements		
Interchangeable control units		
Overload protection	long time	**Ir** (In x …)
Short-circuit protection	short time	**Isd** (Ir x …)
	instantaneous	**Ii** (In x …)
Earth-fault protection		**Ig** (In x …)
Residual earth-leakage protection		**IΔn**
Zone selective interlocking		**ZSI**
Protection of the fourth pole		
Current measurements		
Power measurements		
Advanced protection		
Quick view		
Remote communication by bus		
Device-status indication		
Device remote operation (2)		
Transmission of settings		
Indication and identification of protection devices and alarms		
Transmission of measured current values		

Compact circuit breakers		
Additional indication and control auxiliaries		
Indication contacts		
Voltage releases	MX shunt release/MN undervoltage release	
Installation		
Accessories	terminal extensions and spreaders terminal shields and interphase barriers escutcheons	
Dimensions fixed devices, front connections (mm) H x W x D		3P 4P
Weight fixed devices, front connections (kg)		3P 4P
Source changeover system (see section on "source changeover systems")		
Manual, remote-operated and automatic source changeover systems		

(1) Except 1600b-3200.
(2) With NS630b...NS1600, remote operation is possible with electrically operated device. With NS1600...NS3200, remote operation is not possible.

	NS630b		NS800		NS1000		NS1250		NS1600		NS1600b		NS2000		NS2500		NS3200	
Micrologic																		
	2.0	5.0	6.0		2.0 A	5.0 A	6.0 A		7.0 A		2.0 E	5.0 E	6.0E		5.0 P (1)	6.0 P (1)	7.0 P (1)	
	■	■	■		■	■	■		■		■	■	■		■	■	■	
	-	■	■		-	■	■		■		-	■	■		■	■	■	
	■	■	■		■	■	■		■		■	■	■		■	■	■	
	-	-	■		-	-	■		-		-	-	■		-	■	-	
	-	-	-		-	-	-		■		-	-	-		-	-	■	
	-	-	-		■	■	■		■		■	■	■		■	■	■	
	■	■	■		■	■	■		■		■	■	■		■	■	■	
	-	-	-		■	■	■		■		■	■	■		■	■	■	
	-	-	-		-	-	-		-		■	■	■		■	■	■	
	-	-	-		-	-	-		-		-	-	-		■	■	■	
	-	-	-		-	-	-		-		■	■	■		-	-	-	
	■	■	■		■	■	■		■		■	■	■		■	■	■	
	■	■	■		■	■	■		■		■	■	■		■	■	■	
	-	-	-		■	■	■		■		■	■	■		■	■	■	
	-	-	-		■	■	■		■		■	■	■		■	■	■	
	-	-	-		■	■	■		■		■	■	■		■	■	■	

	NS630b	NS800	NS1000	NS1250	NS1600	NS1600b	NS2000	NS2500	NS3200
	■					■			
	■					■			
	■					-			
	■					■			
	■					■			
	327 x 210 x 147					350 x 420 x 160			
	327 x 280 x 147					350 x 535 x 160			
	14					24			
	18					36			
	■					-			

Micrologic control units
Overview of functions

All Compact circuit breakers are equipped with a Micrologic control unit that can be changed on site. Control units are designed to protect Power circuits and loads. Alarms may be programmed for remote indications.
Measurements of current, voltage, frequency, power and power quality optimise continuity of service and energy management.

Dependability
Integration of protection functions in an ASIC electronic component used in all Micrologic control units guarantees a high degree of reliability and immunity to conducted or radiated disturbances.
On Micrologic A, E and P control units, advanced functions are managed by an independent microprocessor.

Accessories
Certain functions require the addition of Micrologic control unit accessories, described on page A-27.
The rules governing the various possible combinations can be found in the documentation accessible via the Products and services menu of the www.schneider-electric.com web site.

Micrologic name codes

2.0 E
X Y Z

X: type of protection
- 2 for basic protection
- 5 for selective protection
- 6 for selective + earth-fault protection
- 7 for selective + earth-leakage protection.

Y: control-unit generation
Identification of the control-unit generation.
“0” signifies the first generation.

Z: type of measurement
- A for “ammeter”
- E for “energy”
- P for “power meter”

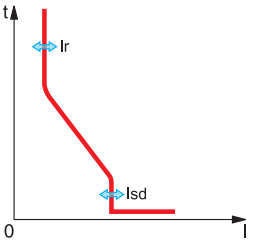
PB100772-32

PB106351A32

Current protection

Micrologic 2: basic protection

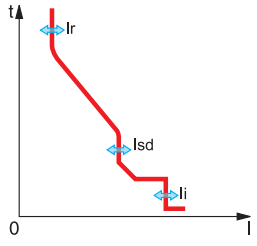
DB128024



Protection:
long time
+ instantaneous

Micrologic 5: selective protection

DB128025

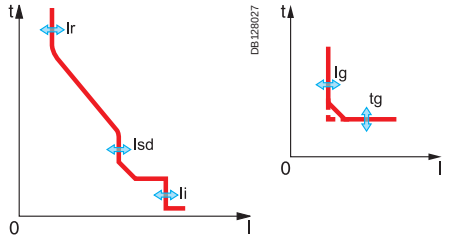


Protection:
long time
+ short time
+ instantaneous

Micrologic 6: selective + earth-fault protection

DB128025

DB128027

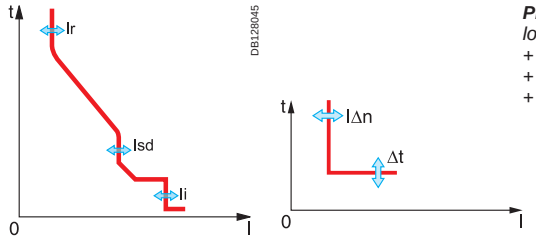


Protection:
long time
+ short time
+ instantaneous
+ earth fault

Micrologic 7: selective + earth-leakage protection 6: selective + earth-fault protection

DB128025

DB128045



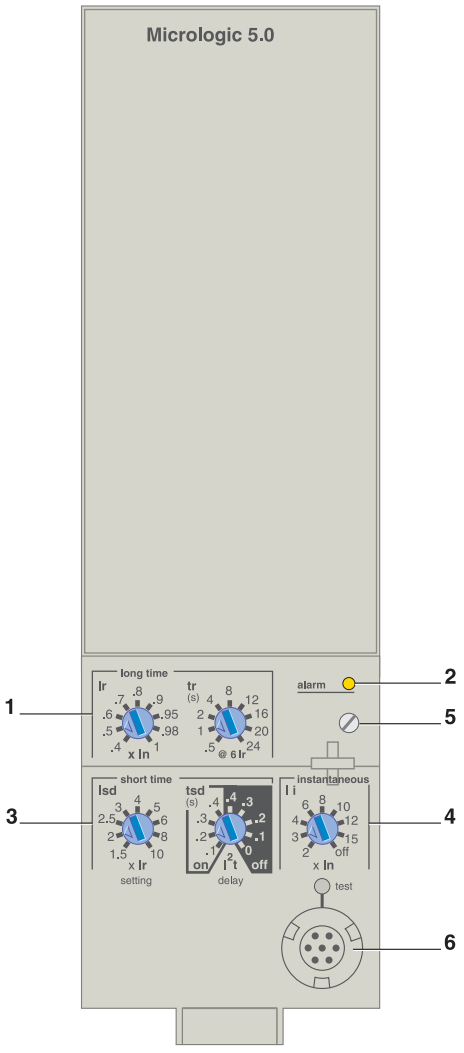
Protection:
long time
+ short time
+ instantaneous
+ earth leakage up to 3200A

Micrologic without measurement	Measurements and programmable protection		
	A: ammeter ■ I_1, I_2, I_3, I_N, $I_{earth-fault}$, $I_{earth-leakage}$ and maximeter for these measurements ■ fault indications ■ settings in amperes and in seconds.		
		E: Energy ■ incorporates all the rms measurements of Micrologic A, plus voltage, power factor, power and energy metering measurements. □ calculates the current demand value □ "Quickview" function for the automatic cyclical display of the most useful values (as standard or by selection).	**P: A + power meter + programmable protection** ■ measurements of V, A, W, VAR, VA, Wh, VARh, VAh, Hz, V_{peak}, A_{peak}, power factor and maximeters and minimeters ■ IDMTL long-time protection, minimum and maximum voltage and frequency, voltage and current imbalance, phase sequence, reverse power ■ load shedding and reconnection depending on power or current ■ measurements of interrupted currents, differentiated fault indications, maintenance indications, event histories and time-stamping, etc.
2.0 DB112837 	**2.0 A** DB112829 	**2.0 E** DB112830 	
5.0 DB112837 	**5.0 A** DB128299 	**5.0 E** DB128306 	**5.0 P** DB128308 
6.0 DB128286 	**6.0 A** DB128300 	**6.0 E** DB128307 	**6.0 P** DB128309 
	7.0 A DB128301 		**7.0 P** db128321 

Micrologic control units
For Compact NS630b to 3200

Micrologic 2.0, 5.0 and 6.0 control units protect power circuits. Micrologic 5.0 and 6.0 offers time discrimination for short-circuits as well.

DB128030



1 long-time threshold and tripping delay
2 overload alarm (LED)
3 short-time pick-up and tripping delay
4 instantaneous pick-up
5 fixing screw for long-time rating plug
6 test connector

Protection
Protection thresholds and delays are set using the adjustment dials.

Overload protection
True rms long-time protection.
Thermal memory: thermal image before and after tripping.
Setting accuracy may be enhanced by limiting the setting range using a different long-time rating plug.
Overload protection can be cancelled using a specific LT rating plug "Off".

Short-circuit protection
Short-time (rms) and instantaneous protection.
Selection of I^2t type (ON or OFF) for short-time delay.

Earth-fault protection
Residual or source ground return earth fault protection.
Selection of I^2t type (ON or OFF) for delay.

Neutral protection
On three-pole circuit breakers, neutral protection is not possible.
On four-pole circuit breakers, neutral protection may be set using a three-position switch: neutral unprotected (4P 3d), neutral protection at 0.5 Ir (4P 3d + N/2) or neutral protection at Ir (4P 4d).

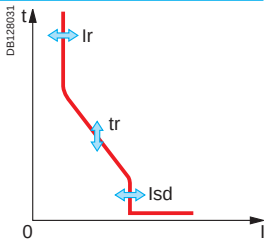
Indications
Overload indication by alarm LED on the front; the LED goes on when the current exceeds the long-time trip threshold.

Test
A mini test kit or a portable test kit may be connected to the test connector on the front to check circuit-breaker operation after installing the trip unit or accessories.

Note.
Micrologic control units are equipped with a transparent lead-seal cover as standard.

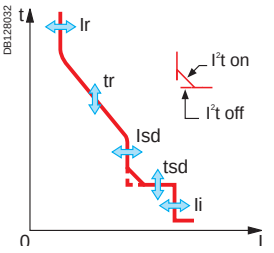
Protection — Micrologic 2.0

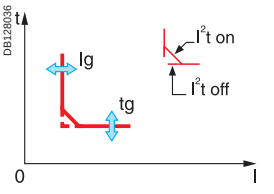
Long time												
Current setting (A)	**Ir** = In x …		0.4	0.5	0.6	0.7	0.8	0.9	0.95	0.98	1
tripping between 1.05 and 1.20 x Ir			other ranges or disable by changing long-time rating plug								
Time setting		t_r (s)	0.5	1	2	4	8	12	16	20	24
Time delay (s)	accuracy: 0 to -30 %	1.5 x Ir	12.5	25	50	100	200	300	400	500	600
	accuracy: 0 to -20 %	6 x Ir	0.7 (1)	1	2	4	8	12	16	20	24
	accuracy: 0 to -20 %	7.2 x Ir	0.7 (2)	0.69	1.38	2.7	5.5	8.3	11	13.8	16.6
Thermal memory			20 minutes before and after tripping								
(1) 0 to -40 % - (2) 0 to -60 %											
Instantaneous											
Pick-up (A)	**Isd** = Ir x …		1.5	2	2.5	3	4	5	6	8	10
accuracy: ±10 %											
Time delay			max. resettable time: 20 ms; max break time: 80 ms								



Protection — Micrologic 5.0 / 6.0

Long time											
Current setting (A)	**Ir** = In x …		0.4	0.5	0.6	0.7	0.8	0.9	0.95	0.98	1
Tripping between 1.05 and 1.20 x Ir			Other ranges or disable by changing long-time rating plug								
Time setting		**tr (s)**	0.5	1	2	4	8	12	16	20	24
Time delay (s)	Accuracy: 0 to -30 %	1.5 x Ir	12.5	25	50	100	200	300	400	500	600
	Accuracy: 0 to -20 %	6 x Ir	0.7(1)	1	2	4	8	12	16	20	24
	Accuracy: 0 to -20 %	7.2 x Ir	0.7(2)	0.69	1.38	2.7	5.5	8.3	11	13.8	16.6
Thermal memory			20 minutes before and after tripping								
(1) 0 to -40 % - (2) 0 to -60 %											
Short time											
Pick-up (A)	**Isd** = Ir x …		1.5	2	2.5	3	4	5	6	8	10
Accuracy: ±10 %											
Time setting tsd (s)	Settings	I^2t Off	0	0.1	0.2	0.3	0.4				
		I^2t On	-	0.1	0.2	0.3	0.4				
Time delay (ms) at 10 x Ir	**tsd** (max resettable time)		20	80	140	230	350				
(I^2t Off or I^2t On)	**tsd** (max break time)		80	140	200	320	500				
Instantaneous											
Pick-up (A)	**Ii** = In x …		2	3	4	6	8	10	12	15	off
Accuracy: ±10 %											
Time delay			Max resettable time: 20 ms Max break time: 50 ms								
Earth fault			**Micrologic 6.0**								
Pick-up (A)	**Ig** = In x …		A	B	C	D	E	F	G	H	J
Accuracy: ±10 %	In ⩽ 400 A		0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
	400 A < In < 1250 A		0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
	In ⩾ 1250 A		500	640	720	800	880	960	1040	1120	1200
Time setting tg (s)	Settings	I^2t Off	0	0.1	0.2	0.3	0.4				
		I^2t On	-	0.1	0.2	0.3	0.4				
Time delay (ms)	**tg** (max resettable time)		20	80	140	230	350				
at In or 1200 A (I^2t Off or I^2t On)	**tg** (max break time)		80	140	200	320	500				

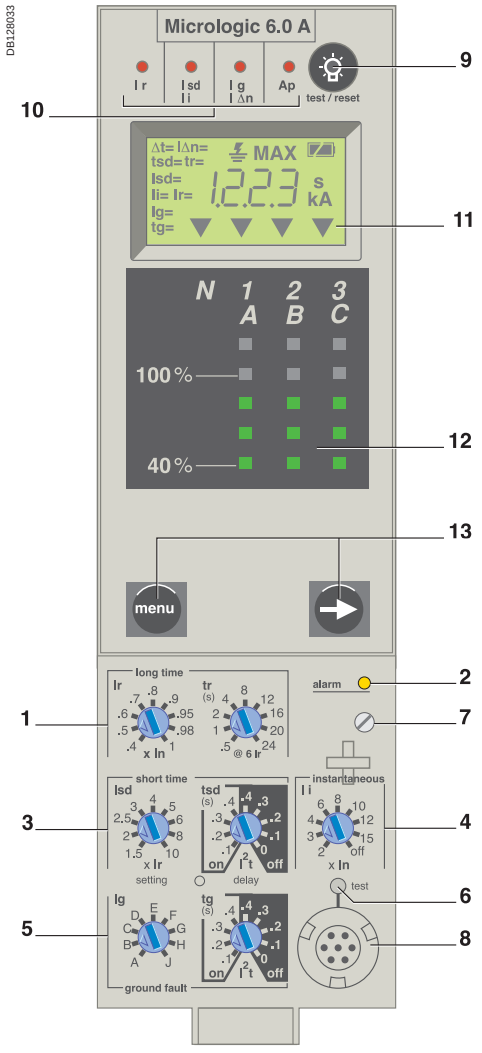




Note: *all current-based protection functions require no auxiliary source.*
The test / reset button resets maximeters, clears the tripping indication and tests the battery.

Micrologic control units
Micrologic A "ammeter"

Micrologic A control units protect power circuits. They also offer measurements, display, communication and current maximeters. Version 6 provides earth-fault protection, version 7 provides earth-leakage protection.



1 *long-time threshold and tripping delay*
2 *overload alarm (LED) at 1.125 Ir*
3 *short-time pick-up and tripping delay*
4 *instantaneous pick-up*
5 *earth-leakage or earth-fault pick-up and tripping delay*
6 *earth-leakage or earth-fault test button*
7 *long-time rating plug screw*
8 *test connector*
9 *lamp test, reset and battery test*
10 *indication of tripping cause*
11 *digital display*
12 *three-phase bargraph and ammeter*
13 *navigation buttons*

"Ammeter" measurements
Micrologic A control units measure the true (rms) value of currents.
They provide continuous current measurements from 0.2 to 1.2 In and are accurate to within 1.5 % (including the sensors).
A digital LCD screen continuously displays the most heavily loaded phase (Imax) or displays the I_1, I_2, I_3, I_N, I_g,$I\Delta_n$, stored-current (maximeter) and setting values by successively pressing the navigation button.
The optional external power supply makes it possible to display currents < 20 % In. Below 0.1 In, measurements are not significant. Between 0.1and 0.2 In, accuracy changes linearly from 4 % to 1.5 %.

Communication option
In conjunction with the COM communication option, the control unit transmits the following:
- settings
- all “ammeter” measurements
- tripping causes
- maximeter readings.

Protection
Protection thresholds and delays are set using the adjustment dials.

Overload protection
True rms long-time protection.
Thermal memory: thermal image before and after tripping.
Setting accuracy may be enhanced by limiting the setting range using a different long-time rating plug.
Overload protection can be cancelled using a specific LT rating plug "Off".

Short-circuit protection
Short-time (rms) and instantaneous protection.
Selection of I^2t type (ON or OFF) for short-time delay.

Earth-fault protection
Residual or source ground return earth fault protection.
Selection of I^2t type (ON or OFF) for delay.

Residual earth-leakage protection (Vigi).
Operation without an external power supply.
⎍ Protected against nuisance tripping.
⏦ DC-component withstand class A up to 10 A.

Neutral protection
On three-pole circuit breakers, neutral protection is not possible.
On four-pole circuit breakers, neutral protection may be set using a three-position switch: neutral unprotected (4P 3d), neutral protection at 0.5 Ir (4P 3d + N/2), neutral protection at Ir (4P 4d).

Zone selective interlocking (ZSI)
A ZSI terminal block may be used to interconnect a number of control units to provide total discrimination for short-time and earth-fault protection, without a delay before tripping.

Overload alarm
A yellow alarm LED goes on when the current exceeds the long-time trip threshold.

Fault indications
LEDs indicate the type of fault:
- overload (long-time protection Ir)
- short-circuit (short-time Isd or instantaneous Ii protection)
- earth fault or earth leakage (Ig or IΔn)
- internal fault (Ap).

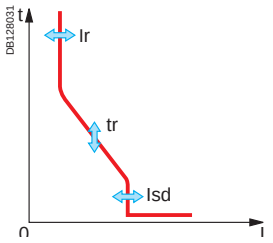
Battery power
The fault indication LEDs remain on until the test/reset button is pressed. Under normal operating conditions, the battery supplying the LEDs has a service life of approximately 10 years.

Test
A mini test kit or a portable test kit may be connected to the test connector on the front to check circuit-breaker operation. For Micrologic 6.0 A and 7.0 A control units, the operation of earth-fault or earth-leakage protection can be checked by pressing the test button located above the test connector.

Note.
Micrologic A control units come with a transparent lead-seal cover as standard.

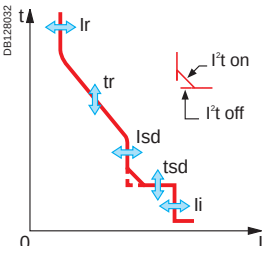
Protection — Micrologic 2.0 A

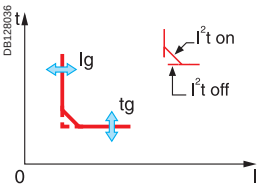
Long time											
Current setting (A)			0.4	0.5	0.6	0.7	0.8	0.9	0.95	0.98	1
Tripping between 1.05 and 1.20 x Ir			Other ranges or disable by changing long-time rating plug								
Time setting		**tr (s)**	0.5	1	2	4	8	12	16	20	24
Time delay (s)	Accuracy: 0 to -30 %	1.5 x Ir	12.5	25	50	100	200	300	400	500	600
	Accuracy: 0 to -20 %	6 x Ir	0.7(1)	1	2	4	8	12	16	20	24
	Accuracy: 0 to -20 %	7.2 x Ir	0.7(2)	0.69	1.38	2.7	5.5	8.3	11	13.8	16.6
Thermal memory			20 minutes before and after tripping								
(1) 0 to -40 % - (2) 0 to -60 %											
Instantaneous											
Pick-up (A)	**Isd** = Ir x …		1.5	2	2.5	3	4	5	6	8	10
Accuracy: ±10 %											
Time delay			Max resettable time: 20 ms Max break time: 80 ms								

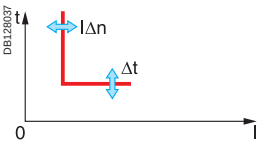


Protection — Micrologic 5.0 / 6.0 / 7.0 A

Long time			**Micrologic 5.0 / 6.0 / 7.0 A**								
Current setting (A)	**Ir** = In x …		0.4	0.5	0.6	0.7	0.8	0.9	0.95	0.98	1
Tripping between 1.05 and 1.20 x Ir			Other ranges or disable by changing long-time rating plug								
Time setting		**tr (s)**	0.5	1	2	4	8	12	16	20	24
Time delay (s)	Accuracy: 0 to -30 %	1.5 x Ir	12.5	25	50	100	200	300	400	500	600
	Accuracy: 0 to -20 %	6 x Ir	0.7(1)	1	2	4	8	12	16	20	24
	Accuracy: 0 to -20 %	7.2 x Ir	0.7(2)	0.69	1.38	2.7	5.5	8.3	11	13.8	16.6
Thermal memory			20 minutes before and after tripping								
(1) 0 to -40 % - (2) 0 to -60 %											
Short time											
Pick-up (A)	**Isd** = Ir x …		1.5	2	2.5	3	4	5	6	8	10
Accuracy: ±10 %											
Time setting tsd (s)	Settings	I^2t Off	0	0.1	0.2	0.3	0.4				
		I^2t On	-	0.1	0.2	0.3	0.4				
Time delay (ms) at 10 x Ir	**tsd** (max resettable time)		20	80	140	230	350				
(I^2t Off or I^2t On)	**tsd** (max break time)		80	140	200	320	500				
Instantaneous											
Pick-up (A)	**Ii** = In x …		2	3	4	6	8	10	12	15	off
Accuracy: ±10 %											
Time delay			Max resettable time: 20 ms Max break time: 50 ms								
Earth fault			**Micrologic 6.0 A**								
Pick-up (A)	**Ig** = In x …		A	B	C	D	E	F	G	H	J
Accuracy: ±10 %	In ⩽ 400 A		0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
	400 A < In < 1250 A		0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
	In ⩾ 1250 A		500	640	720	800	880	960	1040	1120	1200
Time setting tg (s)	Settings	I^2t Off	0	0.1	0.2	0.3	0.4				
		I^2t On	-	0.1	0.2	0.3	0.4				
Time delay (ms)	**tg** (max resettable time)		20	80	140	230	350				
at In or 1200 A (I^2t Off or I^2t On)	**tg** (max break time)		80	140	200	320	500				
Residual earth leakage (Vigi)			**Micrologic 7.0 A**								
Sensitivity (A)	**IΔn**		0.5	1	2	3	5	7	10	20	30
Accuracy: 0 to -20 %											
Time delay Δt (ms)	Settings		60	140	230	350	800				
	Δt (max resettable time)		60	140	230	350	800				
	Δt (max break time)		140	200	320	500	1000				







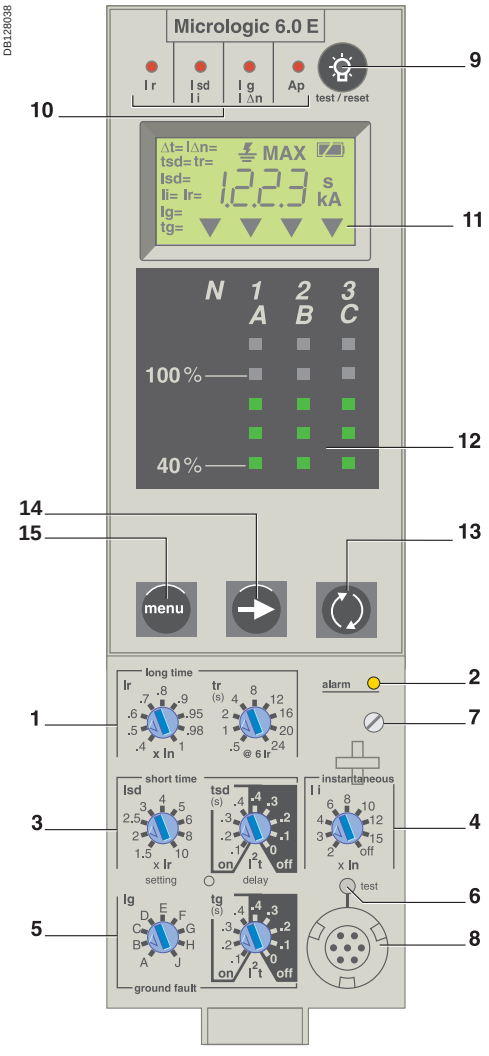
Ammeter — Micrologic 2.0 / 5.0 / 6.0 / 7.0 A

Type of measurements		**Range**	**Accuracy**
Instantaneous currents	I1, I2, I3, IN	0.2 x In to 1.2 x In	± 1.5 %
	Ig (6.0 A)	0.2 x In to In	± 10 %
	IΔn (7.0 A)	0 to 30 A	± 1.5 %
Current maximeters of	I1, I2, I3, IN	0.2 x In to 1.2 x In	± 1.5 %

Note: *all current-based protection functions require no auxiliary source.*
The test / reset button resets maximeters, clears the tripping indication and tests the battery.

Micrologic control units
Micrologic E "energy"

Micrologic E control units protect power circuits. They also offer measurements, display, communication and current maximeters. Version 6 provides earth-fault protection.



1 long-time threshold and tripping delay
2 overload alarm (LED) at 1.125 Ir
3 short-time pick-up and tripping delay
4 instantaneous pick-up
5 earth-leakage or earth-fault pick-up and tripping delay
6 earth-leakage or earth-fault test button
7 long-time rating plug screw
8 test connector
9 lamp test, reset and battery test
10 indication of tripping cause
11 digital display
12 three-phase bargraph and ammeter
13 navigation button "quick View" (only with Micrologic E)
14 navigation button to view menu contents
15 navigation button to change menu

(1) Display on FDM121 only.

Note: Micrologic E control units come with a transparent lead-seal cover as standard.

"Energy meter" measurements

In addition to the ammeter measurements of Micrologic A
Micrologic E control units measure and display:
- current demand
- voltages: phase to phase, phase to neutral, average (1) and unbalanced (1)
- instantaneous power: P, Q, S
- power factor: PF
- power demand: P demand
- energy: Ep, Eq (1), Es (1).

Accuracy of active energy Ep is 2 % (including the sensors). The range of measurement is the same as current with Micrologic A, depending of an external power supply module (24 V DC).

Communication option

In conjunction with the COM communication option, the control unit transmits the following:
- settings
- all "ammeter" and "energy" measurements
- enable connection to FDM121
- tripping causes
- maximeter / minimeter readings.

Protection

Protection thresholds and delays are set using the adjustment dials.

Overload protection
True rms long-time protection.
Thermal memory: thermal image before and after tripping.
Setting accuracy may be enhanced by limiting the setting range using a different long-time rating plug. Overload protection can be cancelled using a specific LT rating plug "Off".

Short-circuit protection
Short-time (rms) and instantaneous protection.
Selection of I^2t type (ON or OFF) for short-time delay.

Earth-fault protection
Source ground return earth fault protection.
Selection of I^2t type (ON or OFF) for delay.

Neutral protection
On three-pole circuit breakers, neutral protection is not possible.
On four-pole circuit breakers, neutral protection may be set using a three-position switch: neutral unprotected (4P 3d), neutral protection at 0.5 Ir (4P 3d + N/2), neutral protection at Ir (4P 4d).

Zone selective interlocking (ZSI)
A ZSI terminal block may be used to interconnect a number of control units to provide total discrimination for short-time and earth-fault protection, without a delay before tripping.

Overload alarm

A yellow alarm LED goes on when the current exceeds the long-time trip threshold.

Programmable contacts

The programmable contacts may be used to signal events
(Ir, Isd, Alarm Ir, Alarm Ig, Ig). They can be programmed using the keypad on the Micrologic E control unit or remotely using the COM option (BCM ULP) and RSU software.

Fault indications

LEDs indicate the type of fault:
- overload (long-time protection Ir)
- short-circuit (short-time Isd or instantaneous Ii protection)
- earth fault (Ig)
- internal fault (Ap).

Trip history
The trip history displays the list of the last 10 trips. For each trip, the following indications are recorded and displayed:
- the tripping cause: Ir, Isd, Ii, Ig or Auto-protection (Ap) trips
- the date and time of the trip (requires communication option).

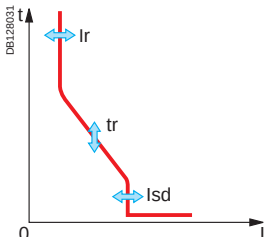
Battery power
The fault indication LEDs remain on until the test/reset button is pressed. Under normal operating conditions, the battery supplying the LEDs has a service life of approximately 10 years.

Test

A mini test kit or a portable test kit may be connected to the test connector on the front to check circuit-breaker operation. For Micrologic 6.0 E control units, the operation of earth-fault or earth-leakage protection can be checked by pressing the test button located above the test connector.

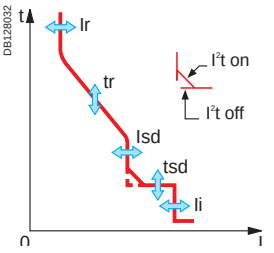
Protection — Micrologic 2.0 E

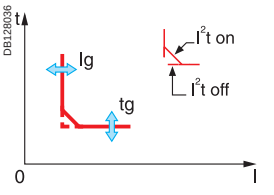
Long time											
Current setting (A)			0.4	0.5	0.6	0.7	0.8	0.9	0.95	0.98	1
Tripping between 1.05 and 1.20 x Ir			Other ranges or disable by changing long-time rating plug								
Time setting		**tr (s)**	0.5	1	2	4	8	12	16	20	24
Time delay (s)	Accuracy: 0 to -30 %	1.5 x Ir	12.5	25	50	100	200	300	400	500	600
	Accuracy: 0 to -20 %	6 x Ir	0.7(1)	1	2	4	8	12	16	20	24
	Accuracy: 0 to -20 %	7.2 x Ir	0.7(2)	0.69	1.38	2.7	5.5	8.3	11	13.8	16.6
Thermal memory			20 minutes before and after tripping								
(1) 0 to -40 % - (2) 0 to -60 %											
Instantaneous											
Pick-up (A)	**Isd** = Ir x …		1.5	2	2.5	3	4	5	6	8	10
Accuracy: ±10 %											
Time delay			Max resettable time: 20 ms Max break time: 80 ms								



Protection — Micrologic 5.0 / 6.0 E

Long time			**Micrologic 5.0 / 6.0 E**								
Current setting (A)	**Ir** = In x …		0.4	0.5	0.6	0.7	0.8	0.9	0.95	0.98	1
Tripping between 1.05 and 1.20 x Ir			Other ranges or disable by changing long-time rating plug								
Time setting		**tr (s)**	0.5	1	2	4	8	12	16	20	24
Time delay (s)	Accuracy: 0 to -30 %	1.5 x Ir	12.5	25	50	100	200	300	400	500	600
	Accuracy: 0 to -20 %	6 x Ir	0.7(1)	1	2	4	8	12	16	20	24
	Accuracy: 0 to -20 %	7.2 x Ir	0.7(2)	0.69	1.38	2.7	5.5	8.3	11	13.8	16.6
Thermal memory			20 minutes before and after tripping								
(1) 0 to -40 % - (2) 0 to -60 %											
Short time											
Pick-up (A)	**Isd** = Ir x …		1.5	2	2.5	3	4	5	6	8	10
Accuracy: ±10 %											
Time setting tsd (s)	Settings	I^2t Off	0	0.1	0.2	0.3	0.4				
		I^2t On	-	0.1	0.2	0.3	0.4				
Time delay (ms) at 10 x Ir	**tsd** (max resettable time)		20	80	140	230	350				
(I^2t Off or I^2t On)	**tsd** (max break time)		80	140	200	320	500				
Instantaneous											
Pick-up (A)	**Ii** = In x …		2	3	4	6	8	10	12	15	off
Accuracy: ±10 %											
Time delay			Max resettable time: 20 ms Max break time: 50 ms								
Earth fault			**Micrologic 6.0 E**								
Pick-up (A)	**Ig** = In x …		A	B	C	D	E	F	G	H	J
Accuracy: ±10 %	In ⩽ 400 A		0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
	400 A < In < 1250 A		0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
	In ⩾ 1250 A		500	640	720	800	880	960	1040	1120	1200
Time setting tg (s)	Settings	I^2t Off	0	0.1	0.2	0.3	0.4				
		I^2t On	-	0.1	0.2	0.3	0.4				
Time delay (ms)	**tg** (max resettable time)		20	80	140	230	350				
at In or 1200 A (I^2t Off or I^2t On)	**tg** (max break time)		80	140	200	320	500				





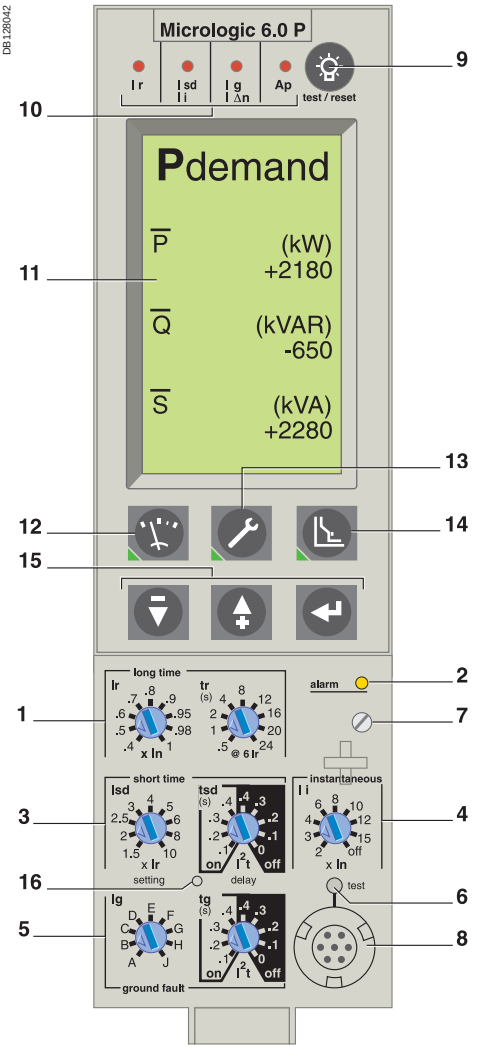
Energy — Micrologic 2.0 / 5.0 / 6.0 E

Type of measurements		**Range**	**Accuracy**
Instantaneous currents	I1, I2, I3, IN	0.2 x In to 1.2 x In	± 1.5 %
	Ig (6.0 E)	0.05 x In to In	± 10 %
Current maximeters of	I1, I2, I3, IN	0.2 x In to 1.2 x In	± 1.5 %
Demand currents of I1, I2, I3, Ig		0.2 x In to 1.2 x In	± 1.5 %
Voltages	V12, V23, V31, V1N, V2N, V3N	100 to 690 V	± 0.5 %
Active power	P	30 to 2000 kW	± 2 %
Power factor	PF	0 to 1	± 2 %
Demand power	P demand	30 to 2000 kW	± 2 %
Active energy	Ep	-10^{10} GWh to 10^{10} GWh	± 2 %

Note: all current-based protection functions require no auxiliary source.
The test / reset button resets maximeters, clears the tripping indication and tests the battery.

Micrologic control units
Micrologic P "power"

Micrologic P control units include all the functions offered by Micrologic A.
In addition, they measure voltages and calculate power and energy values.
They also offer new protection functions based on currents, voltages, frequency and power reinforce load protection in real time.



1 *Long-time current setting and tripping delay.*
2 *Overload signal (LED).*
3 *Short-time pick-up and tripping delay.*
4 *Instantaneous pick-up.*
5 *Earth-leakage or earth-fault pick-up and tripping delay.*
6 *Earth-leakage or earth-fault test button.*
7 *Long-time rating plug screw.*
8 *Test connector.*
9 *Lamp + battery test and indications reset.*
10 *Indication of tripping cause.*
11 *High-resolution screen.*
12 *Measurement display.*
13 *Maintenance indicators.*
14 *Protection settings.*
15 *Navigation buttons.*
16 *Hole for settings lockout pin on cover.*

Note: *Micrologic P control units come with a non-transparent lead-seal cover as standard.*

Protection

Protection settings
The adjustable protection functions are identical to those of Micrologic A (overloads, short-circuits, earth-fault and earth-leakage protection).

Fine adjustment
Within the range determined by the adjustment dial, fine adjustment of thresholds (to within one ampere) and time delays (to within one second) is possible on the keypad or remotely using the COM option.

IDMTL (Inverse Definite Minimum Time Lag) setting
Coordination with fuse-type or medium-voltage protection systems is optimised by adjusting the slope of the overload-protection curve. This setting also ensures better operation of this protection function with certain loads.

Neutral protection
On three-pole circuit breakers, neutral protection may be set using the keypad or remotely using the COM option, to one of four positions: neutral unprotected (4P 3d), neutral protection at 0.5 Ir (4P 3d + N/2), neutral protection at Ir (4P 4d) and neutral protection at 1.6 Ir (4P 3d + 1.6N). Neutral protection at 1.6 Ir is used when the neutral conductor is twice the size of the phase conductors (major load imbalance, high level of third order harmonics).
On four-pole circuit breakers, neutral protection may be set using a three-position switch or the keypad: neutral unprotected (4P 3d), neutral protection at 0.5 Ir (4P 3d + N/2), neutral protection at Ir (4P 4d). Neutral protection produces no effect if the long-time curve is set to one of the IDMTL protection settings.

Programmable alarms and other protection
Depending on the thresholds and time delays set using the keypad or remotely using the COM option, the Micrologic P control unit monitors currents and voltage, power, frequency and the phase sequence. Each threshold overrun is signalled remotely via the COM option. Each threshold overrun may be combined with tripping (protection) or an indication carried out by an optional M6C programmable contact (alarm), or both (protection and alarm).

Load shedding and reconnection
Load shedding and reconnection parameters may be set according to the power or the current flowing through the circuit breaker. Load shedding is carried out by a supervisor via the COM option or by an M6C programmable contact.

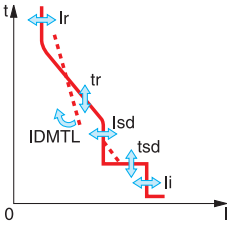
Indication option via programmable contacts
The M6C (six contacts) auxiliary contacts may be used to signal threshold overruns or status changes. They can be programmed using the keypad on the Micrologic P control unit or remotely using the COM option (BCM ULP) and RSU software.

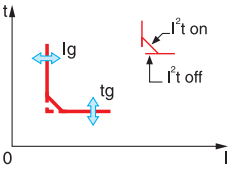
Communication option (COM)
The communication option may be used to:
- remotely read and set parameters for the protection functions
- transmit all the calculated indicators and measurements
- signal the causes of tripping and alarms
- consult the history files and the maintenance-indicator register.
- maximeter reset.

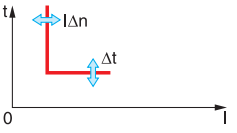
An event log and a maintenance register, stored in control-unit memory but not available locally, may be accessed in addition via the COM option.

Protection — Micrologic 5.0 / 6.0 / 7.0 P

Long time (rms)			**Micrologic 5.0 / 6.0 / 7.0 P**								
Current setting (A)	**Ir** = In x …		0.4	0.5	0.6	0.7	0.8	0.9	0.95	0.98	1
Tripping between 1.05 and 1.20 x Ir			Other ranges or disable by changing long-time rating plug								
Time setting		t_r (s)	0.5	1	2	4	8	12	16	20	24
Time delay (s)	Accuracy: 0 to -30 %	1.5 x Ir	12.5	25	50	100	200	300	400	500	600
	Accuracy: 0 to -20 %	6 x Ir	0.7(1)	1	2	4	8	12	16	20	24
	Accuracy: 0 to -20 %	7.2 x Ir	0.7(2)	0.69	1.38	2.7	5.5	8.3	11	13.8	16.6
IDMTL setting	Curve slope		SIT	VIT	EIT	HVFuse	DT				
Thermal memory			20 minutes before and after tripping								
(1) 0 to -40 % - (2) 0 to -60 %											
Short time (rms)											
Pick-up (A)	**Isd** = Ir x …		1.5	2	2.5	3	4	5	6	8	10
Accuracy: ±10 %											
Time setting t_{sd} (s)	Settings	I^2t Off	0	0.1	0.2	0.3	0.4				
		I^2t On	-	0.1	0.2	0.3	0.4				
Time delay (ms) at 10 Ir	t_{sd} (max resettable time)		20	80	140	230	350				
(I^2t Off or I^2t On)	t_{sd} (max break time)		80	140	200	320	500				
Instantaneous											
Pick-up (A)	**Ii** = In x …		2	3	4	6	8	10	12	15	off
Accuracy: ±10 %											
Time delay			Max resettable time: 20 ms Max break time: 50 ms								
Earth fault			**Micrologic 6.0 P**								
Pick-up (A)	**Ig** = In x …		A	B	C	D	E	F	G	H	J
Accuracy: ±10 %	In ⩽ 400 A		0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
	400 A < In < 1250 A		0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
	In ⩾ 1250 A		500	640	720	800	880	960	1040	1120	1200
Time setting t_g (s)	Settings	I^2t Off	0	0.1	0.2	0.3	0.4				
		I^2t On	-	0.1	0.2	0.3	0.4				
Time delay (ms)	t_g (max resettable time)		20	80	140	230	350				
at In or 1200 A (I^2t Off or I^2t On)	t_g (max break time)		80	140	200	320	500				
Residual earth leakage (Vigi)			**Micrologic 7.0 P**								
Sensitivity (A)	**IΔn**		0.5	1	2	3	5	7	10	20	30
Accuracy: 0 to -20 %											
Time delay Dt (ms)	Settings		60	140	230	350	800				
	Δt (max resettable time)		60	140	230	350	800				
	Δt (max break time)		140	200	320	500	1000				

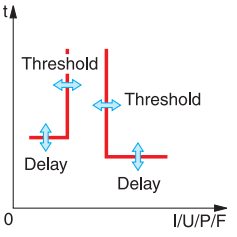






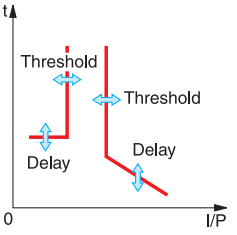
Alarms and other protection — Micrologic 5.0 / 6.0 / 7.0 P

Current		**Threshold**	**Delay**
Current unbalance	**Iunbalance**	0.05 to 0.6 Iaverage	1 to 40 s
Max. demand current	**Imax demand** : I1, I2, I3, IN,	0.2 In to In	15 to 1500 s
Earth fault alarm			
	I⏚	10 to 100 % In(3)	1 to 10 s
Voltage			
Voltage unbalance	**Uunbalance**	2 to 30 % x Uaverage	1 to 40 s
Minimum voltage	**Umin**	100 to Umax between phases	1.2 to 10 s
Maximum voltage(4)	**Umax**	Umin to 1200 between phases	1.2 to 10 s
Power			
Reverse power	**rP**	5 to 500 kW	0.2 to 20 s
Frequency			
Minimum frequency	**Fmin**	45 to Fmax	1.2 to 5 s
Maximum frequency	**Fmax**	Fmin to 440 Hz	1.2 to 5 s
Phase sequence			
Sequence (alarm)	**ΔØ**	Ø1/2/3 or Ø1/3/2	0.3 s



Load shedding and reconnection — Micrologic 5.0 / 6.0 / 7.0 P

Measured value		**Threshold**	**Delay**
Current	**I**	0.5 to 1 Ir per phases	20 % tr to 80 % tr
Power	**P**	200 kW to 10 MW	10 to 3600 s



Power — Micrologic 5.0 / 6.0 / 7.0 P

Type of measurements		**Range**	**Accuracy**
Current maximeters of	I1, I2, I3, IN	0.2 x In to 1.2 x In	± 1.5 %
Voltages	V12, V23, V31, V1N, V2N, V3N	100 to 690 V	± 0.5 %
Power factor	PF	0 to 1	± 2 %
Frequency (Hz)			0.1 %

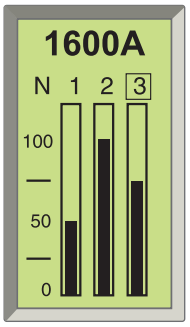
(3) In ⩽ 400 A 30 %
400 A < In < 1250 A 20 %
In ⩾ 1250 A 10 %

(4) For 690 V applications, a step-down transformer must be used if the voltage exceeds the nominal value of 690 V by more than 10 %.

Note: all current-based protection functions require no auxiliary source.
Voltage-based protection functions are connected to AC power via a voltage measurement input built into the circuit breaker.

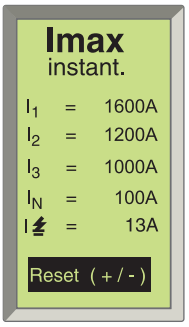
Micrologic control units
Micrologic P "power"

DB101133



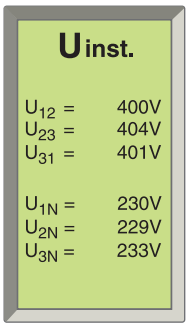
Default display.

DB101134



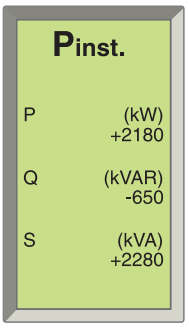
Display of a maximum current.

DB101135



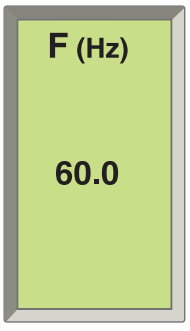
Display of a voltage.

DB117042



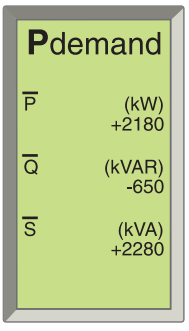
Display of a power.

DB101137



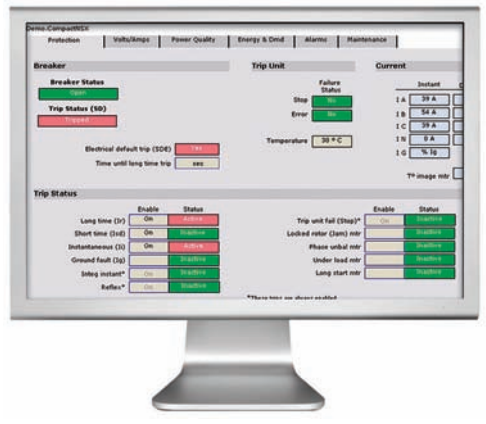
Display of a frequency.

DB101138



Display of a demand power.

PB104850



ION Enterprise Power Management software.

Measurements

The Micrologic P control unit calculates in real time all the electrical values (V, A, W, VAR, VA, Wh, VARh, VAh, Hz), power factors and cosφ factors.
The Micrologic P control unit also calculates demand current and demand power over an adjustable time period. Each measurement is associated with a minimeter and a maximeter.
In the event of tripping on a fault, the interrupted current is stored. The optional external power supply makes it possible to display the value with the circuit breaker open or not supplied.

Instantaneous values

The value displayed on the screen is refreshed every second.
Minimum and maximum values of measurements are stored in memory (minimeters and maximeters).

Currents					
I rms	A	1	2	3	N
	A	E-fault		E-leakage	
I max rms	A	1	2	3	N
	A	E-fault		E-leakage	
Voltages					
U rms	V	12	23	31	
V rms	V	1N	2N	3N	
U average rms	V	(U12 + U23 + U31) / 3			
U unbalance	%				
Power, energy					
P active, Q reactive, S apparent	W, Var, VA	Totals			
E active, E reactive, E apparent	Wh, VARh, VAh	Totals consumed - supplied Totals consumed Totals supplied			
Power factor	PF	Total			
Frequencies					
F	Hz				

Demand metering

The demand is calculated over a fixed or sliding time window that may be programmed from 5 to 60 minutes. According to the contract signed with the power supplier, an indicator associated with a load shedding function makes it possible to avoid or minimise the costs of overrunning the subscribed power. Maximum demand values are systematically stored and time stamped (maximeter).

Currents					
I demand	A	1	2	3	N
	A	E-fault		E-leakage	
I max demand	A	1	2	3	N
	A	E-fault		E-leakage	
Power					
P, Q, S demand	W, Var, VA	Totals			
P, Q, S max demand	W, Var, VA	Totals			

Minimeters and maximeters

Only the current and power maximeters may be displayed on the screen.

Time-stamping

Time-stamping is activated as soon as time is set manually or by a supervisor.
No external power supply module is required (max. drift of 1 hour per year).

Reset

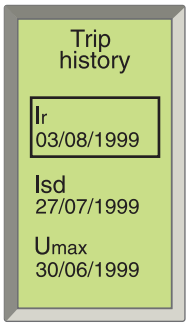
An individual reset, via the keypad or remotely, acts on alarms, minimum and maximum data, peak values, the counters and the indicators.

Additional measurements accessible with the COM option

Some measured or calculated values are only accessible with the COM communication option:
- I peak / $\sqrt{2}$, $(I_1 + I_2 + I_3)/3$, I unbalance
- load level in % Ir
- total power factor.

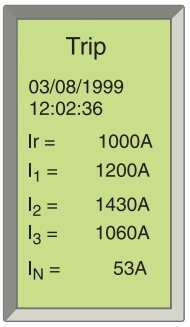
The maximeters and minimeters are available only via the COM option for use with a supervisor.

DB117041



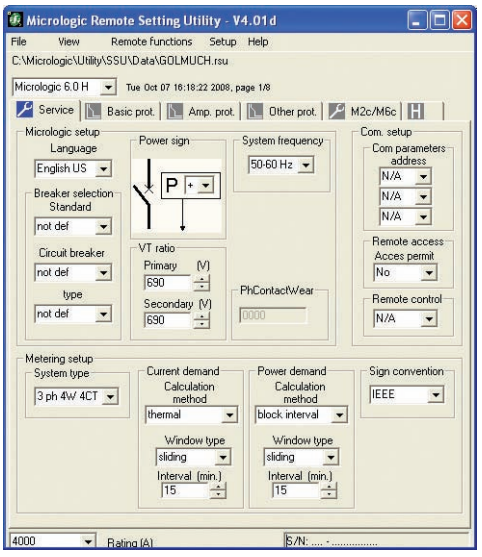
Display of a tripping history.

DB101140



Display after tripping.

DB120970A



RSU configuration screen for a Micrologic.

Histories and maintenance indicators .....

The last ten trips and alarms are recorded in two separate history files that may be displayed on the screen:

- ■ tripping history:
  - □ type of fault
  - □ date and time
  - □ values measured at the time of tripping (interrupted current, etc.)
- ■ alarm history:
  - □ type of alarm
  - □ date and time
  - □ values measured at the time of the alarm.

All the other events are recorded in a third history file which is only accessible through the communication network.

- ■ Event log history (only accessible through the communication network):
  - □ modifications to settings and parameters
  - □ counter resets
  - □ system faults
  - □ fallback position
  - □ thermal self-protection
  - □ loss of time
  - □ overrun of wear indicators
  - □ test-kit connections
  - □ etc.

Note:

All the events are time stampled: time-stamping is activated as soon as time is set manually or by a supervisor. No external power supply module is required (max. drift of 1 hour per year).

Maintenance indicators with COM option (BCM ULP)

A number of maintenance indicators may be called up on the screen to better plan for device maintenance:

- ■ contact wear
- ■ operation counter:
  - □ cumulative total
  - □ total since last reset.

Additional maintenance indicators are also available through the COM network, and can be used as an aid in troubleshooting:

- ■ highest current measured
- ■ number of test-kit connections
- ■ number of trips in operating mode and in test mode.

Additional technical characteristics

Safety

Measurement functions are independent of the protection functions.
The high-accuracy measurement module operates independently of the protection module.

Simplicity and multi-language

Navigation from one display to another is intuitive. The six buttons on the keypad provide access to the menus and easy selection of values. When the setting cover is closed, the keypad may no longer be used to access the protection settings, but still provides access to the displays for measurements, histories, indicators, etc.
Micrologic is also multi-language, including the following languages: English, Spanish, Portuguese, Russian, Chinese, French, German...

Intelligent measurement

Measurement-calculation mode:

- ■ energies are calculated on the basis of the instantaneous power values, in two manners:
  - □ the traditional mode where only positive (consumed) energies are considered
  - □ the signed mode where the positive (consumed) and negative (supplied) energies are considered separately
- ■ measurement functions implement the new “zero blind time” concept which consists in continuously measuring signals at a high sampling rate. The traditional “blind window” used to process samples no longer exists. This method ensures accurate energy calculations even for highly variable loads (welding machines, robots, etc.).

Always powered

All current-based protection functions require no auxiliary source. Voltage-based protection functions are connected to AC power via a voltage measurement input built into the circuit breaker.

Stored information

The fine setting adjustments, the last 100 events and the maintenance register remain in the control-unit memory even when power is lost.

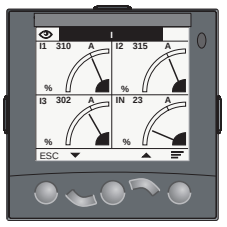
Power Meter functions
Micrologic A/E/P control unit with COM option (BCM ULP)

In addition to protection functions, Micrologic A/E/P control units offer all the functions of Power Meter products as well as operating-assistance for the circuit breaker.

DB125911

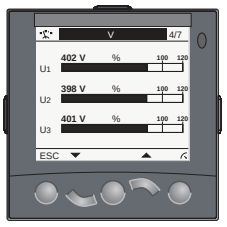
FDM121 display: navigation.

DB112131



Current.

DB112132

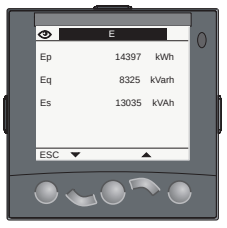


Voltage.

DB112133

Power.

DB112134



Consumption.

Examples of measurement screens on the FDM121 display unit.

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

Display

FDM121 display unit

The FDM121 switchboard display unit can be connected to a Micrologic COM option (BCM ULP) using a breaker ULP cord to display all measurements on a screen.
The result is a veritable 96 x 96 mm Power Meter.
In addition to the information displayed on the Micrologic LCD, the FDM121 screen shows demand, power quality and maximeter/minimeter values along with histories and maintenance indicators.
The FMD121 display unit requires a 24 V DC power supply. The COM option (BCM ULP) unit is supplied by the same power supply via the breaker ULP cord connecting it to the FDM121.

Measurements

Instantaneous rms measurements

The Micrologic continuously display the RMS value of the highest current of the three phases and neutral (Imax). The navigation buttons can be used to scroll through the main measurements.
In the event of a fault trip, the trip cause is displayed.
The Micrologic A measures phase, neutral, ground fault currents.
The Micrologic E offers voltage, power, Power Factor, measurements in addition to the measurements provided by Micrologic A.
The Micrologic P offer frequency, cos.φ in addition to the measurements provided by Micrologic E.

Maximeters / minimeters

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

Energy metering

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

Demand and maximum demand values

Micrologic E/P also calculates demand current and power values. These calculations can be made using a block or sliding interval that can be set from 5 to 60 minutes in steps of 1 minute. The window can be synchronised with a signal sent via the communication system. Whatever the calculation method, the calculated values can be recovered on a PC via Modbus communication.
Ordinary spreadsheet software can be used to provide trend curves and forecasts based on this data. They will provide a basis for load shedding and reconnection operations used to adjust consumption to the subscribed power.

Micrologic A/E/P integrated Power Meter functions			Type		Display	
			A/E	P	Micrologic LCD	FDM121 display
Display of protection settings						
Pick-ups (A) and delays	All settings can be displayed	Ir, tr, Isd, tsd, Ii, Ig, tg	**A/E**	**P**	■	-
Measurements						
Instantaneous rms measurements						
Currents (A)	Phases and neutral	I1, I2, I3, IN	**A/E**	**P**	■	■
	Average of phases	Iavg = (I1 + I2 + I3) / 3	**A/E**	**P**	-	■
	Highest current of the 3 phases and neutral	Imax of I1, I2, I3, IN	**A/E**	**P**	■	■
	Ground fault (Micrologic 6)	% Ig (pick-up setting)	**A/E**	**P**	■	■
	Current unbalance between phases	% Iavg	- **/E**	**P**	-	■
Voltages (V)	Phase-to-phase	V12, V23, V31	- **/E**	**P**	■	■
	Phase-to-neutral	V1N, V2N, V3N	- **/E**	**P**	■	■
	Average of phase-to-phase voltages	Vavg = (V12 + V23 + V31) / 3	- **/E**	**P**	-	■
	Average of phase-to-neutral voltages	Vavg = (V1N + V2N + V3N) / 3	- **/E**	**P**	-	■
	Ph-Ph and Ph-N voltage unbalance	% Vavg and % Vavg	- **/E**	**P**	-	■
	Phase sequence	1-2-3, 1-3-2	- / -	**P**	■	■
Frequency (Hz)	Power system	f	- / -	**P**	■	■
Power	Active (kW)	P, total	- **/E**	**P**	■	■
		P, per phase	- **/E**	**P**	■ (2)	■
	Reactive (kVAR)	Q, total	- **/E**	**P**	■	■
		Q, per phase	- / -	**P**	■ (2)	■
	Apparent (kVA)	S, total	- **/E**	**P**	■	■
		S, per phase	- / -	**P**	■ (2)	■
	Power Factor	PF, total	- **/E**	**P**	■	■
		PF, per phase	- / -	**P**	■ (2)	■
	Cos.φ	Cos.φ, total	- / -	**P**	■ (2)	■
		Cos.φ, per phase	- / -	**P**	■ (2)	■
Maximeters / minimeters						
	Associated with instantaneous rms measurements	Reset via FDM121 display unit and Micrologic keypad	**A/E**	**P**	■	■
Energy metering						
Energy	Active (kW), reactive (kVARh), apparent (kVAh)	Total since last reset	- **/E**	**P**	■	■
Demand and maximum demand values						
Demand current (A)	Phases and neutral	Present value on the selected window	- **/E**	**P**	■	■
		Maximum demand since last reset	- **/E**	**P**	■ (2)	■
Demand power	Active (kWh), reactive (kVAR), apparent (kVA)	Present value on the selected window	- **/E**	**P**	■	■
		Maximum demand since last reset	- **/E**	**P**	■ (2)	■
Calculation window	Sliding, fixed or com-synchronised	Adjustable from 5 to 60 minutes in 1 minute steps (1)	- **/E**	**P**	-	-

(1) Available via the communication system only.
(2) Available for Micrologic P only.

Operating-assistance functions
Micrologic A/E/P control unit with COM option (BCM ULP)

Histories
- trip indications in clear text in a number of user-selectable languages
- time-stamping: date and time of trip.

Maintenance indicators
Micrologic control unit have indicators for, among others, the number of operating cycles, contact wear P, load profile and operating times (operating hours counter) of the Masterpact circuit breaker.
It is possible to assign an alarm to the operating cycle counter to plan maintenance.
The various indicators can be used together with the trip histories to analyse the level of stresses the device has been subjected to.

Management of installed devices
Each circuit breaker equipped with a COM option (BCM ULP) can be identified via the communication system:
- serial number
- firmware version
- hardware version
- device name assigned by the user.

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

Micrologic A/E/P operating assistance functions			Type		Display	
			A/E	P	Micrologic LCD	FDM121 display
Operating assistance						
Trip history						
Trips	Cause of tripping	Ir, Isd, Ii, Ig, IΔn	- /E	P	■	■
Maintenance indicators						
Counter	Mechanical cycles	Assignable to an alarm	A/E	P	-	■
	Electrical cycles	Assignable to an alarm	A/E	P	-	■
	Hours	Total operating time (hours) (1)	A/E	P	-	-
Indicator	Contact wear	%	- / -	P	-	■
Load profile	Hours at different load levels	% of hours in four current ranges: 0-49 % In, 50-79 % In, 80-89 % In and ≥ 90 % In	A /E	P	-	■

(1) Also available via the communication system.

Additional technical characteristics

Contact wear

Each time Compact opens, the Micrologic P trip unit measures the interrupted current and increments the contact-wear indicator as a function of the interrupted current, according to test results stored in memory. Breaking under normal load conditions results in a very slight increment. The indicator value may be read on the FDM121 display. It provides an estimation of contact wear calculated on the basis of the cumulative forces affecting the circuit breaker. When the indicator reaches 100 %, it is advised to inspect the circuit breaker to ensure the availability of the protected equipment.

Circuit breaker load profile

Micrologic A/E/P calculates the load profile of the circuit breaker protecting a load circuit. The profile indicates the percentage of the total operating time at four current levels (% of breaker In):
- *0 to 49 % In*
- *50 to 79 % In*
- *80 to 89 % In*
- *≥ 90 % In.*

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

Switchboard-display functions
Micrologic A/E/P control unit with COM option (BCM ULP)

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

PB103582

FDM121 display.

PB103807-32

Surface mount accessory.

PB103581-31

Connection with FDM121 display unit.

FDM121 switchboard display

The FDM121 switchboard display unit can be connected to a Micrologic COM option (BCM ULP). It uses the sensors and processing capacity of the Micrologic control unit. It is easy to use and requires no special software or settings. It is immediately operational when connected to the COM option (BCM ULP) by a breaker ULP cord. The FDM121 is a large display, but requires very little depth. The anti-glare graphic screen is backlit for very easy reading even under poor ambient lighting and at sharp angles.

Display of Micrologic measurements and trips

The FDM121 is intended to display Micrologic A/E/P measurements, trips and operating information. It cannot be used to modify the protection settings.
Measurements may be easily accessed via a menu.
Trips are automatically displayed.
■ A pop-up window displays the time-stamped description of the trip and the orange LED flashes

Status indications

When the circuit breaker is equipped with the COM option (BCM ULP) (including its set of sensors) the FDM121 display can also be used to view circuit breaker status conditions:
■ O/F: ON/OFF
■ SDE: Fault-trip indication (overload, short-circuit, ground fault).
■ PF: ready to close
■ CH: charged (spring loaded).

Remote control

When the circuit breaker is equipped with the COM option (BCM ULP) (including its kit for connection to XF and MX1 communication voltage releases), the FDM121 display can also be used to control (open/close) the circuit breaker. Two operating mode are available.
■ local mode : open/close commands are enabled from FDM121 while disable from communication network
■ remote mode : open/close commands are disabled from FDM121 while, enabled from communication network.

Main characteristics

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

Mounting

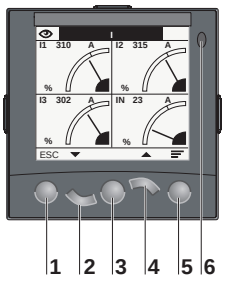
The FDM121 is easily installed in a switchboard.
■ Standard door cut-out 92 x 92 mm.
■ Attached using clips.
To avoid a cut-out in the door, an accessory is available for surface mounting by drilling only two 22 mm diameter holes.
The FDM121 degree of protection is IP54 in front. IP54 is maintained after switchboard mounting by using the supplied gasket during installation.

Connection

The FDM121 is equipped with:
■ a 24 V DC terminal block:
□ plug-in type with 2 wire inputs per point for easy daisy-chaining
□ power supply range of 24 V DC -20 % (19.2 V) to 24 V DC +10 % (26.4 V).
A 24 V DC type auxiliary power supply must be connected to a single point on the ULP system. The FDM121 display unit has a 2-point screw connector on the rear panel of the module for this purpose. The ULP module to which the auxiliary power supply is connected distributes the supply via the ULP cable to all the ULP modules connected to the system and therefore also to Micrologic.
■ two RJ45 jacks.
The Micrologic connects to the internal communication terminal block on the Compact via the breaker ULP cord. Connection to one of the RJ45 connectors on the FDM121 automatically establishes communication between the Micrologic and the FDM121 and supplies power to the Micrologic measurement functions.
When the second connector is not used, it must be fitted with a line terminator.

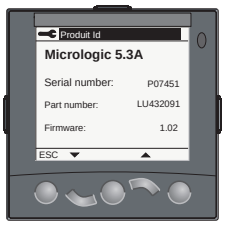
Switchboard-display functions
Micrologic A/E/P control unit with COM option (BCM ULP)

DB112135



1 *Escape*
2 *Down*
3 *OK*
4 *Up*
5 *Context*
6 *Alarm LED*

DB112136

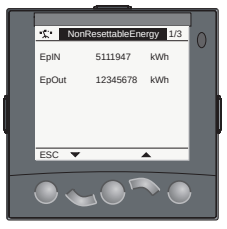


Product identification.

DB112138

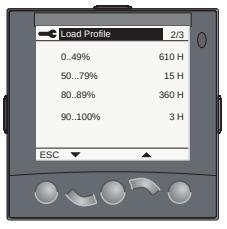
Metering: sub-menu.

DB112140



Metering: meter.

DB125912



Services.

Navigation

Five buttons are used for intuitive and fast navigation. The “Context” button may be used to select the type of display (digital, bargraph, analogue).
The user can select the display language (Chinese, English, French, German, Italian, Portuguese, Spanish, etc.).

Screens

Main menu

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

- Quick view
- Alarms
- Metering
- Services.
- Control

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

Fast access to essential information

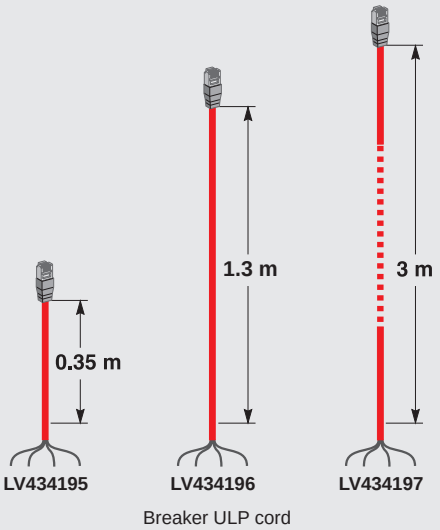
■ “Quick view” provides access to five screens that display a summary of essential operating information (I, U, f, P, E, THD, circuit breaker On / Off).

Access to detailed information

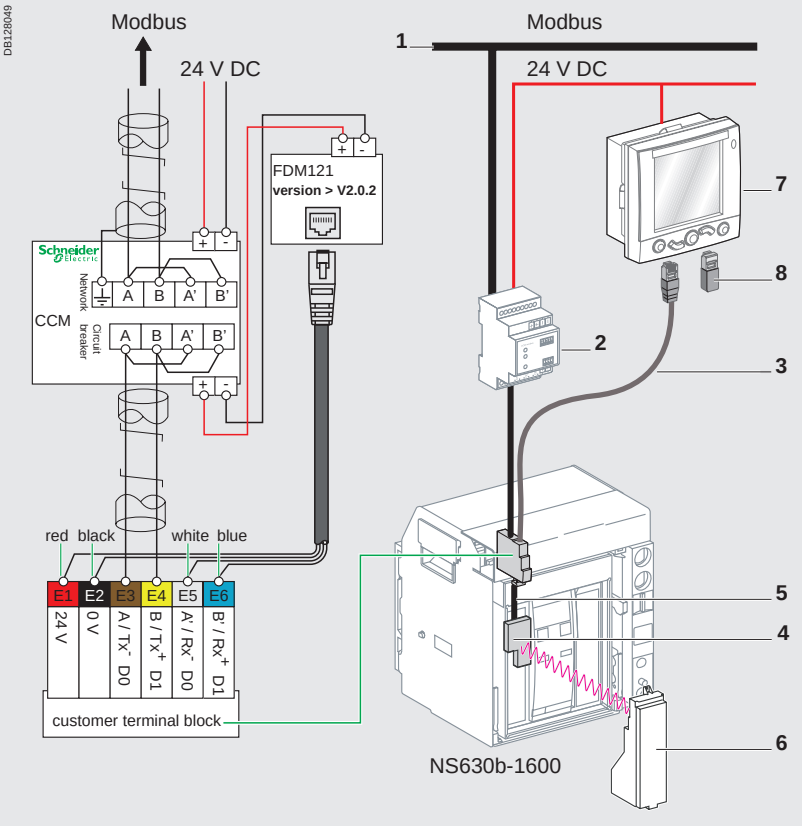
■ "Metering" can be used to display the measurement data (I, U-V, f, P, Q, S, E, THD, PF) with the corresponding min/max values.
■ Alarms displays the trip history.
■ Services provides access to the operation counters, energy and maximeter reset function, maintenance indicators, identification of modules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

Communication components and FDM121 connections

DB128048



DB128049

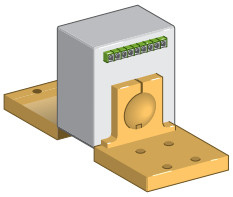


Connections

■ *Compact is connected to the FDM121 display unit via the breaker ULP cord.*
□ *cord available in three lengths: 0.35 m, 1.3 m and 3 m.*
□ *lengths up to 10 m possible using extensions.*

1 *Modbus network*
2 *CCM (chassis module)*
3 *Breaker ULP cord*
4 *"device" communication module (BCM ULP)*
5 *Prefabricated wiring*
6 *Micrologic trip unit*
7 *FDM121 display*
8 *Line terminator*

DB128050



External sensor (CT).

06133779A

External sensor for source ground return protection.

PB100773-32

Long-time rating plug.

PB101026-32A

External 24 V DC power power supply module.

External sensors

External sensor for earth-fault and neutral protection

The sensors, used with the 3P circuit breakers, are installed on the neutral conductor for:
- neutral protection (with Micrologic P)
- residual type earth-fault protection (with Micrologic A, E and P).

The rating of the sensor (CT) must be compatible with the rating of the circuit breaker:
- NS630b to 1600 A - 400/1600 CT
- NS1600b to 3200 A - 1000/4000 CT.

Rectangular sensor for earth-leakage protection

The sensor is installed around the busbars (phases + neutral) to detect the zero-phase sequence current required for the earth-leakage protection. Rectangular sensors are available in two sizes.
Inside dimensions (mm)
- 280 x 115 up to 1600 A for Compact NS630b to 1600 A
- 470 x 160 up to 3200 A for Compact NS1600b to 3200 A.

External sensor for source ground return protection

The sensor is installed around the connection of the transformer neutral point to earth and connects to the Micrologic 6.0 control unit via an MDGF module to provide the source ground return (SGR) protection.

Long-time rating plug

Four interchangeable plugs may be used to limit the long-time threshold setting range for higher accuracy.
The time delay settings indicated on the plugs are for an overload of 6 Ir (for further details, see the characteristics on page A-13 and page A-17).

As standard, control units are equipped with the 0.4 to 1 plug.

Setting ranges										
Standard	Ir = In x…	0.4	0.5	0.6	0.7	0.8	0.9	0.95	0.98	1
Low-setting option	Ir = In x…	0.4	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.8
High-setting option	Ir = In x…	0.80	0.82	0.85	0.88	0.90	0.92	0.95	0.98	1
Off plug		No long-time protection (Ir = In for Isd setting)								

Important: *long-time rating plugs must always be removed before carrying out insulation or dielectric withstand tests.*

External 24 V DC power-supply module

The external power-supply module makes it possible to use the display even if the circuit breaker is open or not supplied (for the exact conditions of use, see the “electrical diagrams” part of this catalogue).
This module powers both the control unit (100 mA) and M6C programmable contacts (100 mA).
If the COM communication option is used, the communication bus requires 24 V DC power supply. With the Micrologic A/E control unit, this module makes it possible to display currents of less than 20 % of In.
With the Micrologic P, it can be used to display fault currents after tripping.

Characteristics
- power supply:
  - 110/130, 200/240, 380/415 V AC (+10 % -15 %)
  - 24/30, 48/60, 100/125 V DC (+20 % -20 %)
- output voltage: 24 V DC ±5 %, 1 A.
- ripple < 1 %
- dielectric withstand : 3.5 kV rms between input/output, for 1 minutew
- overvoltage category: as per IEC 60947-1 cat. 4.

Protection of distribution systems

Micrologic control units for Compact NS630b to 3200

PB100771-24

Battery module.

PB100781-32_SE

M6C.

PB100775-32

Lead-seal cover.

Battery module

The battery module maintains display operation and communication with the supervisor if the power supply to the Micrologic control unit is interrupted.
It is installed in series between the Micrologic control unit and the AD module.

Characteristics

- battery run-time: 4 hours (approximately)
- mounted on vertical backplate or symmetrical rail.

M6C programmable contacts

These contacts are optional equipment for the Micrologic P control units.
They are described with the indication contacts for the circuit breakers.

Micrologic			Type P
Characteristics			**M6C**
Minimum load			100 mA/24 V
Breaking capacity (A) p.f.: 0.7	V AC	240	5
		380	3
	V DC	24	1.8
		48	1.5
		125	0.4
		250	0.15

M6C: external 24 V DC power supply required (consumption 100 mA).

Spare parts

Lead-seal covers

A lead-seal cover controls access to the adjustment dials.
When the cover is closed:

- it is impossible to modify settings using the keypad unless the settings lockout pin on the cover is removed
- the test connector remains accessible
- the test button for the earth-fault and earth-leakage protection function remains accessible.

Characteristics

- transparent cover for basic Micrologic and Micrologic A, E control units
- non-transparent cover for Micrologic P control units.

Spare battery

A battery supplies power to the LEDs identifying the tripping causes. Battery service life is approximately ten years.
A test button on the front of the control unit is used to check the battery condition.
The battery may be replaced on site when discharged.

PB100837

Portable test kit.

Test equipment

Hand-held test kit

The hand-held mini test kit may be used to:

■ check operation of the control unit and the tripping and pole-opening system by sending a signal simulating a short-circuit

■ supply power to the control units for settings via the keypad when the circuit breaker is open (Micrologic P control units).

Power source: standard LR6-AA battery.

Full function test kit

The test kit can be used alone or with a supporting personal computer.

The test kit without PC may be used to check:

■ the mechanical operation of the circuit breaker

■ the electrical continuity of the connection between the circuit breaker and the control unit

■ operation of the control unit:

□ display of settings

□ automatic and manual tests on protection functions

□ test on the zone-selective interlocking (ZSI) function

□ inhibition of the earth-fault protection

□ inhibition of the thermal memory.

The test kit with PC offers in addition:

■ the test report (software available on request).

Portable data acquisition
GetnSet

GetnSet is a portable data acquisition and storage accessory that connects directly to the Micrologic control units of Compact and Masterpact circuit breakers to read important electrical installation operating data and Compact protection settings. This information is stored in the GetnSet internal memory and can be transferred to a PC via USB or Bluetooth for monitoring and analysis.

Overview GetnSet functions

GetnSet(1) is a portable data acquisition and storage device that works like a USB drive, letting users manually transfer data to and from a Compact and Masterpact circuit breakers or PC.
GetnSet can download operating data from Compact and Masterpact, and download or upload settings.
Downloadable operating data include measurements, the last 3 trip history records and contact wear status.
Accessible settings include protection thresholds, external relay assignment modes and pre-defined alarm configurations if applicable.

PB104017

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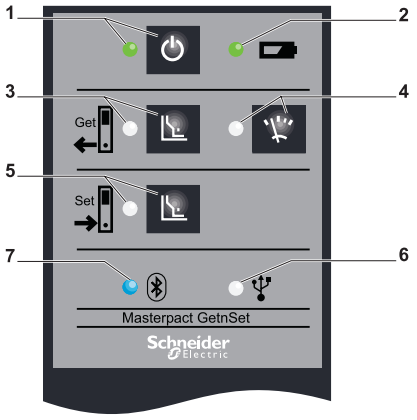
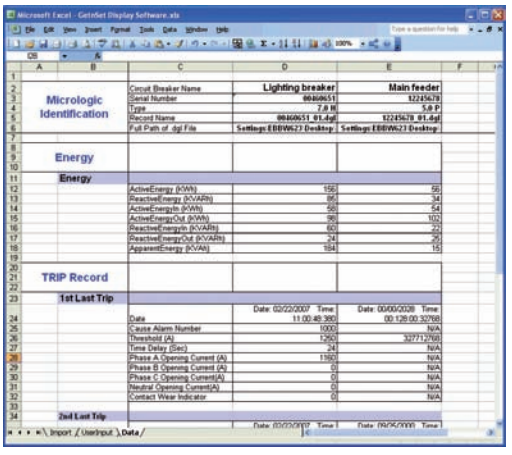


1 *On/Off*
2 *batterie indicator*
3 *Download settings*
4 *Download operating parameters*
5 *Upload settings*
6 *USB indicator*
7 *Bluetooth indicator*

DB117440



Operating data functions

Electrical installation information such as energy measurements and contact wear status is increasingly important to help reduce operating expenses and increase the availability of electrical power. Such data is often available from devices within the installation, but needs to be gathered and aggregated to allow analysis and determine effective improvement actions.
With GetnSet, this operating data can be easily read and stored as .dgl files in the internal memory. It can then be transferred to a PC via a USB or Bluetooth link and imported in an Excel spreadsheet.
The provided Excel spreadsheet can be used to display the operating data from several breakers in order to:

- analyse changes in parameters such as energy, power factor and contact wear
- compare the values of parameters between circuit breakers
- create graphics and reports using standard Excel tools

GetnSet data accessible in the Excel spreadsheet

Type of data	Micrologic	
Current	A/E	P
Energy, voltages, frequency, power, power factor	E	P
Power quality: fundamental, harmonics	-	-
Trip history	E	P
Contact wear	-	P

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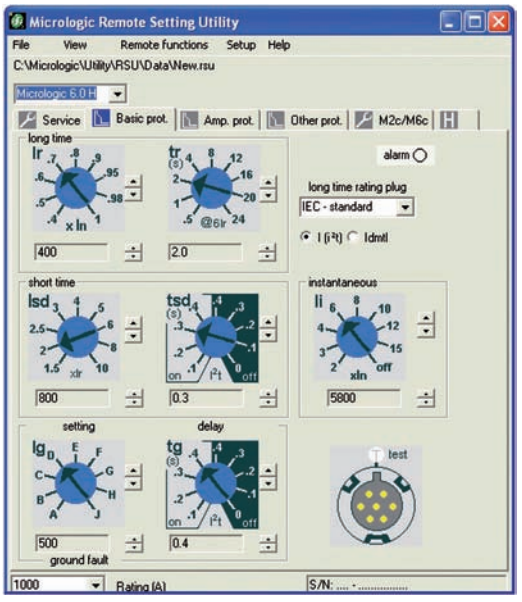

Protection setting functions

GetnSet can also be used to back up circuit breaker settings and restore them on the same device or, under certain conditions, copy them to any Compact and Masterpact circuit breakers equipped with the same type of Micrologic control unit.
This concerns only advanced settings, as other parameters must be set manually using the dials on the Micrologic control unit.

- When commissioning the installation, safeguard the configuration parameters of your electrical distribution system by creating a back-up of circuit breaker settings so that they can be restored at any time.
- The settings read by GetnSet can be transferred to a PC and are compatible with RSU software (Remote Setting Utility). Protection configurations can also be created on a PC using this software, copied to GetnSet's internal memory and uploaded to a Compact and Masterpact circuit breakers with a compatible Micrologic trip unit and dial settings.

Operating procedure

The procedure includes several steps.

- Plug GetnSet into the receptacle on the front of the Micrologic control unit of a Compact and Masterpact circuit breakers.
- On the keypad, select the type of data (operating data or settings) and the transfer direction (download or upload). This operation can be done as many times as required for the entire set of Compact and Masterpact circuit breakers.
- Downloaded data is transferred to the GetnSet internal memory and a file is created for each Compact device (either an .rsu file for settings or a.dgl file for operating data).
- Data can be transferred between GetnSet and a PC via a USB or Bluetooth connection.
- Operating data can be imported in an Excel spreadsheet and protection settings can be read with RSU (remote setting utility) software.

Features

- Battery-powered to power a Micrologic control unit even if the breaker has been opened or tripped. This battery provides power for an average of 1 hour of use, enough for more than 100 download operations.
- Can be used on Compact and Masterpact circuit breakers equipped or not equipped with a Modbus "device" communication module.
- Portable, standalone accessory eliminating the need for a PC to connect to a Compact and Masterpact circuit breakers.
- No driver or software required for GetnSet connection to a PC.
- Can be used with many circuit breakers, one after the other.
- Embedded memory sized to hold data from more than 5000 circuit breakers.
- Supplied with its battery, a cable for connection to Micrologic trip units, a USB cable for connection to a PC and a battery charger.

Compatibility

- Micrologic control units A, E, P.
- PC with USB port or Bluetooth link and Excel software.

Technical characteristics

Charger power supply	100 – 240 V; ∿1 A; 50 – 60 Hz
Charger power consumption	Max 100 W
Battery	3.3 V DC; 9 mAh; Li-Ion
Operating temperature	-20 to +60 °C
GetnSet dimensions	95 x 60 x 35 mm

Communication
Compact NS630b to 3200
COM option in Compact

All the Compact devices can be fitted with the communication function thanks to the COM option. Compact uses the Modbus communications protocol for full compatibility with the supervision management systems. An external gateway is available for communication on other networks:
Eco COM is limited to the transmission of metering data.
It is not used to communicate status and controls.

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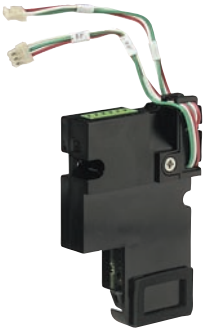

Modbus BCM ULP "device" communication module.

PB100802B-27

Modbus CCM "chassis" communication module.

For fixed devices, the COM option is made up of:
■ a Modbus BCM ULP "device" communication module, installed behind the Micrologic control unit and supplied with its set of sensors (OF, SDE ,PF and CH micro switches) its kit for connection to XF and MX1 communicating voltage releases and its COM terminal block (inputs E1 to E6).
For drawout devices, the COM option is made up of:
■ a Modbus BCM ULP "device" communication module, installed behind the Micrologic control unit and supplied with its set of sensors (OF, SDE, PF and CH micro switches) its kit for connection to XF and MX1 communicating voltage releases and its COM terminal block (inputs E1 to E6).
■ a "chassis" communication module supplied separately with its set of sensors (CE, CD and CT contacts) Modbus CCM.
Modbus BCM ULP "Device" communication module
This module is independent of the control unit. It receives and transmits information on the communication network. An infra-red link transmits data between the control unit and the communication module.
Consumption: 30 mA, 24 V.
Modbus CCM "chassis" communication module
This module is independent of the control unit. With Modbus "chassis" communication module, this module makes it possible to address the chassis and to maintain the address when the circuit breaker is in the disconnected position.
Consumption: 30 mA, 24 V.

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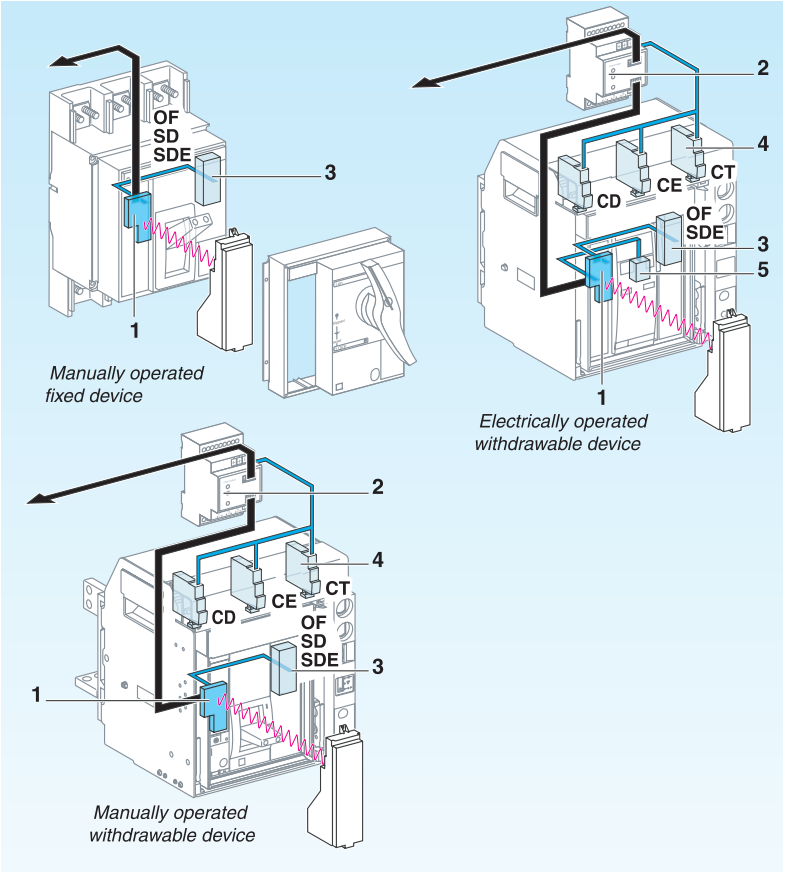


1 *Modbus BCM ULP "Device" communication module.*
2 *Modbus CCM "Chassis" communication module (option).*
3 *OF, SDE, PF and CH micro switches.*
4 *CE, CD and CT contacts.*
5 *XF, MN or MX communicating voltage releases.*
6 *Micrologic control unit.*
7 *COM terminal block (E1 to E6).*

: Hard wire.
: Modbus.

PB104863

S: Micrologic without measurement.
A: Micrologic with ammeter
E: Micrologic "Energy"
P: Micrologic "Power"

***Note:** see the description of the Micrologic control units for further details on protection and alarms, measurements, waveform capture, histories, logs and maintenance indicators.*

Four functional levels
The Compact can be integrated into a Modbus communication environment. There are four possible functional levels that can be combined.

	Switch-disconnectors	Circuit breaker			
Status indications					
ON/OFF (O/F)	■	S	A	E	P
Spring charged CH	■	S	A	E	P
Ready to close	■	S	A	E	P
Fault-trip SDE	■	S	A	E	P
Connected / disconnected / test position	■	S	A	E	P
CE/CD/CT (CCM only)		S	A	E	P
Controls					
MX1 open	■	S	A	E	P
XF close	■	S	A	E	P
Measurements					
Instantaneous measurement information	■		A	E	P
Averaged measurement information	■			E	P
Maximeter / minimeter	■		A	E	P
Energy metering	■			E	P
Demand for current and power	■			E	P
Power quality	■				
Operating assistance					
Protection and alarm settings					P
Histories				E	P
Time stamped event tables					P
Maintenance indicators			A	E	P

Communication Modbus bus

The Modbus RS 485 (RTU protocol) system is an open bus on which communicating Modbus devices (Compact NS with Modbus COM, Power Meter PM700, PM800, Sepam, Vigilohm, Compact NSX, etc.) are installed. All types of PLCs and microcomputers may be connected to the bus.

Addresses
The Modbus communication parameters (address, baud rate, parity) are entered using the keypad on the Micrologic A, E, P. For a switch-disconnector, it is necessary to use the RSU (Remote Setting Utility) Micrologic utility.

Modbus addresses		
@xx	Circuit breaker manager	(1 to 47)
@xx + 50	Chassis manager	(51 to 97)
@xx + 200	Measurement manager	(201 to 247)
@xx + 100	Protection manager	(101 to 147)

The manager addresses are automatically derived from the circuit breaker address @xx entered via the Micrologic control unit (the default address is 47).

Number of devices
The maximum number of devices that may be connected to the Modbus bus depends on the type of device (Compact with Modbus COM, PM700, PM800, Sepam, Vigilohm, Compact NSX, etc.), the baud rate (19200 is recommended), the volume of data exchanged and the desired response time. The RS 485 physical layer offers up to 32 connection points on the bus (1 master, 31 slaves).
A fixed device requires only one connection point (communication module on the device). A drawout device uses two connection points (communication modules on the device and on the chassis).
The number must never exceed 31 fixed devices or 15 drawout devices.

Length of bus
The maximum recommended length for the Modbus bus is 1200 meters.

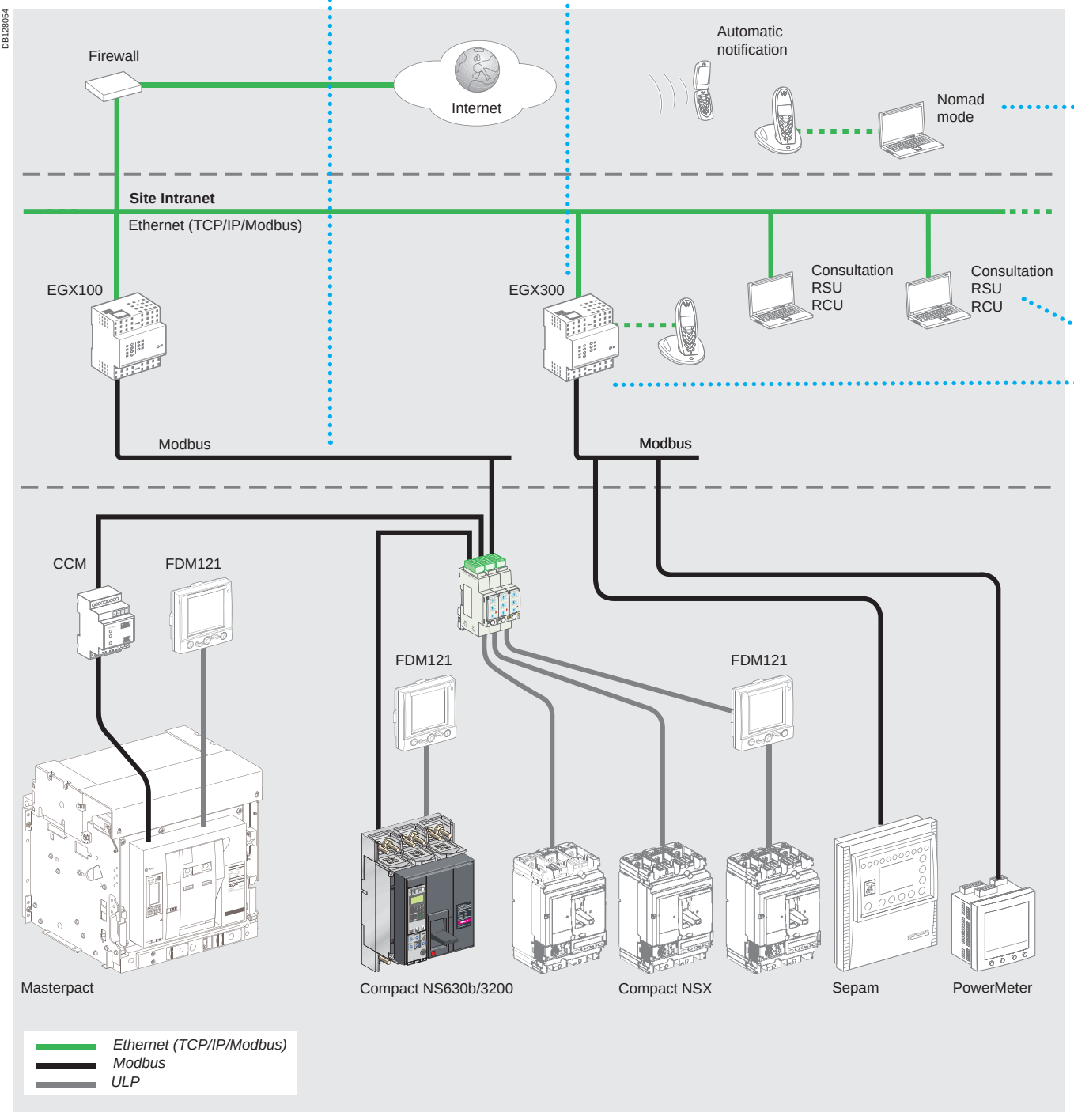
Bus power source
A 24 V DC power supply is required (less than 20 % ripple, insulation class II).

Compact communication
Networks and sofware

Compact uses the Modbus communication protocol, compatible with ION-E electrical engineering expert system software.
Two downloadable sofware (RSU, RCU) from schneider-electric.com facilitate implementation of communication functions.

Modbus

Modbus is the most widely used communication protocol in industrial networks.
It operates in master-slave mode. The devices (slaves) communicate one after the other with a gateway (master).
Compact, Compact NSX, PowerLogic and Sepam products all operate with this protocol. A Modbus network is generally implemented on an LV or MV switchboard scale. Depending on the data monitored and the desired refresh rate, a Modbus network connected to a gateway can serve 4 to 16 devices. For larger installations, a number of Modbus networks can be connected to an Ethernet network (TCP/IP/Modbus protocol) via their gateways (EGX).

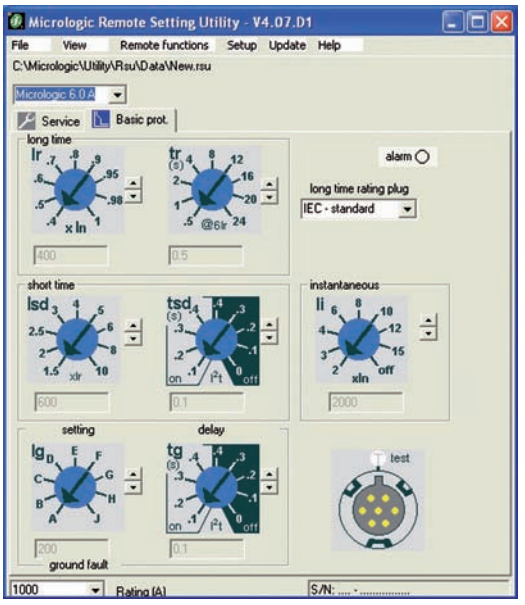


Micrologic utilities

■ Two utilities, RSU and RCU, presented on the next page, are available to assist in starting up a communicating installation. Intended for Compact and Compact NSX, the software can be downloaded from the Schneider Electric internet site.

■ The "Live update" function enables immediate updating to obtain the most recent upgrades. These easy-to-use utilities include starting assistance and on-line help. They are compatible with Microsoft Windows 2000, XP and Windows 7.

PB104805



RSU configuration screen for a Micrologic.

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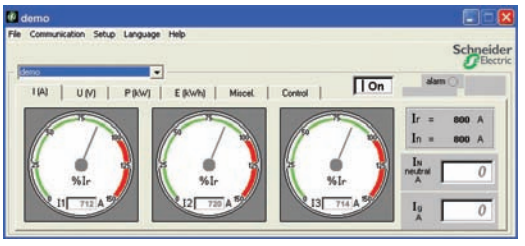

RCU mini-supervision screen for current measurements.

Gateway

The gateway has two functions:

■ access to the company intranet (Ethernet) by converting Modbus frames to the TCP/IP/Modbus protocol

■ optional web-page server for the information from the devices.

Examples include EGX300 and EGX100.

PE86181r-25

EGX300.

Compact communication
RSU and RCU utilities

Two utilities, RSU and RCU, are available to assist in starting up a communicating installation.
They can be downloaded from the Schneider Electric internet site and include a "Live update" function that enables immediate updating.

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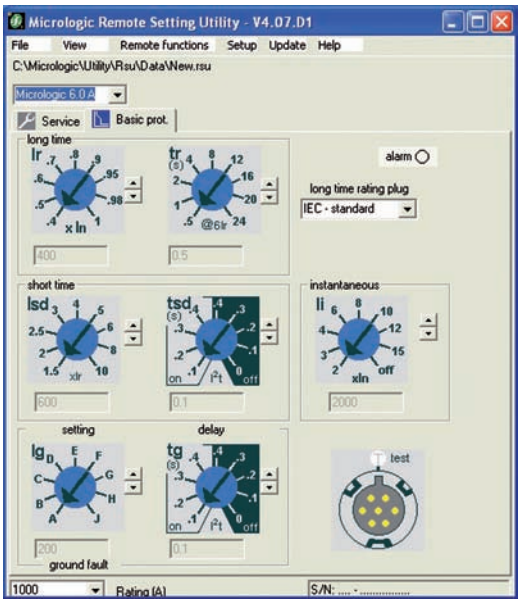

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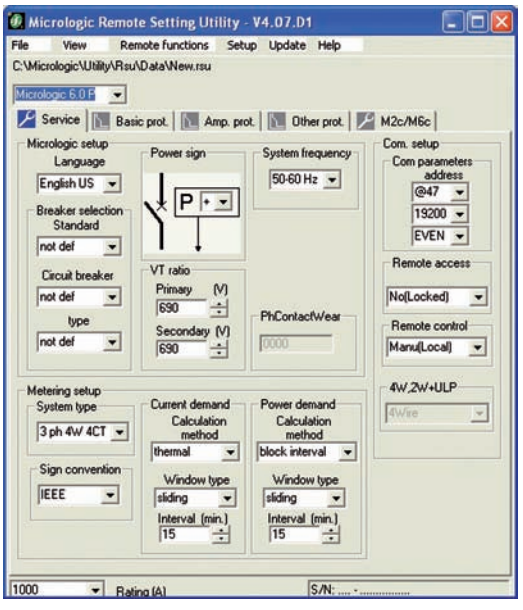
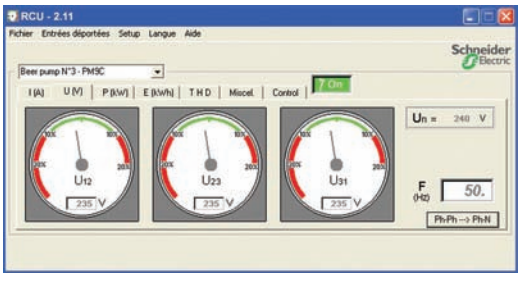


RSU: Micrologic Remote Setting Utility.

DB118723



RCU: Remote Control Utility for communication tests.

RSU (Remote Setting Utility)

This utility is used to set the protection functions and alarms for each Compact and Compact NSX device.
After connection to the network and entry of the circuit breaker Modbus address, the software automatically detects the type of trip unit installed.
There are two possible operating modes.

Off-line with the software disconnected from the communication network

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

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

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

On-line with the software connected to the network

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

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

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

Modify settings in a secure manner
■ There are different levels of security:
□ password: by default, it is the same for all devices, but can be differentiated for each device
□ locking of the Modbus interface module which must be unlocked before the corresponding device can be set remotely
□ maximum settings limited by the positions of the two dials on the trip unit.
These dials, set by the user, determine the maximum settings that can be made via the communication system.
■ Settings are modified by:
□ either direct, on-line setting of the protection settings on the screen
□ or by loading the settings prepared in off-line mode. This is possible only if the positions of the dials allow the new settings.
All manual settings made subsequently on the device have priority.

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

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

RCU (Remote Control Utility)

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

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

Open and close commands for each device
A common or individual password must first be entered.

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

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

Types of software

Masterpact, Compact and Compact NSX communication functions are designed to interface with software dedicated to electrical installations:
- switchboard supervision
- electrical installation supervision
- power system management: electrical engineering expert systems
- process control
- SCADA (Supervisory Control & Data Acquisition), EMS (Enterprise Management System) or BMS (Building Management System) type software.

Schneider Electric solutions

Electrical switchboard supervision via EGX300 Web servers

A simple solution for customers who want to consult the main electrical parameters of switchboard devices without dedicated software.
Up to 16 switchboard devices are connected via Modbus interfaces to an EGX300 Ethernet gateway integrating the functions of a web page server. The embedded Web pages can be easily configured with just a few mouse clicks. The information they provide is updated in real time.
The Web pages can be consulted using a standard Web browser on a PC connected via Ethernet to the company Intranet or remotely via a modem. Automatic notification of alarms and threshold overruns is possible via e-mail or SMS (Short Message Service).

PE86181r-25

EGX300

Electrical installation supervision via iRIO RTU

The iRIO RTU(remote terminal unit) can be used as Ethernet coupler for the PowerLogic System devices and for any other communicating devices operating under Modbus RS 485 protocol. Data is viewable via a standard web browser.

PB104859

iRIO RTU

ION-E electrical engineering expert system software

ION-E is a family of web-enabled software products for high-end power-monitoring applications. It is designed for large power systems.
ION-E offer detailed analysis of electrical events, long-duration data logging and extensive, economical report-building capabilities (e.g. consumption monitoring and tariff management).
A wide variety of screens can be displayed in real time, including more than 50 tables, analogue meters, bargraphs, alarms logs with links to display waveforms and predefined reports on energy quality and service costs.

PB104807_68

ION Enterprise Power Management Software

Other software

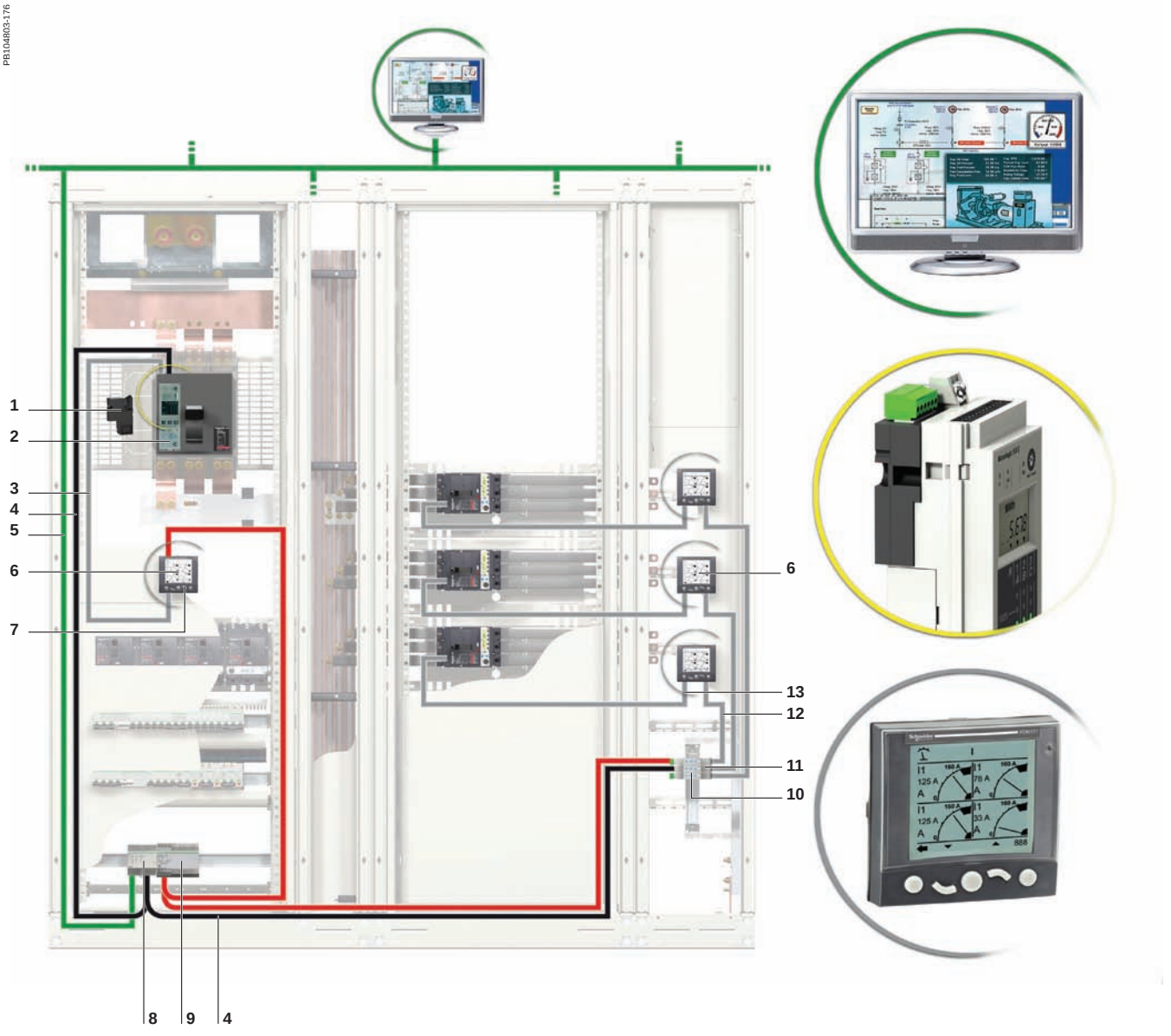
Masterpact, Compact and Compact NSX devices can forward their measurement and operating information to special software integrating the electrical installation and other technical facilities:
- SCADA process control software: Vijeo CITECT
- BMS Building Management System software: Vista.

www.schneider-electric.com

Compact communication
Communication wiring system

Wiring system UPP
The wiring system is designed for low-voltage power switchboards.
Installation requires no tools or special skills.
The prefabricated wiring ensures both data transmission (ModBus protocol) and 24 V DC power distribution for the communications modules on the Micrologic control units.

PB104803-176



1 BCM ULP: Breaker Communication Module with ULP port
2 Micrologic control unit
3 Breaker ULP cord
- 0.35 m LV434195
- 1.3 m LV434196
- 3 m LV434197

4 Modbus cable
5 Ethernet cable
6 FDM121: Front Display Module TRV00121
7 ULP linel terminators TRV00880
8 EGX100: Ethernet gateway
9 External 24 V DC power supply module
10 Modbus interface TRV00210
11 Stacking accessorie TRV00217
12 ULP cable
- 0.3 m TRV00803
- 0.6 m TRV00806
- 1 m TRV00810
- 2 m TRV00820
- 3 m TRV00830
- 5 m TRV00850

13 NSX cord
- 0.35 m LV434200
- 1.3 m LV434201
- 3 m LV434202

Motor protection
Overview of solutions

The circuit breakers presented here provide protection against short circuits and are suitable for isolation as defined by standard IEC 60947-2.
For complete protection of the motor and its control device, overload protection may be provided by either the circuit breaker or a separate Schneider Electric thermal relay.
The control device may be of the direct on-line type (with or without reversing) or of the “star-delta” type.
Combinations are governed by standard IEC 60947-4.1.

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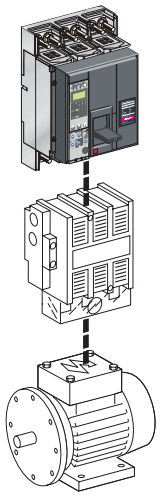


Protection coordination (as defined by IEC 60947-4)
Whatever the power of the motor, the coordination between the circuit breaker, contactor and relay can be of either type 1 or 2.
Selection depends on operational requirements concerning continuity of service and the technical skills of servicing personnel.
All type 2 have been tested under the conditions defined by standards and they are certified ASEFA/LOVAG.

Motor protection up to 750 kW

Motor rating (kW)		160…750
Compact		NS630b to 1600
		PB104839 
Breaking capacity (kA rms) 380/415 V	N	50
	H	70
	L	150

General circuit breaker characteristics page A-2

Compact NS630b to 1600 circuit breakers equipped with Micrologic control units are the same as those for distribution systems.

Accompanying control units page A-16

Micrologic electronic control units may be used on all Compact NS630b to 1600 circuit breakers.
Micrologic 2.0 A and 5.0 A electronic control units provide protection against short-circuits and overloads. Micrologic 7.0 A provides the same protection functions, plus earth-leakage protection.

Selection of a trip unit or Micrologic control unit

DB128056

P (kW) (400 V, 50 Hz)	0.37	1.1	5.5	18.5		37				110	160	250		560	750
Ir (A)	1.5	2.5	12	40	50	80	100	160	200	220	320	500	800	1000	1350
Compact NS630b … NS1600										Micrologic 2.0 A / 5.0 A / 6.0 A / 7.0 A					
										Micrologic 2.0 E / 5.0 E / 6.0 E					

Earth-leakage protection
Overview of solutions

Earth-leakage protection is obtained by:
■ installing a Micrologic 7.0 A control unit (Compact NS630b to 3200)
■ using a Vigirex relay and separate sensors (all Compact circuit breakers).

Circuit breakers equipped with a control unit offering integrated earth-leakage protection and an external rectangular sensor

Rated current (A)	630… 3200	
Compact	NS630b to 1000 N/L NS1250 and 1600 N	NS1600b to 3200

PB104844_ME

PB104845_SE

General circuit breaker characteristics page A-12

Compact NS630b to 3200 circuit breakers are presented in the “Protection of distribution systems” section.

Accompanying control units page A-22

Micrologic 7.0 A electronic control units offer earth-leakage protection as standard.

Earth-leakage protection using a Vigirex relay

Earth-leakage relay	Separate toroids	Rectangular sensors

PB100435_16_SE

051352_32_SE

06133779A

Compact circuit breaker + Vigirex relay combination

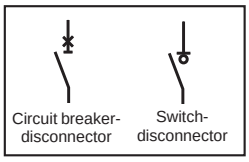
Vigirex relays may be used to add external earth-leakage protection to Compact NS circuit breakers. The circuit breakers must be equipped with an MN or MX voltage release. Vigirex relays are very useful when special time-delay or tripping-threshold values are required, or when there are major installation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

Vigirex-relay characteristics:
■ rectangular sensors up to 3200 A
■ 400 Hz distribution systems.

Options:
■ trip alarm by a fail-safe contact
■ pre-alarm LED and contact, etc.

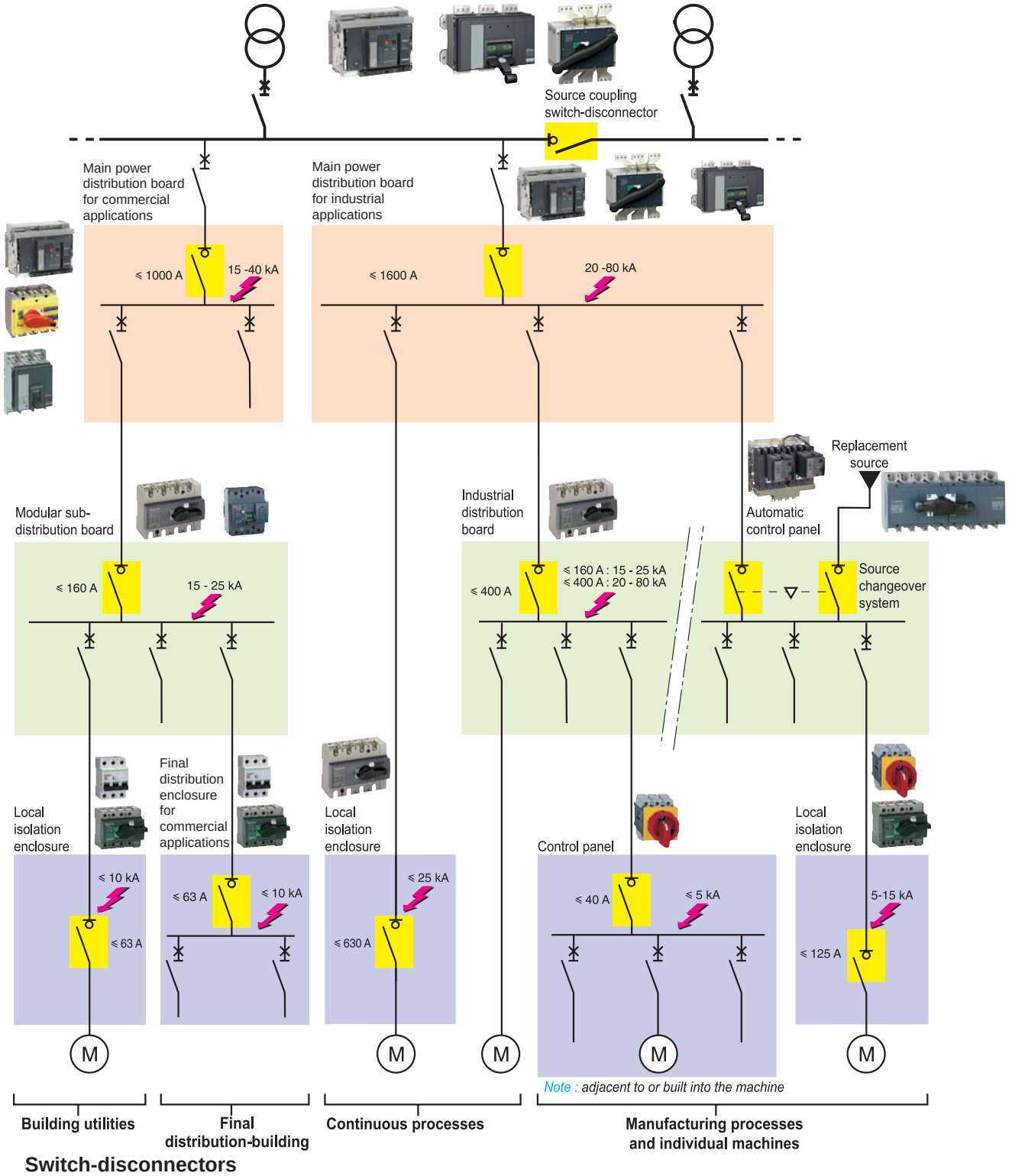
Compliance with standards:
■ IEC 60947-2, appendix M
■ IEC/EN 60755: general requirements for residual current operated protective devices
■ IEC/EN 6100-4-2 to 4-6: immunity tests
■ CISPR11: radio-frequency radiated and conducted emission tests
■ UL1053 and CSA22.2 No. 144 for RH10, RH21 and RH99 relays at supply voltages up to and including 220/240 V.

Control and isolation
Overview of solutions



Standardised symbols

DB401468



Switch-disconnectors


PB104396_17_SE

Masterpact


056470_11_SE

Compact NS


052164b-95

Interpact INS


PB101043_10

Interlocking Compact NSX


86106d

Vario


054361

NG125


PB104838

Compact NS


PB100020b

Interpact IN


052168_SE

Interpact INS


PB100840-15_SE

Source-changeover


054629_7_SE

Multi 9


056662_SE

Interpact INS

Control and isolation
Overview of solutions

Compact switch-disconnectors are used to control and isolate electrical distribution circuits. In addition to these basic functions, other functions for safety, remote control and convenience include:
- earth-leakage protection
- auxiliary MN/MX releases
- remote operation.

Compact switch-disconnectors may be interlocked with another Compact switch-disconnector or circuit breaker to constitute a source-changeover system.

PB104837

Compact NS1600 switch-disconnector.

Control and disconnection
Compact NS630bNA to NS1600NA switch-disconnectors

Installation standards require upstream protection.

PB104837

Compact NS800NA.

Compact switch-disconnectors				
Number of poles				
Control	manual		toggle direct or extended rotary handle	
	electric			
Connections	fixed			front connection rear connection
	withdrawable (on chassis)			front connection rear connection
Electrical characteristics as per IEC 60947-3 and EN 60947-3				
Conventional thermal current (A)		**Ith**	60 °C	
Rated insulation voltage (V)		**Ui**		
Rated impulse withstand voltage (kV)		**Uimp**		
Rated operational voltage (V)		**Ue**	AC 50/60 Hz	
Rated operational current		**Ie**	AC 50/60 Hz	
				220/240 V 380/415 V 440/480 V (1) 500/525 V 660/690 V
Short-circuit making capacity		**Icm**	(kA peak)	
Short-time withstand current		**Icw**	(A rms)	0.5 s 20 s
Suitability for isolation				
Durability (C-O cycles)	mechanical			
	electrical	AC	440 V	AC23A/In
Positive contact indication				
Pollution degree				
Protection				
Add-on earth-leakage protection			combination with Vigirex relay	
Additional indication and control auxiliaries				
Indication contacts				
Voltage releases		MX shunt release MN undervoltage release		
Remote communication by bus				
Device status indications (communicating auxiliary contacts)				
Device remote operation (communicating motor mechanism)				
Installation				
Accessories		terminal extensions and spreaders terminal shields and interphase barriers escutcheons		
Dimensions (mm) W x H x D		fixed		3P 4P
Weight (kg)		fixed		3P 4P
Source-changeover system (see section "on source-changeover systems")				
Manual source-changeover systems, remote-operated and automatic				

(1) Suitable for 480 V NEMA.

	NS630bNA	NS800NA	NS1000NA	NS1250NA	NS1600NA
	3, 4	3, 4	3, 4	3, 4	3, 4
	■	■	■	■	■
	■	■	■	■	■
	■	■	■	■	■
	■	■	■	■	■
	■	■	■	■	■
	■	■	■	■	■
	■	■	■	■	■
	630	**800**	**1000**	**1250**	**1600**
	800	800	800	800	800
	8	8	8	8	8
	690	690	690	690	690
	AC23A	**AC23A**	**AC23A**	**AC23A**	**AC23A**
	630	800	1000	1250	1600
	630	800	1000	1250	1600
	630	800	1000	1250	1600
	630	800	1000	1250	1600
	630	800	1000	1250	1600
	52	52	52	52	52
	25	25	25	25	25
	4	4	4	4	4
	■	■	■	■	■
	10000	10000	10000	10000	10000
	2000	2000	2000	2000	1000
	■	■	■	■	■
	3	3	3	3	3
	■				
	■				
	■				
	■				
	■				
	■				
	■				
	■				
	■				
	327 x 210 x 147				
	327 x 280 x 147				
	14				
	18				
	■				

Control and disconnection
Compact NS1600bNA to 3200NA switch-disconnectors

Installation standards require upstream protection. However, Compact NS1600b to 3200NA switch-disconnectors are self-protected for all currents higher than 130 kA peak.

PB104838

Compact NS2000NA.

Compact switch-disconnectors

Number of poles			
Control	manual	toggle	
		direct or extended rotary handle	
	electric		
Connections	fixed		front connection
			rear connection
	withdrawable (on chassis)		front connection
			rear connection
Electrical characteristics as per IEC 60947-3 and EN 60947-3			
Conventional thermal current (A)	**Ith**	60 °C	
Rated insulation voltage (V)	**Ui**		
Rated impulse withstand voltage (kV)	**Uimp**		
Rated operational voltage (V)	**Ue**	AC 50/60 Hz	
Rated operational current	**Ie**	AC 50/60 Hz	
			220/240 V
			380/415 V
			440/480 V (1)
			500/525 V
			660/690 V
Short-circuit making capacity	**Icm**	(kA peak)	
Short-time withstand current	**Icw**	(A rms)	3 s
Integrated instantaneous protection (kA peak ±10 %)			
Suitability for isolation			
Durability (C-O cycles)	mechanical		
	electrical	AC	440 V AC23A/In
Positive contact indication			
Pollution degree			
Protection			
Add-on earth-leakage protection	combination with Vigirex relay		
Additional indication and control auxiliaries			
Indication contacts			
Voltage releases	MX shunt release		
	MN undervoltage release		
Installation			
Accessories	escutcheons		
Dimensions (mm)	fixed		3P
W x H x D			4P
Weight (kg)	fixed		3P
			4P
Source-changeover system (see section "on source-changeover systems")			
Manual source-changeover systems, remote-operated and automatic			

(1) Suitable for 480 V NEMA.

	NS1600bNA	NS2000NA	NS2500NA	NS3200NA
	3, 4	3, 4	3, 4	3, 4
	■	■	■	■
	-	-	-	-
	-	-	-	-
	■	■	■	■
	-	-	-	-
	-	-	-	-
	-	-	-	-
	1600	2000	2500	3200
	800	800	800	800
	8	8	8	8
	690	690	690	690
	AC23A	**AC23A**	**AC23A**	**AC23A**
	1600	2000	2500	3200
	1600	2000	2500	3200
	1600	2000	2500	3200
	1600	2000	2500	3200
	1600	2000	2500	3200
	135	135	135	135
	32	32	32	32
	130	130	130	130
	■	■	■	■
	6000	6000	6000	6000
	1000	1000	1000	1000
	■	■	■	■
	3	3	3	3
	■			
	■			
	■			
	■			
	■			
	350 x 420 x 160			
	350 x 535 x 160			
	23			
	36			
	-			

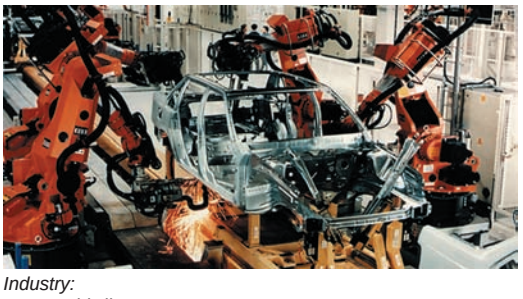
Source-changeover systems
Presentation

PB100843

PB100844

Commercial and service sector:
operating rooms in hospitals
- *safety systems for tall buildings*
- *computer rooms (banks, insurance companies, etc.)*
- *lighting systems in shopping centres…*

PB100945



Industry:
- *assembly lines*
- *engine rooms on ships*
- *critical auxiliaries in thermal power stations…*

PB100846

PB100847

Infrastructures:
- *port and railway installations*
- *runway lighting systems*
- *control systems on military sites…*

Manual source-changeover system
This is the most simple type. It is controlled manually by an operator and consequently the time required to switch from the normal to the replacement source can vary.
A manual source-changeover system is made up of two or three mechanically interlocked manually-operated circuit breakers or switch-disconnectors.

Remote-operated source-changeover system
This is the most commonly employed system for devices with high ratings (above 400 A). No human intervention is required. Transfer from the normal to the replacement source is controlled electrically.
A remote-controlled source-changeover system is made up of two or three circuit breakers or switch-disconnectors linked by an electrical interlocking system that may have different configurations. In addition, a mechanical interlocking system protects against electrical malfunctions or incorrect manual operations.

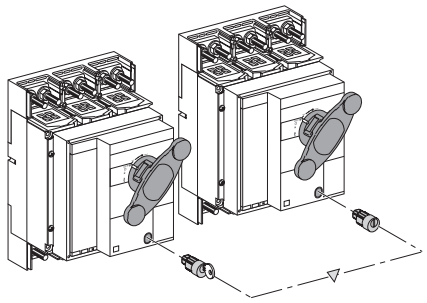
Automatic source-changeover systems
An automatic controller may be added to a remote-operated source-changeover system for automatic source control according to programmable operating modes. This solution ensures optimum energy management:
- transfer to a replacement source according to external requirements
- management of power sources
- regulation
- emergency source replacement, etc.

The automatic controller may be fitted with an option for communication with a supervisor.

Communication option
The communication option must not be used to control the opening or closing of source-changeover system circuit breakers. It should be used only to transmit measurement data or circuit breaker status.
The eco COM option is perfectly suited to these equipments.

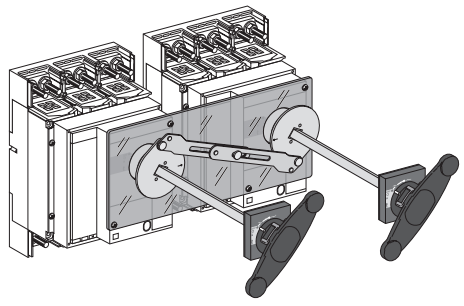
A manual source-changeover system can be installed on two to three manually-operated circuit breakers or switch-disconnectors. Interlocking is mechanical. Interlocks prevent connection to both sources at the same time, even momentarily.

DB401829



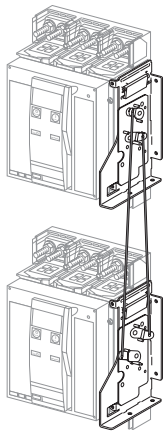
Interlocking with keylocks.

DB401830



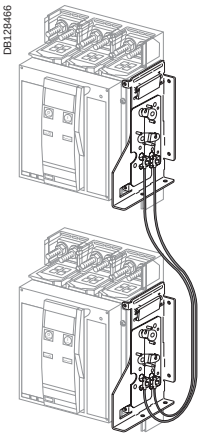
Interlocking of two devices with rotary handles.

DB128465



Interlocking with connecting rods

DB128466



Interlocking with cables

Interlocking of two devices with rotary handles

The rotary handles are padlocked with the devices in the OFF position.
The mechanism inhibits the two devices being closed at the same time, but does allow for both to be open (OFF) at the same time.

Combinations of Normal and Replacement devices
All Compact NS630b to 1600 circuit breakers and switch-disconnectors with rotary handles can be interlocked.
Interlocking of a Compact NS630b with a Compact NS630b to 1600 is not possible.

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

Interlocking uses two identical keylocks with a single key. This solution enables interlocking between two devices that are physically distant or that have significantly different characteristics, for example between a low and a medium-voltage device, or between Compact NS circuit breakers and switch-disconnectors.
A system of wall-mounted units with captive keys makes possible a large number of combinations between many devices.

Combinations of Normal and Replacement devices
All Compact NS630b to 1600 circuit breakers and switch-disconnectors with rotary handles or motor mechanisms can be interlocked.

Interlocking of two Compact NS630b to 1600 devices using connecting rods

The two devices must be mounted one above the other (either 2 fixed or 2 withdrawable/drawout devices).

Installation
This function requires:
- an adaptation fixture on the right side of each circuit breaker or switch-disconnector
- a set of connecting rods with no-slip adjustments.

The adaptation fixtures, connecting rods and circuit breakers or switch-disconnectors are supplied separately, ready for assembly by the customer.
The maximum vertical distance between the fixing planes is 900 mm.

Possible combinations of "Normal" and "Replacement" source circuit breakers
Combinations are possible between Compact NS630b to NS1600 devices and between Masterpact NT and Masterpact NW devices.

Interlocking of two Compact NS630b to 1600 devices using cables

For cable interlocking, the circuit breakers may be mounted one above the other or side-by-side.
The interlocked devices may be fixed or drawout, three-pole or four-pole, and have different ratings and sizes.

Installation
This function requires:
- an adaptation fixture on the right side of each device
- a set of cables with no-slip adjustments.

The maximum distance between the fixing planes (vertical or horizontal) is 2000 mm.

Possible combinations of "Normal" and "Replacement" source circuit breakers

"Normal N"	"Replacement" R			
	NS630b to NS1600	NT06 to NT16	NW08 to NW40	NW40b to NW63
NS630b to NS1600				
Ratings 250... 1600 A	■	-	-	-

It is not possible to combine Compact NS630b to 1600 and Masterpact (NT or NW) devices.

Source-changeover systems
Electrical interlocking

Electrical interlocking is used with a mechanical interlocking system.
An automatic controller may be added to take into account information from the distribution system.

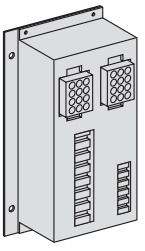
Moreover, the relays controlling the “normal” and “replacement” circuit breakers must be mechanically and/or electrically interlocked to prevent them from giving simultaneous closing commands.

Electrical interlocking is carried out by an electrical control device.
For Compact NS630b to 1600, this function can be implemented in one of two ways:
■ using the IVE unit
■ by an electrician in accordance with the chapter "Electrical Diagrams" of the catalogue source-changeover system.

Characteristics of the IVE unit
■ external connection terminal block:
□ inputs: circuit breaker control signals
□ outputs: status of the SDE contacts on the “Normal” and “Replacement” source circuit breakers
■ 2 connectors for the two “Normal” and “Replacement” source circuit breakers:
□ inputs:
- status of the OF contacts on each circuit breaker (ON or OFF)
- status of the SDE contacts on the “Normal” and “Replacement” source circuit breakers

□ outputs: power supply for operating mechanisms
■ control voltage:
□ 24 to 250 V DC
□ 48 to 415 V 50/60 Hz - 440 V 60 Hz.
The IVE unit control voltage must be same as that of the circuit breaker operating mechanisms.

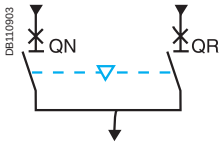
DB128058



IVE unit.

Necessary equipment
For Compact NS630b to 1600, each circuit breaker must be equipped with:
■ a motor mechanism
■ an available OF contact
■ a CE connected-position contact (carriage switch) on withdrawable circuit breakers
■ an SDE contact.

Standard configuration for Compact NS

Types of mechanical interlocking	Possible combinations		Typical electrical diagrams	Diagram no.
2 devices				
DB110503 	QN	QR	**Compact NS630b to 1600:**	
	0	0	■ electrical interlocking with lockout after fault:	
	1	0	□ permanent replacement source (without IVE)	**51201180**
	0	1	□ with EPO by MX (without IVE)	**51201181**
			□ with EPO by MN (without IVE)	**51201182**
			□ permanent replacement source (with IVE)	**51201183**
			□ with EPO by MX (with IVE)	**51201184**
			□ with EPO by MN (with IVE)	**51201185**
			■ automatic control without lockout after fault:	
			□ permanent replacement source (without IVE)	**51201186**

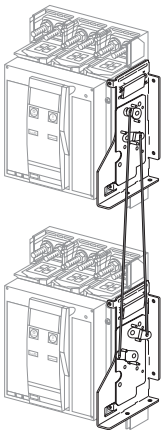
PB100857_16_SE

Control plate.

PB100856_15_SE

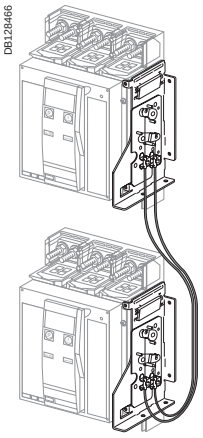
Controller.

DB128465



Interlocking by rods.

DB128466

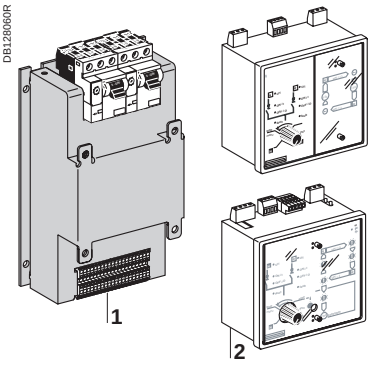


Interlocking by cables.

Source-changeover system with a controller

In this case, changeovers between the Normal and Replacement sources under predefined conditions are initiated by a Schneider Electric controller.

DB128060R



Switching between sources can be automated by adding:

1 *ACP control plate*

2 *BA or UA controller, or an electrical system provided by the installer for NS630b to 1600. Electrical system example: part no. 51156904 and 51156904 in the source-changeover system catalogue.*

By combining a remote-operated source-changeover system with an integrated BA or UA automatic controller, it is possible to automatically control source transfer according to user-selected sequences.
These controllers can be used on source-changeover systems comprising 2 circuit breakers.
For source-changeover systems comprising 3 circuit breakers, the automatic control diagram must be prepared by the installer as a complement to to diagrams provided in the “electrical diagrams” section of this catalogue.

PB100855_SE

BA controller.

PB100856_SE

UA controller

Controller		BA	UA
4-position switch			
Compatible circuit breaker		All Compact NS circuit breaker	
Automatic operation		■	■
Forced operation on "Normal" source		■	■
Forced operation on "Replacement" source		■	■
Stop (both Normal and Replacement sources OFF)		■	■
Automatic operation			
Monitoring of the "Normal" source and automatic transfer		■	■
Generator set startup control			■
Delayed shutdown (adjustable) of engine generator set			■
Load shedding and reconnection of non-priority circuits			■
Transfer to the “Replacement” source if one of the phases of the “Normal” phase is absent			■
Test			
By opening the P25M circuit breaker supplying the controller		■	
By pressing the test button on the front of the controller			■
Indications			
Circuit breaker status indication on the front of the controller: on, off, fault trip		■	■
Automatic mode indication contact		■	■
Other functions			
Selection of type of "Normal" source (single-phase or three-phase) (1)			■
Voluntary transfer to "Replacement" source (e.g. energy-management commands)		■	■
During peak-tariff periods (energy-management commands) forced operation on "Normal" source if "Replacement" source not operational			■
Additional control contact (not in controller). Transfer to "Replacement" source only if contact closed (e.g. used to test the frequency of UR)		■	■
Setting of maximum startup time for the replacement source			■
Options			
Communication option			■
Power supply			
Control voltages (2)	110 V	■	■
	220 to 240 V 50/60 Hz	■	■
	380 to 415 V 50/60 Hz	■	■
	440 V 60 Hz	■	■
Operating thresholds			
Undervoltage	0.35 Un ⩽ voltage ⩽ 0.7 Un	■	■
Phase failure	0.5 Un ⩽ voltage ⩽ 0.7 Un		■
Voltage presence	voltage ⩾ 0.85 Un	■	■
IP degree of protection (EN 60529) and IK degree of protection against external mechanical impacts (EN 50102)			
Front	IP40	■	■
Side	IP30	■	■
Connectors	IP20	■	■
Front	IK07	■	■
Characteristics of output contacts (dry, volt-free contacts)			
Rated thermal current (A)	8		
Minimum load	10 mA at 12 V		
Output contacts: Position of the Auto/Stop switch		■	■
Load shedding and reconnection order			■
Generator set start order			■

		AC				DC	
Utilisation category (IEC 60947-5-1)		AC12	AC13	AC14	AC15	DC12	DC13
Operational current (A)	24 V	8	7	5	6	8	2
	48 V	8	7	5	5	2	-
	110 V	8	6	4	4	0.6	-
	220/240 V	8	6	4	3	-	-
	250 V	-	-	-	-	0.4	-
	380/415 V	5	-	-	-	-	-
	440 V	4	-	-	-	-	-
	660/690 V	-	-	-	-	-	-

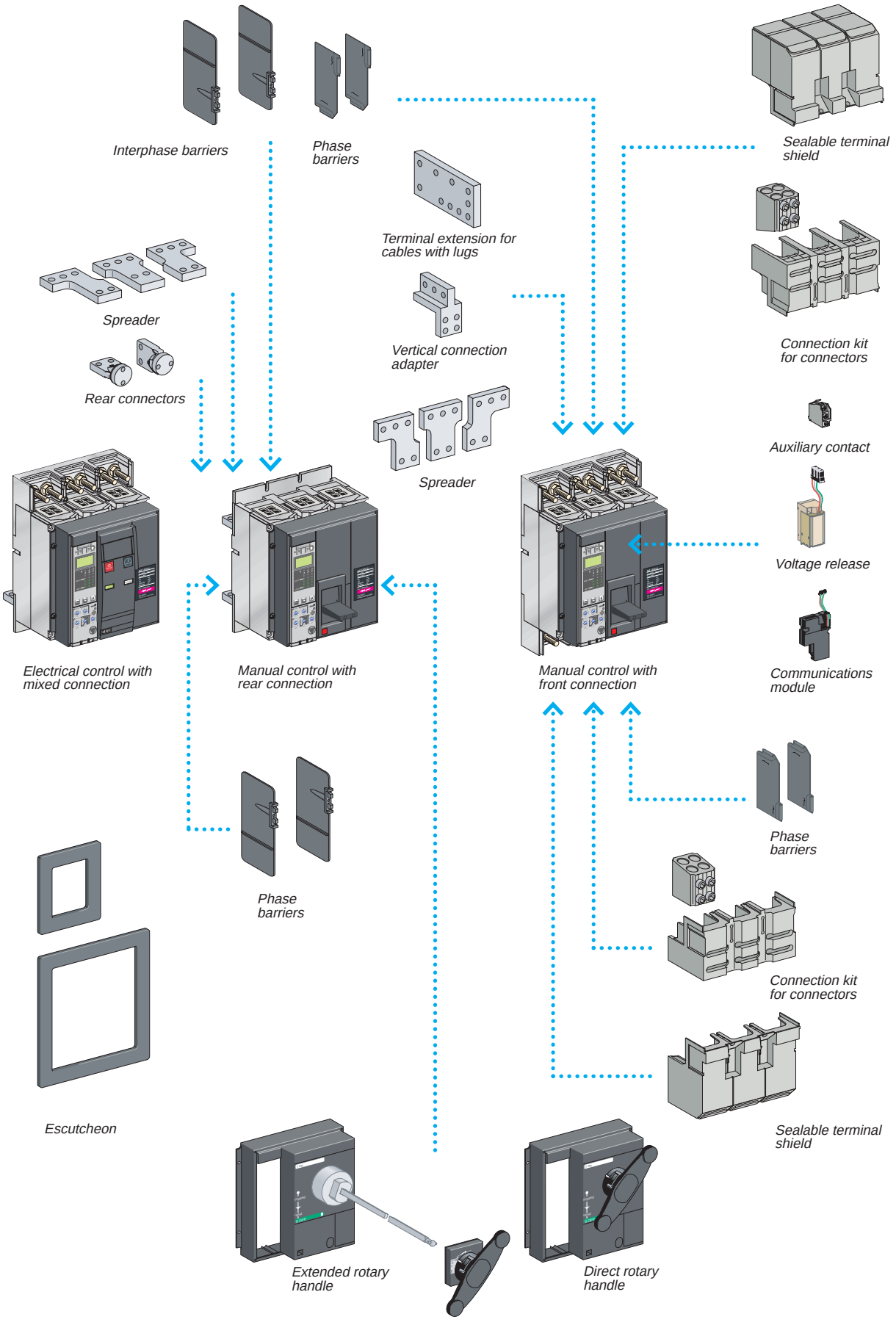
(1) For example, 220 V single-phase or 220 V three-phase.

(2) The controller is powered by the ACP control plate. The same voltage must be used for the ACP plate, the IVE unit and the operating mechanisms. If this voltage is the same as the source voltage, then the “Normal” and “Replacement” sources can be used directly for the power supply. If not, an isolation transformer must be used.

Electrical and mechanical accessories

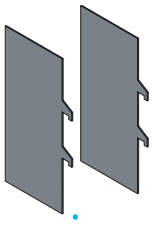
Compact NS630b to 1600 (fixed version)

DB128062

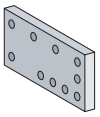


Compact NS630b to 1600 (withdrawable version)

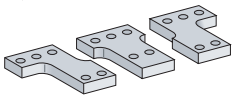
DB128035



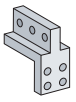
Interphase barriers



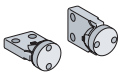
Terminal extension for cables with lugs



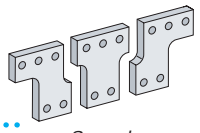
Spreader



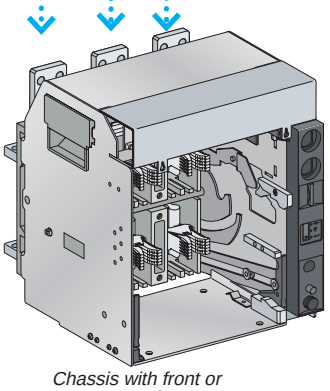
Vertical connection adapter



Rear connectors

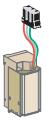


Spreader

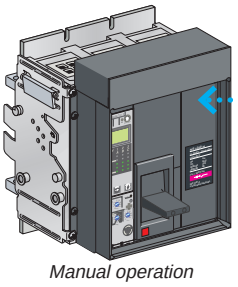


Chassis with front or rear connection

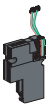
Auxiliary contact



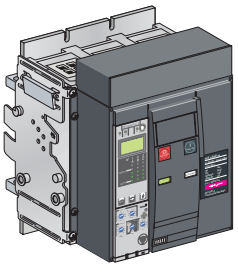
Voltage release



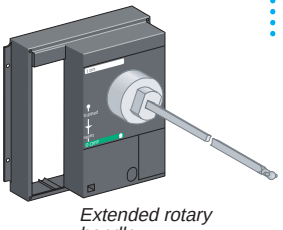
Manual operation



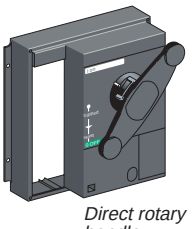
Communications module



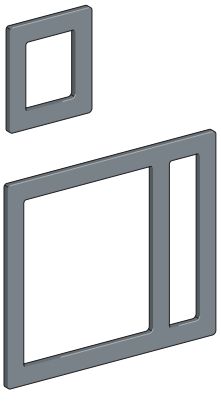
Electrical operation



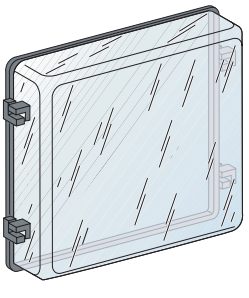
Extended rotary handle



Direct rotary handle



Escutcheon



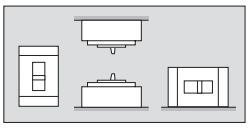
Transparent cover

Electrical and mechanical accessories
Compact NS630b to 1600

PB103391_39_SE

Fixed Compact NS800.

DB128034

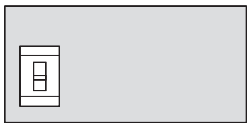


The withdrawable configuration makes it possible to:
- extract and/or rapidly replace the circuit breaker without having to touch connections;
- allow for the addition of future circuits at a later date.

059782N_I_50_SE_ME

Withdrawable Compact NS800H.

DB128069

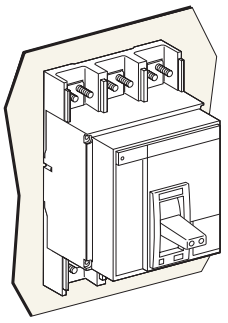


Installation

Fixed configuration

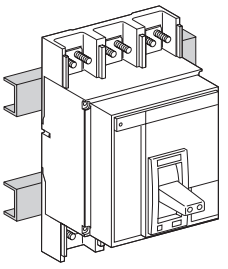
Compact NS630b to 1600 circuit breakers may be installed vertically, horizontally or flat on their back.

DB128063



Mounting on a backplate.

DB128064

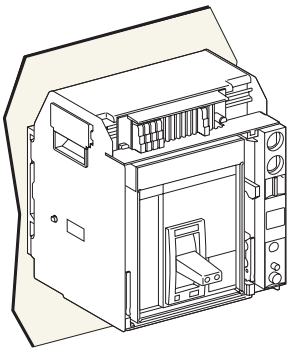


Mounting on rails.

Withdrawable configuration

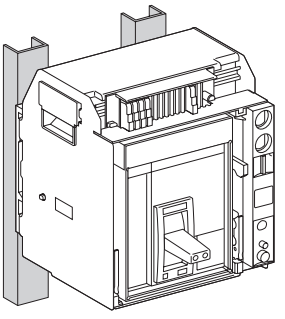
Compact NS630b to 1600 circuit breakers should be installed vertically only.

DB128065



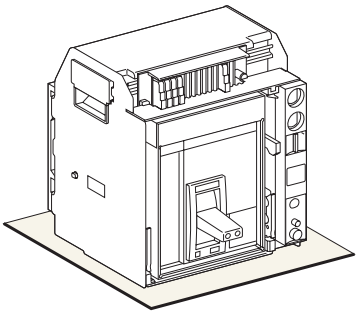
Mounting on a backplate.

DB128066



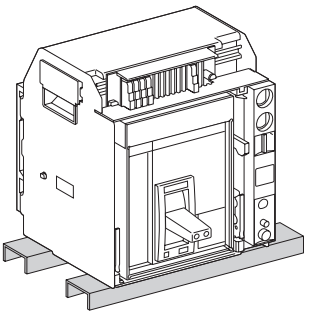
Rear mounting on rails.

DB128067



Device on mounting plate.

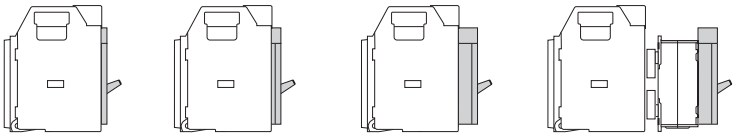
DB128068



Device on rails.

The device may be in one of four positions on the chassis:
■ connected position. The power circuits and auxiliary contacts are all connected
■ test position. The power circuits are disconnected. The auxiliary contacts are still connected and the device can be operated electrically
■ disconnected position. The power circuits and auxiliary contacts are all disconnected, however the device is still mounted on the chassis. It can be operated manually (ON, OFF, "push to trip").
■ removed position. All circuits are disconnected. The device simply rests on the chassis rails and can be removed.

DB128070



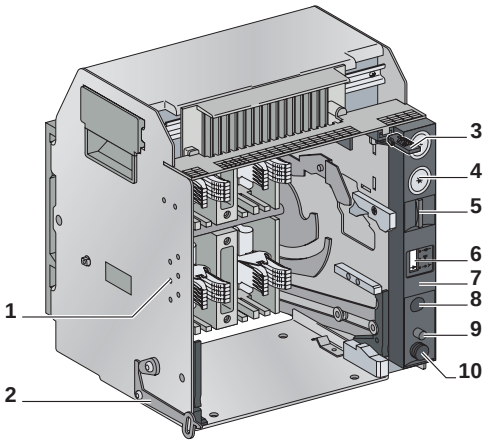
Connected *Test* *Disconnected* *Removed*

The multifunctional chassis for Compact NS630b to 1600 devices is particularly suited for incoming circuit breakers. Features include:
■ device connection and disconnection through a door, using a crank that can be stored in the chassis
■ three positions (connected, test and disconnected) that are indicated:
□ locally by a position indicator
□ remotely by carriage switches (3 for the connected position, 2 for the disconnected position and 1 for the test position)
■ circuit breaker ON/OFF commands through a switchboard front panel.

Locking
There are extensive locking possibilities:
■ chassis locking in connected, disconnected and test positions using three padlocks and two keylocks, on the switchboard front panel
■ door interlock (inhibits door opening with breaker in connected position)
■ racking interlock (inhibits racking with door open)
■ locking in each of the connected, disconnected and test positions during device connection or disconnection. Continuation to the next position requires pressing a release button to free the crank.

Other safety function
Mismatch protection ensures that a circuit breaker is installed only in a chassis with compatible characteristics.

DB128071



1 *mismatch protection*
2 *door interlock*
3 *racking interlock*
4 *keylock locking*
5 *padlock locking*
6 *position indicator*
7 *chassis front plate (accessible with cubicle door closed)*
8 *crank entry*
9 *reset button*
10 *crank storage*

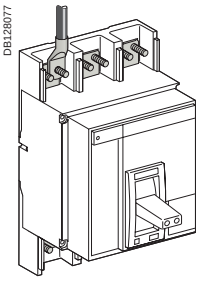
Electrical and mechanical accessories
Compact NS630b to 1600 (cont.)

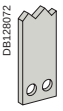
Types of connection

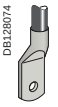
Fixed device

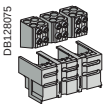
Front connections (N, L) — **Connection by:**

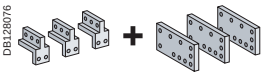
bars | bare cables (except L) | cables with lugs





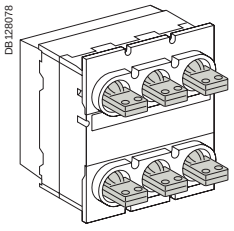


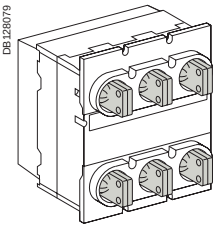


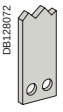


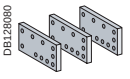
Rear connections (N, L, LB) — **Connection by:**

Horizontal: | Vertical: | bars | cables with lugs





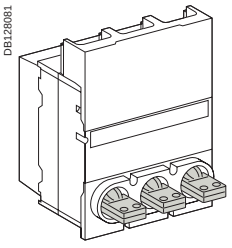


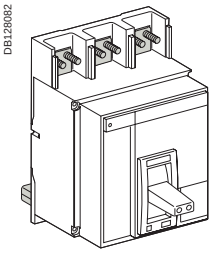


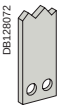
Simply turn a horizontal rear connector 90° to make it a vertical connector.

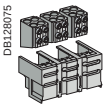
Combination of front and rear connections (N, L) — **Connection by:**

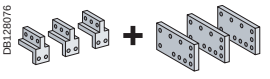
bars | bare cables (except L) | cables with lugs







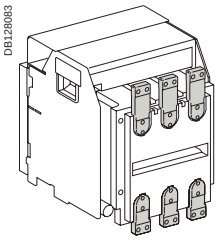


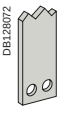


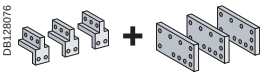
Withdrawable device

Front connections — **Connection by:**

bars | cables with lugs

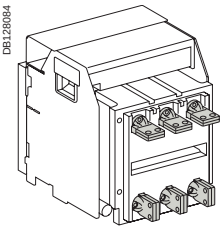


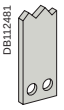


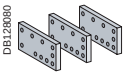


Rear connections — **Connection by:**

bars | cables with lugs

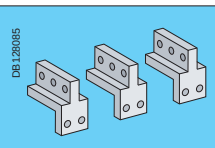
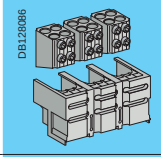
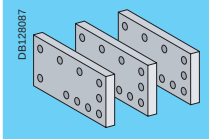
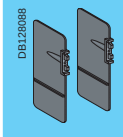
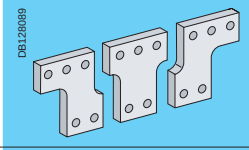
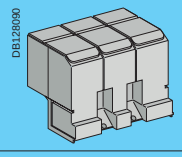
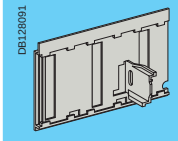
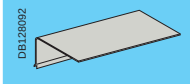






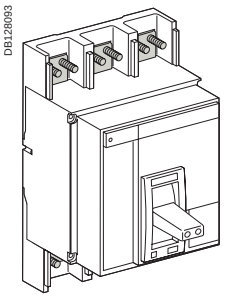
To ensure performance and isolation, depending on the type of circuit breaker (N, L, LB) and type of connection, certain isolation accessories are mandatory.

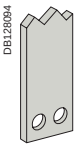
Connections accessories

Type of accessories		For Compact NS630b to NS1600			
		Fixed:		Withdrawable:	
		Front connection	Rear connection	Front connection	Rear connection
Vertical-connection adapters	 DB128085	N, L	-	N, L, LB	-
Set of bare-cable connectors and terminal shields for ratings ⩽ 1250 A	 DB128086	N	-	-	-
Cable lug adapters	 DB128087	N, L	N, L, LB	N, L, LB	N, L, LB
Interphase barriers	 DB128088	N, L, LB (1) (2)	N, L, LB (1)	-	N, L, LB (1)
Spreaders	 DB128089	N, L	N, L, LB	N, L, LB	N, L, LB
Connection shield	 DB128090	N, L	-	-	-
Safety shutters with locking by padlocks (IP20)	 DB128091	-	-	N, L, LB *(standard)*	N, L, LB *(standard)*
Arc chute screen	 DB128092	N, L (1) (2)	-	-	-

(1) Mandatory for voltages ⩾ 500 V unless using the bare-cable connector + terminal shield kit.
(2) Mandatory for fixed devices with L and LB performance levels, whatever the voltage.

Electrical and mechanical accessories
Compact NS630b to 1600 (cont.)

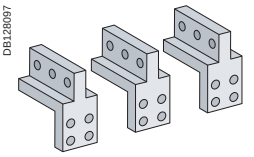

DB128093


DB128094

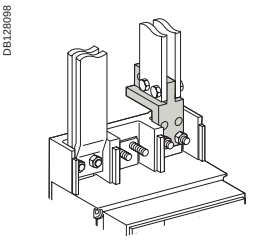
Front connection of fixed devices

Bars

Fixed, front-connection Compact NS630b to 1600 devices are equipped with terminals comprising captive screws for direct connection of bars.
Other connection possibilities for bars include vertical-connection adapters for edgewise bars and spreaders to increase the pole pitch to 95 mm.
If the vertical connection adapters are front oriented, then it is mandatory to install the arc chute screen in order to comply with the safety clearances.


DB128097

Vertical-connection adapters.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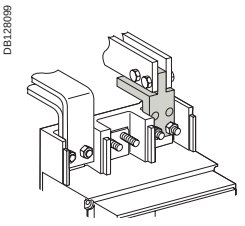
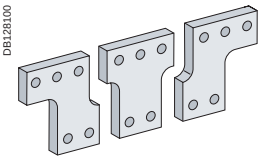
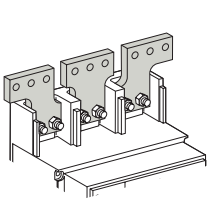

DB128099


DB128100

Spreaders.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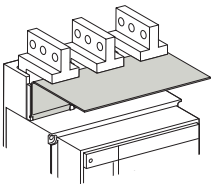
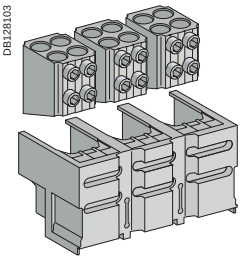

DB128102

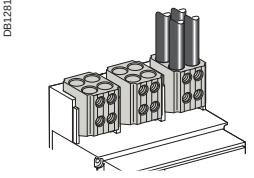

DB128095

Bare cables

Special sets of connectors and terminal shields may be used to connect up to four 240 mm^2 copper or aluminium cables for each phase. Bare cable connection is possible for ratings up to and including 1250 A.


DB128103

4-cable connectors.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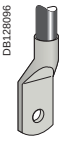
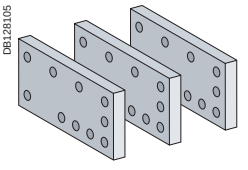
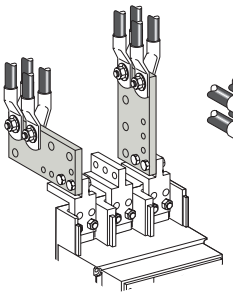

DB128096

Cables with lugs

Cable lug adapters are combined with the vertical-connection adapters.
One to four cables with crimped lugs (⩽ 300 mm^2) may be connected.
To ensure stability, spacers must be positioned between the terminal extensions.
If the cable lug adapters are installed over the top of the arc chute chambers, then it is mandatory to install the arc chute screen in order to comply with the safety clearances.


DB128105

Cable lug adapters.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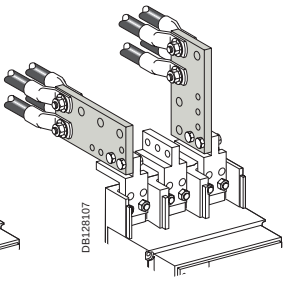
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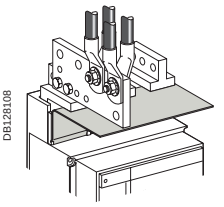
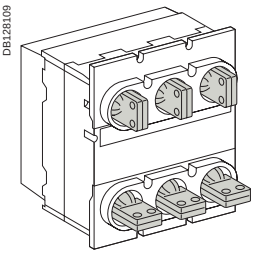
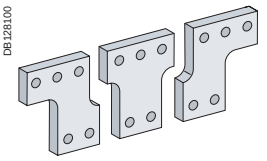

DB128108

Rear connection of fixed devices

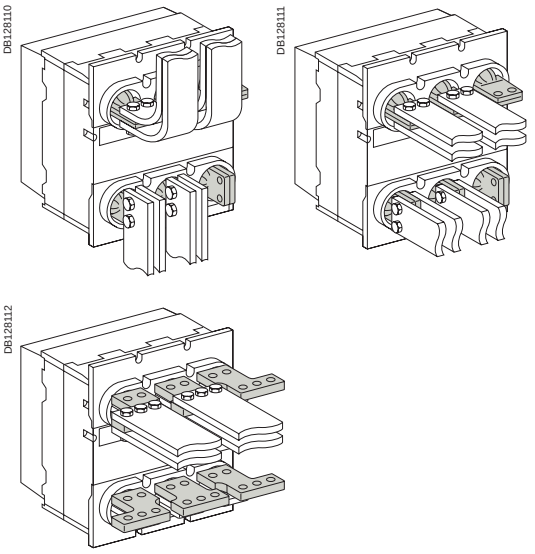


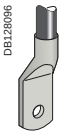
Bars

Fixed, rear-connection Compact NS630b to 1600 devices equipped with horizontal or vertical connectors may be directly connected to flat or edgewise bars, depending on the position of the connectors.
Spreaders are available to increase the pole pitch to 95 mm.



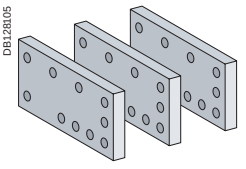
Spreaders.



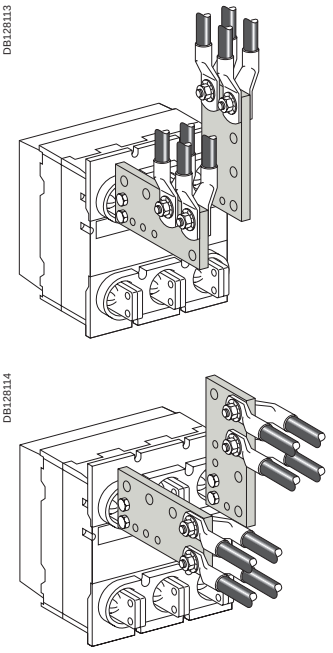


Cables with lugs

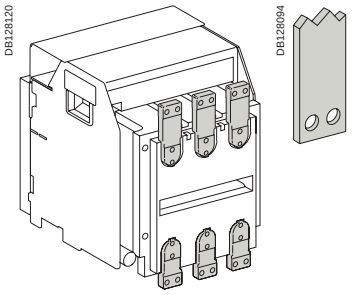
Cable lug adapters enable connection of one to four cables with crimped lugs (⩽ 300 mm^2).
To ensure stability, spacers must be positioned between the terminal extensions.



Cable lug adapters.



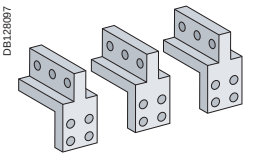
Electrical and mechanical accessories
Compact NS630b to 1600 (cont.)



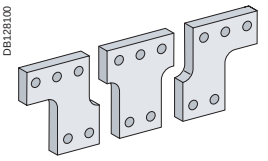
Front connection of withdrawable devices

Bars

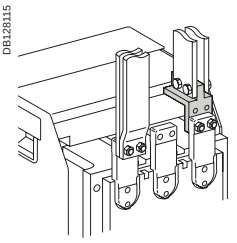
Withdrawable, front-connection Compact NS630b to 1600 devices are suitable for direct connection of bars. Other connection possibilities for bars include vertical-connection adapters for edgewise bars and spreaders to increase the pole pitch to 95 mm.

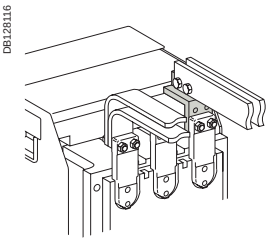


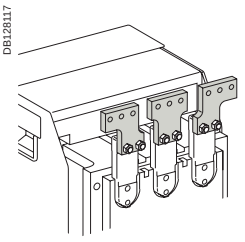
Vertical-connection adapters.



Spreaders.

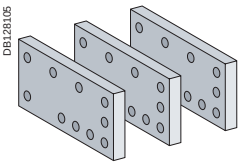




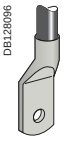


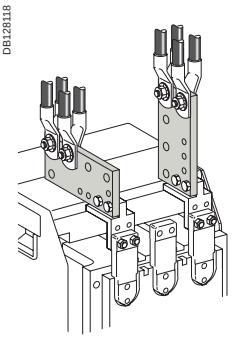
Cables with lugs

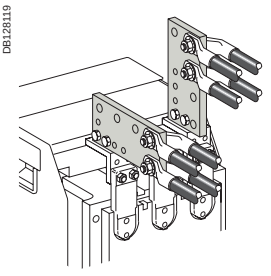
Cable lug adapters enable connection of one to four cables with crimped lugs (≤ 300 mm^2).
To ensure stability, spacers must be positioned between the terminal extensions.



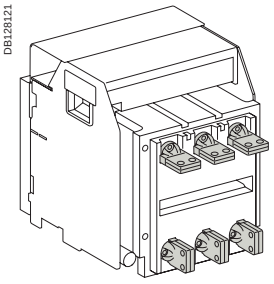
Cable lug adapters.





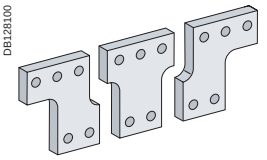


Rear connection of withdrawable devices

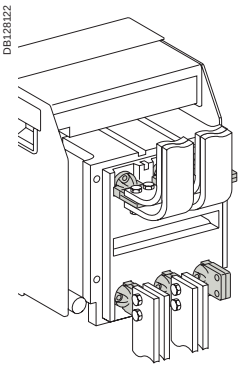


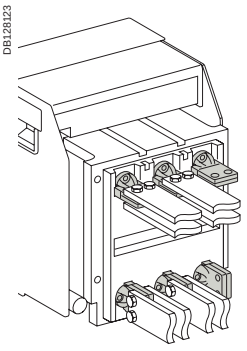
Bars

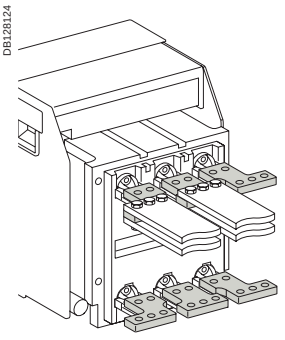
Withdrawable, rear-connection Compact NS630b to 1600 devices equipped with horizontal or vertical connectors may be directly connected to flat or edge-wise bars, depending on the position of the connectors. Spreaders are available to increase the pole pitch to 95 mm.

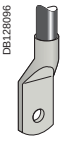


Spreaders.



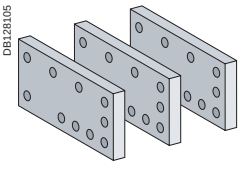




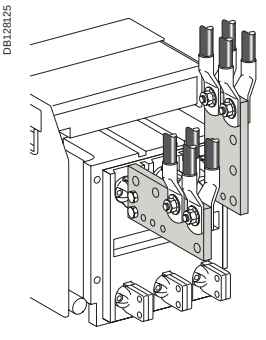


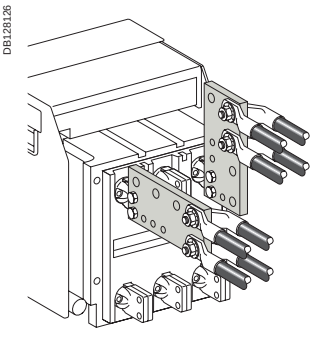
Cables with lugs

Cable lug adapters enable connection of one to four cables with crimped lugs (⩽ 300 mm^2).
To ensure stability, spacers must be positioned between the terminal extensions.



Cable lug adapters.





Electrical and mechanical accessories
Compact NS630b to 1600 (cont.)

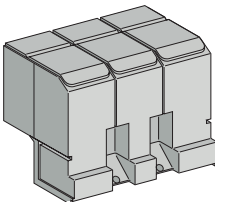
E45190

Compact NS equipped with connection shield.

Insulation of live parts

Connection shield
Mounted on fixed, front-connection devices, this shield insulates power-connection points, particularly when cables with lugs are used

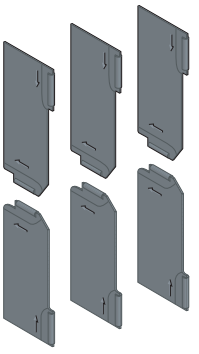
DB128127



Connection shield.

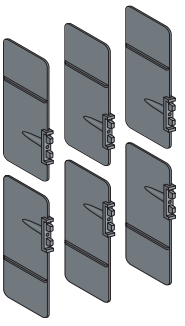
Interphase barriers
These barriers are flexible insulated partitions used to reinforce isolation of connection points in installations with busbars, whether insulated or not.
Barriers are installed vertically between front or rear connection terminals.
They are mandatory for voltages ⩾ 500 V for both fixed and withdrawable products and for L and LB types, whatever the voltage.

DB128128



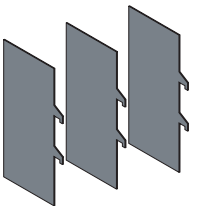
Interphase barriers for fixed device, front connection.

DB128129



Interphase barriers for fixed device, rear connection.

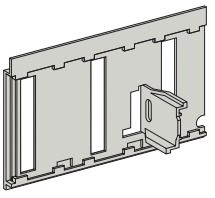
DB128130



Interphase barriers for withdrawable device, rear connection.

Safety shutters (standard)
Mounted on the chassis, the safety shutters automatically block access to the disconnecting contact cluster when the device is in the disconnected or test positions (degree of protection IP20). When the device is removed from its chassis, no live parts are accessible.
The shutters can be padlocked (padlock not supplied) to:
- prevent connection of the device
- lock the shutters in the closed position.

DB128131

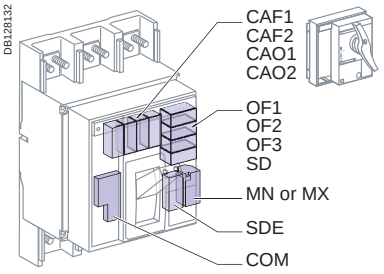


Safety shutters.

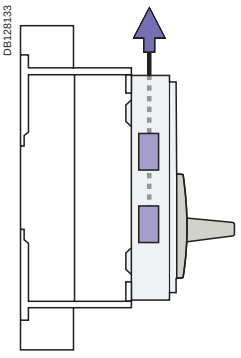
Connection of electrical auxiliaries

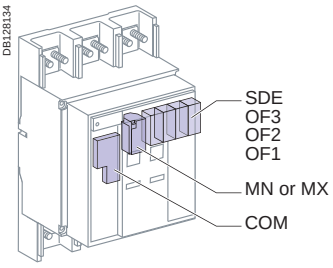
Fixed devices

Connections are made directly to the auxiliaries once the front has been removed.
Wires exit the circuit breaker through a knock-out in the top.



Manually operated device.

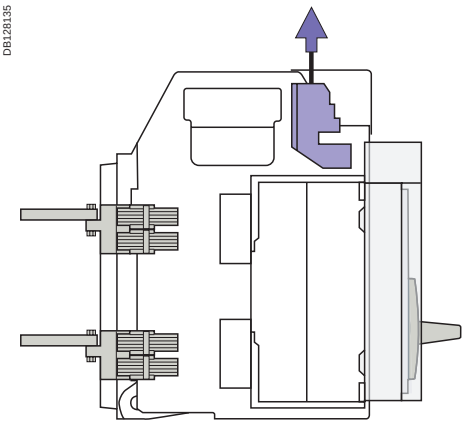


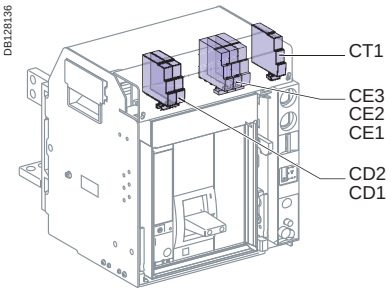


Electrically operated device.

Withdrawable devices

Auxiliary circuits are connected to terminal blocks located in the top part of the chassis.
The auxiliary terminal block is made up of a fixed and moving part. The two parts are in contact when the device is in the test and connected positions.





Withdrawable device.

Electrical and mechanical accessories
Compact NS630b to 1600 (cont.)

All the auxiliary contacts opposite are also available in "low-level" versions capable of switching very low loads (e.g. for the control of PLCs or electronic circuits).

OF, SD and SDE changeover contacts.

Indication contacts

Contacts installed in the device

Changeover contacts are used to remote circuit breaker status information and can thus be used for indications, electrical locking, relaying, etc.
They comply with the IEC 60947-5 international recommendation.

Functions

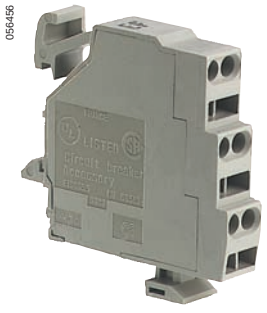
■ OF (ON/OFF) - indicates the position of the main circuit breaker contacts
■ SD (trip indication) - indicates that the circuit breaker has tripped due to:
□ an overload
□ a short-circuit
□ an earth-leakage fault.
□ operation of a voltage release
□ operation of the "push to trip" button
□ disconnection when the device is ON.
Returns to de-energised state when the circuit breaker is reset.
■ SDE (fault indication) - indicates that the circuit breaker has tripped due to:
□ an overload
□ a short-circuit
□ an earth-leakage fault.
Returns to de-energised state when the circuit breaker is reset.
■ CAF / CAO (early-make or early-break function) - indicates the position of the rotary handle. Used in particular for advanced opening of safety trip devices (early break) or to energise a control device prior to circuit breaker closing (early make).

Installation

■ OF, SD and SDE functions - a single type of contact provides all these different indication functions, depending on where it is inserted in the device. The contacts clip into slots behind the front cover of the circuit breaker
■ CAF / CAO function - the contact fits into the rotary-handle unit (direct or extended).

Electrical characteristics of the OF/SD/SDE/CAF/CAO auxiliary contacts

Contacts		Standard				Low level			
Rated thermal current (A)		6				5			
Minimum load		100 mA at 24 V				1 mA at 4 V			
Utilisation cat. (IEC 60947-5-1)		AC12	AC15	DC12	DC14	AC12	AC15	DC12	DC14
Operational current (A)	24 V	6	6	6	1	5	3	5	1
	48 V	6	6	2.5	0.2	5	3	2.5	0.2
	110 V	6	5	0.6	0.05	5	2.5	0.6	0.05
	220/240 V	6	4	-	-	5	2	-	-
	250 V	-	-	0.3	0.03	5	-	0.3	0.03
	380/440 V	6	2	-	-	5	1.5	-	-
	480 V	6	1.5	-	-	5	1	-	-
	660/690 V	6	0.1	-	-	-	-	-	-



Carriage switches for connected (CE), disconnected (CD) and test (CT) positions.

Connected, disconnected, test position carriage switches

A single type of changeover contact can be mounted optionally on the chassis to indicate, depending on the slot where it is installed:
■ the connected (CE) position
■ the disconnected (CD) position. This position is indicated when the required clearance for isolation of the power and auxiliary circuits is reached
■ the test (CT) position. In this position, the power circuits are disconnected and the auxiliary circuits are connected.

Installation

■ contacts for the connected (CE), disconnected (CD) and test (CT) positions clip into the upper front section of the chassis.

Electrical characteristics of the CE/CD/CT auxiliary contacts

Contacts		Standard				Low level			
Rated thermal current (A)		8				5			
Minimum load		100 mA at 24 V				2 mA at 15 V			
Utilisation cat. (IEC 60947-5-1)		AC12	AC15	DC12	DC14	AC12	AC15	DC12	DC14
Operational current (A)	24 V	8	6	2.5	1	5	3	5	1
	48 V	8	6	2.5	0.2	5	3	2.5	0.2
	110 V	8	5	0.8	0.05	5	2.5	0.8	0.05
	220/240 V	8	4	-	-	5	2	-	-
	250 V	-	-	0.3	0.03	5	-	0.3	0.03
	380/440 V	8	3	-	-	5	1.5	-	-
	660/690 V	6	0.1	-	-	-	-	-	-

PB100781-32_SE

M6C programmable contacts:
circuit breaker external relay with six independent changeover contacts controlled from the circuit breaker via a three-wire connection (maximum length is 10 meters).

M6C programmable contacts

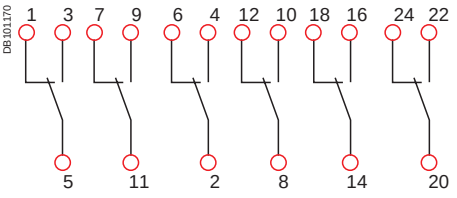
These contacts, used with the Micrologic P control units, may be programmed via the control unit keypad or via a supervisory station with the COM communication option.
They require an external power supply module.
They indicate:
- the type of fault
- instantaneous or delayed threshold overruns.

They may be programmed:
- with instantaneous return to the initial state
- without return to the initial state
- with return to the initial state following a delay.

Characteristics			M6C
Minimum load			100 mA/24 V
Breaking capacity (A)	V AC	240	5
p.f.: 0.7		380	3
	V DC	24	1.8
		48	1.5
		125	0.4
		250	0.15

M6C: external 24 V DC power supply required (consumption 100 mA).

DB101170



PB104828

Compact NS with a direct rotary handle.

PB104829

Compact NS with an extended rotary handle.

Rotary handles

There are two types of rotary handle:
- direct rotary handle
- extended rotary handle.

There are two models:
- standard with a black handle
- VDE with a red handle and yellow front for machine-tool control.

Direct rotary handle

Degree of protection IP40, IK07.
The direct rotary handle maintains:
- visibility of and access to trip unit settings
- suitability for isolation
- indication of the three positions O (OFF), I (ON) and tripped
- access to the "push to trip" button
- circuit breaker locking capability in the OFF position by one to three padlocks, shackle diameter 5 to 8 mm (not supplied).

It replaces the circuit breaker front cover.
Accessories transform the standard direct rotary handle for the following situations:
- a higher degree of protection (IP43, IK07)
- machine-tool control, complying with CNOMO E03.81.501, IP54, IK07.

Extended rotary handle

Degree of protection IP55, IK07.
This handle makes it possible to operate circuit breakers installed at the back of switchboards, from the switchboard front.
It maintains:
- suitability for isolation
- indication of the three positions O (OFF), I (ON) and tripped
- access to trip unit settings, when the switchboard door is open
- circuit breaker locking capability in the OFF position by one to three padlocks, shackle diameter 5 to 8 mm (not supplied).

The door cannot be opened if the circuit breaker is ON or locked.
The extended rotary handle is made up of:
- a unit that replaces the front cover of the circuit breaker (secured by screws)
- an assembly (handle and front plate) on the door that is always secured in the same position, whether the circuit breaker is installed vertically or horizontally
- an extension shaft that must be adjusted to the distance. The min/max distance between the back of circuit breaker and door is 218/605 mm.

Electrical and mechanical accessories
Compact NS630b to 1600 (cont.)

Manually operated circuit breakers may be equipped with an MX shunt release, an MN undervoltage release or a delayed undervoltage release (MN + delay unit). Electrically operated circuit breakers are equipped as standard with a remote-operating mechanism to remotely open or close the circuit breaker. An MX shunt release or an MN undervoltage release (instantaneous or delayed) may be added.

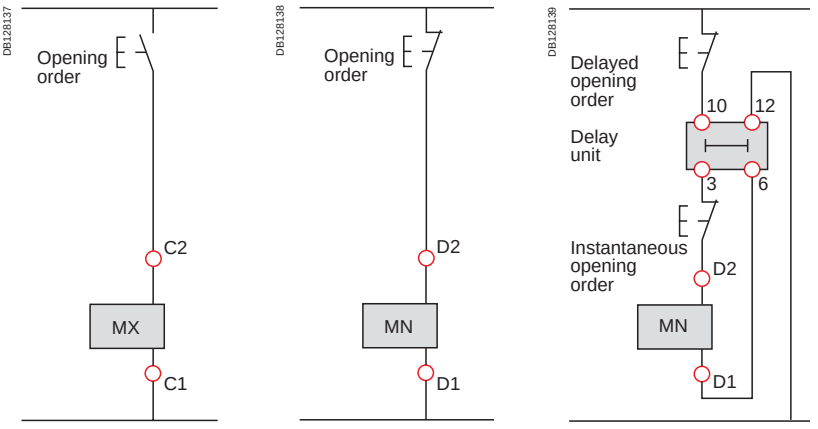
MX voltage release.

Remote tripping

This function opens the circuit breaker via an electrical order. It is made up of:
- a shunt release (2nd MX)
- or an undervoltage release MN
- or a delayed undervoltage release MN + delay unit.

These releases (2nd MX or MN) cannot be operated by the communication bus.
The delay unit, installed outside the circuit breaker, may be disabled by an emergency OFF button to obtain instantaneous opening of the circuit breaker.

Wiring diagram for the remote-tripping function



Voltage releases 2nd MX

When energised, the 2nd MX voltage release instantaneously opens the circuit breaker. A continuous supply of power to the 2nd MX locks the circuit breaker in the OFF position.

Characteristics			
Power supply	V AC 50/60 Hz	24 - 48 - 100/130 - 200/250 - 277 - 380/480	
	V DC	12 - 24/30 - 48/60 - 100/130 - 200/250	
Operating threshold		0.7 to 1.1 Un	
Permanent locking function		0.85 to 1.1 Un	
Consumption (VA or W)		pick-up: 200 (200 ms)	hold: 4.5
Circuit breaker response time at Un		50 ms ±10	

Instantaneous voltage releases MN

The MN release instantaneously opens the circuit breaker when its supply voltage drops to a value between 35 % and 70 % of its rated voltage. If there is no supply on the release, it is impossible to close the circuit breaker, either manually or electrically. Any attempt to close the circuit breaker has no effect on the main contacts. Circuit breaker closing is enabled again when the supply voltage of the release returns to 85 % of its rated value.

Characteristics			
Power supply	V AC 50/60 Hz	24 - 48 - 100/130 - 200/250 - 380/480	
	V DC	24/30 - 48/60 - 100/130 - 200/250	
Operating threshold	opening	0.35 to 0.7 Un	
	closing	0.85 Un	
Consumption (VA or W)		pick-up: 200 (200 ms)	hold: 4.5
MN consumption with delay unit (VA or W)		pick-up: 400 (200 ms)	hold: 4.5
Circuit breaker response time at Un		90 ms ±5	

MN delay units

To eliminate circuit breaker nuisance tripping during short voltage dips, operation of the MN release can be delayed. This function is achieved by adding an external delay unit in the MN voltage-release circuit. Two versions are available, adjustable and non-adjustable.

Characteristics		
Power supply	non-adjustable	100/130 - 200/250
V AC 50-60 Hz /DC	adjustable	48/60 - 100/130 - 200/250 - 380/480
Operating threshold	opening	0.35 to 0.7 Un
	closing	0.85 Un
Consumption of delay unit alone (VA or W)	pick-up: 200 (200 ms)	hold: 4.5
Circuit breaker response time at Un	non-adjustable	0.25 s
	adjustable	0.5 s - 0.9 s - 1.5 s - 3 s

Electrically operated circuit breakers are equipped as standard with a motor mechanism module.
Two solutions are available for electrical operation:
- a point-to-point solution
- a bus solution with the COM communication option.

PB104831

Electrically operated Compact NS circuit breaker.

Electrically operated circuit breaker

The motor mechanism module is used to remotely open and close the circuit breaker. It is made up of a spring-charging motor equipped with an opening release and a closing release.
An electrical operation function is generally combined with:
- device ON/OFF indication OF
- "fault-trip" indication SDE.

Motor mechanism module		
Power supply	V AC 50/60 Hz	48/60 - 100/130 - 200/240 - 277 - 380/415
	V DC	24/30 - 48/60 - 100/125 - 200/250
Operating threshold		0.85 to 1.1 Un
Consumption (VA or W)		180
Motor overcurrent		2 to 3 In for 0.1 second
Charging time		maximum 4 seconds
Operating frequency		maximum 3 cycles per minute

Electrical closing order

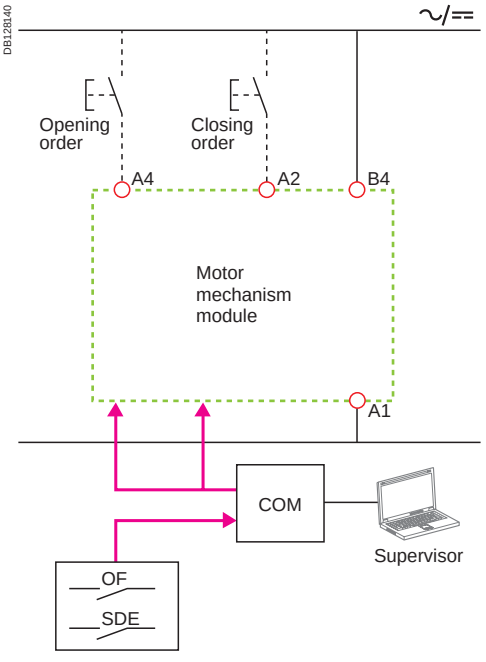
The release remotely closes the circuit breaker if the spring mechanism is charged. Release electrical characteristics are identical to those of an MX release (see above), the operating threshold is from 0.85 to 1.1 Un and the circuit breaker response time at Un is 60 ms ±10.
The Compact NS electrical operation function can be used to implement a synchro-coupling system.

Electrical opening order

The release instantaneously opens the circuit breaker when energised. The supply can be impulse-type or maintained.
Release electrical characteristics are identical to those of an MX release (see above).

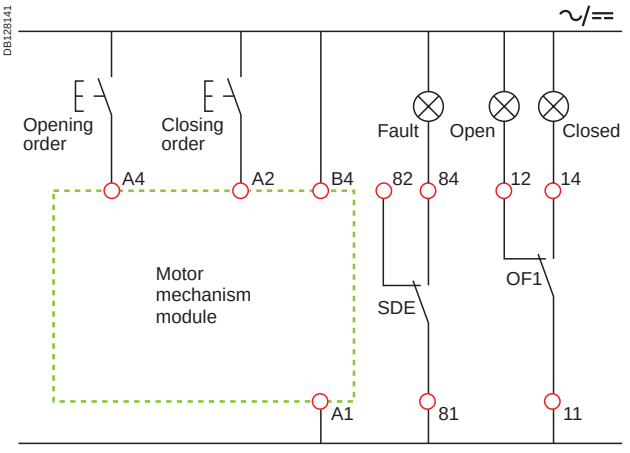
Wiring diagram of a bus-type electrical operation solution

DB128140



Wiring diagram of a point-to-point electrical operation solution

DB128141



In the event of simultaneous opening and closing orders, the mechanism discharges without any movement of the main contacts.
In the event of maintained opening and closing orders, the standard electrical operation solution provides an anti-pumping function by blocking the main contacts in open position.

Electrical and mechanical accessories
Compact NS630b to 1600 (cont.)

PB104830

Toggle locked by removable padlocking device.

PB104828

Rotary handle locked by a keylock.

Locking on manually operated devices

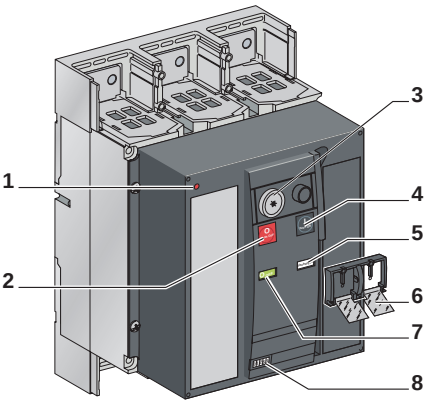
Locking in the OFF position guarantees isolation as per IEC 60947-2.
Padlocking systems can receive up to three padlocks with shackle diameters ranging from 5 to 8 mm (padlocks not supplied).

Control device	Function	Means	Required accessories
Toggle	lock in		
	■ OFF position	padlock	removable device
	■ OFF or ON position	padlock	fixed device
Direct rotary handle	lock in		
	■ OFF position	padlock	
	■ OFF or ON position	keylock	locking device + keylock
CNOMO direct rotary handle	lock in		
	■ OFF position	padlock	
Extended rotary handle	lock in OFF position, door opening prevented	padlock keylock	keylock

Locking in ON position does not prevent the device from tripping in the event of a fault or remote tripping order.

Locking on electrically operated devices

DB128142



1 *reset of mechanical trip indicator*
2 *OFF pushbutton*
3 *OFF position locking*
4 *ON pushbutton*
5 *springs charged indication*
6 *pushbutton locking*
7 *contact position indication*
8 *operation counter*

PB100811A-32

Access to pushbuttons protected by transparent cover.

PB100810A-32

Pushbutton locking using a padlock.

Pushbutton locking VBP

The transparent cover blocks access to the pushbuttons used to open and close the device.
It is possible to independently lock the opening OFF button and the closing ON button.
The pushbuttons may be locked using either:
- three padlocks (not supplied)
- lead seal
- two screws.

PB100812A-32

OFF position locking using padlocks.

PB104365A-32

OFF position locking using a keylock and padlocks.

Device locking in the OFF position
VCPO by padlocks, VSPO by keylocks

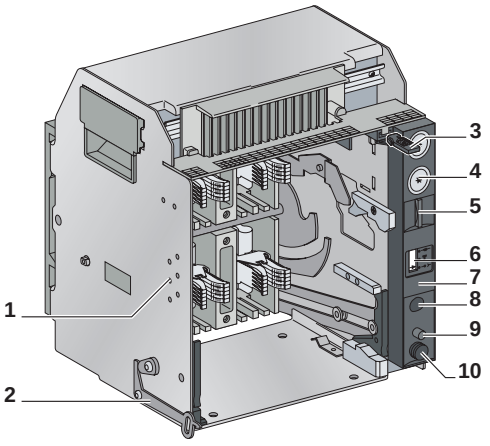
The circuit breaker is locked in the OFF position by physically maintaining the opening pushbutton pressed down:
- using padlocks in standard (one to three padlocks, not supplied)
- using a keylock (supplied).

Keys may be removed only when locking is effective (Profalux or Ronis type locks).
The keylocks are available in any of the following configurations:
- one keylock
- one keylock mounted on the device + one identical keylock supplied separately for interlocking with another device.

A locking kit (without lock) is available for installation of a keylock (Ronis, Profalux, Kirk or Castell).

Chassis locking

DB128071



1 *mismatch protection*
2 *door interlock*
3 *racking interlock*
4 *keylock locking*
5 *padlock locking*
6 *position indicator*
7 *chassis front plate (accessible with cubicle door closed)*
8 *crank entry*
9 *reset button*
10 *crank storage*

PB104366A-32

"Disconnected" position locking by padlocks.

PB104367A-34

"Disconnected" position locking by keylocks.

"Disconnected" position locking by padlocks (standard) or keylocks (VSPD option)

Mounted on the chassis and accessible with the door closed, these devices lock the circuit breaker in the disconnected position in two manners:

- using padlocks (standard), up to three padlocks (not supplied)
- using keylocks (optional), one or two different keylocks are available.

Profalux and Ronis keylocks are available in different options:

- one keylock
- one keylock mounted on the device + one identical keylock supplied separately, using the same key, for interlocking with another device
- one (or two) keylocks mounted on the device + one (or two) identical keylocks supplied separately, for interlocking with another device.

A locking kit (without locks) is available for installation of one or two keylocks (Ronis, Profalux, Kirk or Castell).

PB104352A-32

Door interlock.

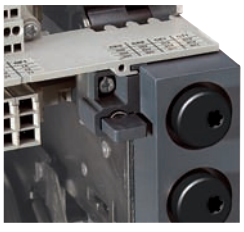
"Connected", "disconnected" and "test" position locking

The connected, disconnected and test positions are shown by an indicator and are mechanically indexed.
The racking crank blocks when the exact position is obtained.
A release button is used to free it.
As standard, the circuit breaker can be locked only in "disconnected position". On request, the locking system may be modified to lock the circuit breaker in any of the three positions: "connected", "disconnected" or "test".

Door interlock catch VPEC

Mounted on the right or left-hand side of the chassis, this device inhibits opening of the cubicle door when the circuit breaker is in connected or test position. It the breaker is put in the connected position with the door open, the door may be closed without having to disconnect the circuit breaker.

PB104368A-32



Racking interlock.

Racking interlock VPOC

This device prevents insertion of the crank when the cubicle door is open (device cannot be connected).

PB100815-32R_SE

Mismatch protection.

Mismatch protection VDC

Mismatch protection ensures that a circuit breaker is installed only in a chassis with compatible characteristics. It is made up of two parts (one on the chassis and one on the circuit breaker) offering twenty different combinations that the user may select.

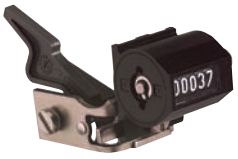
Electrical and mechanical accessories

Compact NS630b to 1600 (cont.)

PB104740-32

Auxiliary terminal shield.

PB104382A32



Operation counter.

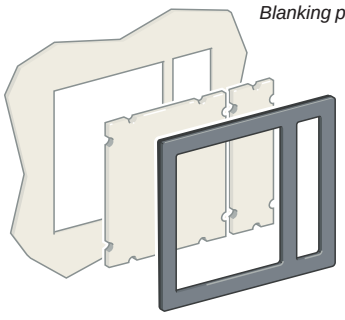
DB128144

Escutcheon.

DB128145

Transparent cover.

DB128146



Blanking plate.

Other accessories

Auxiliary terminal shield (CB)

Optional equipment mounted on the chassis, the shield prevents access to the terminal block of the electrical auxiliaries.

Operation counter (CDM)

The operation counter sums the number of operating cycles and is visible on the front panel. It is compatible with electrically operated devices.

Escutcheon (CDP)

Optional equipment mounted on the door of the cubicle, the escutcheon increases the degree of protection to IP40. It is available in fixed and withdrawable versions.

Transparent cover (CCP) for escutcheon

Optional equipment mounted on the escutcheon, the cover is hinged and secured by a screw. It increases the degree of protection to IP54 and the degree of protection against mechanical impacts to IK10. It may be used for withdrawable devices only.

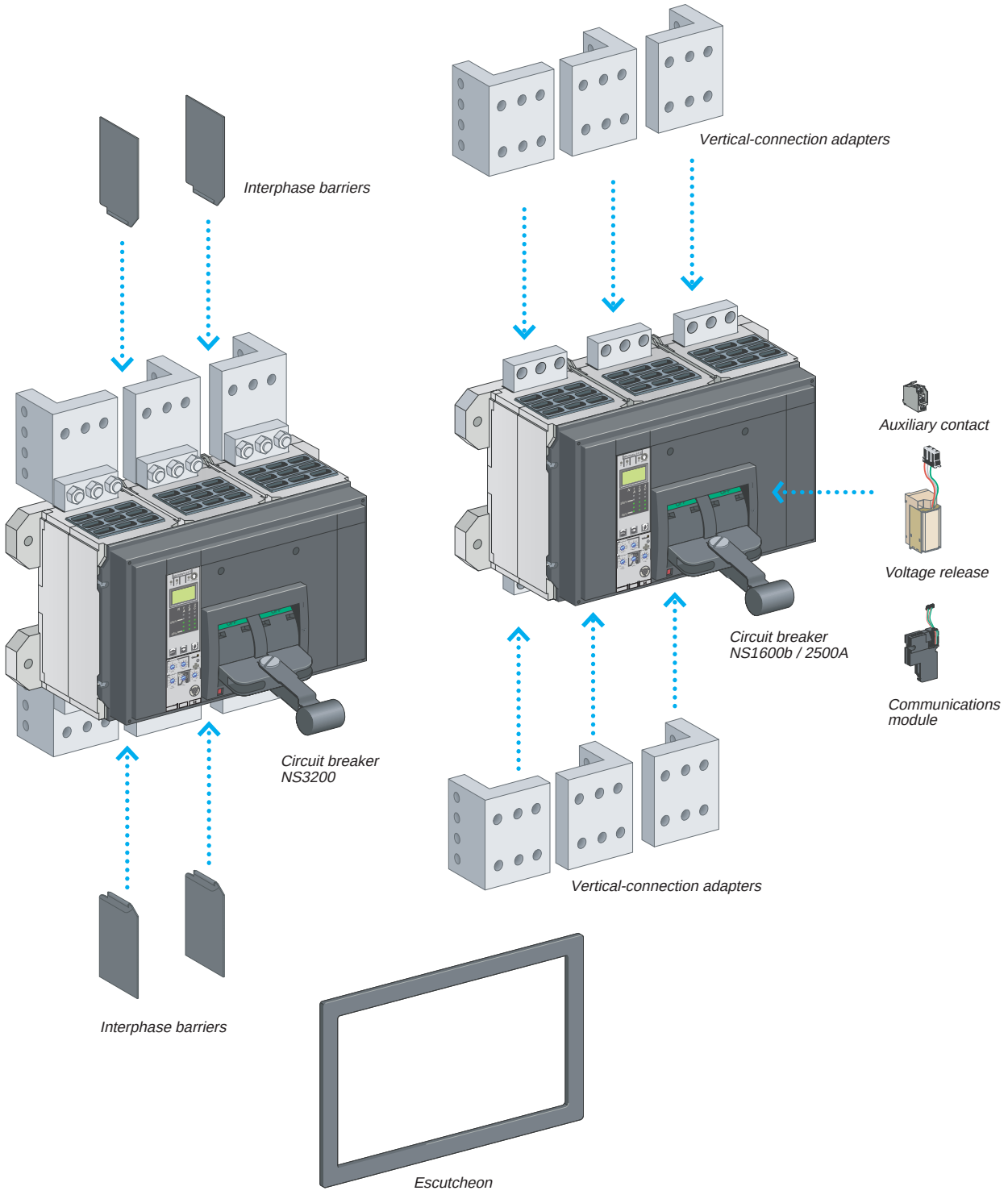
Blanking plate (OP) for escutcheon

Used with the escutcheon, this option closes off the door cutout of a cubicle not yet equipped with a device. It may be used with the escutcheon for both fixed and withdrawable devices.

Electrical and mechanical accessories

Compact NS1600b to 3200 (fixed version)

DB128147



Electrical and mechanical accessories
Compact NS1600b to 3200 (cont.)

PB106366

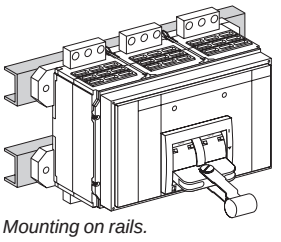
Fixed Compact NS.

Installation

Fixed circuit breakers

Compact NS1600b to 3200 circuit breakers should be installed vertically only.

DB128151



Mounting on rails.

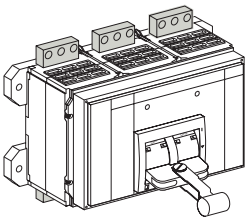
Connection

Front connection

DB128069

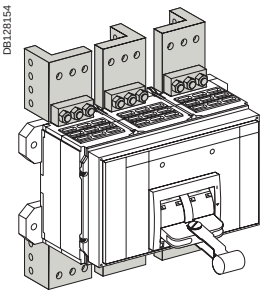
NS1600 to 2500

DB128153



NS3200

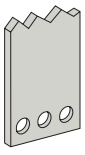
DB128154



Bars

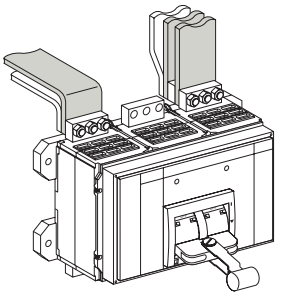
Bars may be directly connected to the terminals of Compact NS1600b to 3200 circuit breakers.

DB128155

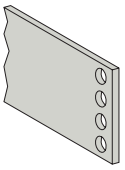


NS1600b to 2500

DB128156

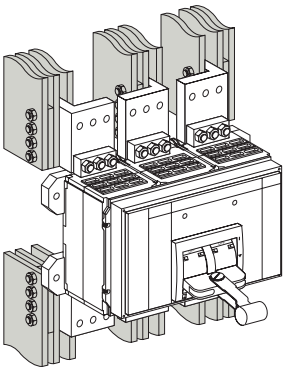


DB128157

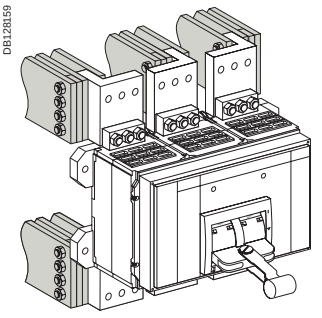


NS1600b to 2500 with connection for vertical-connection adapters or NS3200

DB128158



DB128159



All the auxiliary contacts opposite are also available in "low-level" versions capable of switching very low loads (e.g. for the control of PLCs or electronic circuits).

OF, SD and SDE changeover contacts.

Indication contacts

Contacts installed in the device

Changeover contacts are used to remote circuit breaker status information and can thus be used for indications, electrical locking, relaying, etc.
They comply with the IEC 60947-5 international recommendation.

Functions

■ OF (ON/OFF) - indicates the position of the main circuit breaker contacts
■ SD (trip indication) - indicates that the circuit breaker has tripped due to:
□ an overload
□ a short-circuit
□ an earth-leakage fault
□ operation of a voltage release
□ operation of the "push to trip" button
■ Returns to de-energised state when the circuit breaker is reset.
SDE (fault indication) - indicates that the circuit breaker has tripped due to:
□ an overload
□ a short-circuit
□ an earth-leakage fault.
Returns to de-energised state when the circuit breaker is reset.

Installation

■ OF, SD and SDE functions - a single type of contact provides all these different indication functions, depending on the position where it is inserted in the device.
The contacts clip into slots behind the front cover of the circuit breaker.

Electrical characteristics of the OF/SD/SDE auxiliary contacts

Contacts		Standard				Low level			
Rated thermal current (A)		6				5			
Minimum load		100 mA at 24 V				1 mA at 4 V			
Utilisation cat. (IEC 60947-5-1)		AC12	AC15	DC12	DC14	AC12	AC15	DC12	DC14
Operational current (A)	24 V	6	6	6	1	5	3	5	1
	48 V	6	6	2.5	0.2	5	3	2.5	0.2
	110 V	6	5	0.6	0.05	5	2.5	0.6	0.05
	220/240 V	6	4	-	-	5	2	-	-
	250 V	-	-	0.3	0.03	5	-	0.3	0.03
	380/440 V	6	2	-	-	5	1.5	-	-
	480 V	6	1.5	-	-	5	1	-	-
	660/690 V	6	0.1	-	-	-	-	-	-

Electrical and mechanical accessories
Compact NS1600b to 3200 (cont.)

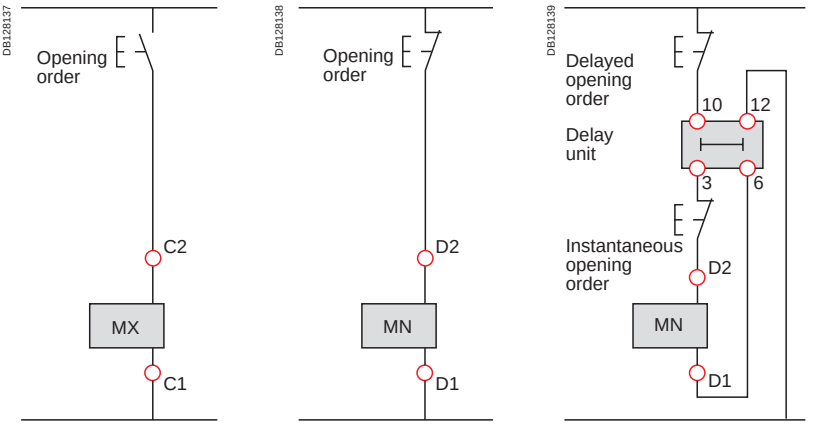
Compact NS1600b to 3200 circuit breakers may be equipped with an MX shunt release, an MN undervoltage release or a delayed undervoltage release (MNR = MN + delay unit).

MX voltage release

Remote tripping

This function opens the circuit breaker via an electrical order. It is made up of:
- a shunt release 2nd MX
- or an undervoltage release MN
- or a delayed undervoltage release MNR = MN + delay unit.

These releases (2nd MX or MN) cannot be operated by the communication bus.
The delay unit, installed outside the circuit breaker, may be disabled by an emergency OFF button to obtain instantaneous opening of the circuit breaker.
Wiring diagram for the remote-tripping function



Voltage releases 2nd MX

When energised, the 2nd MX voltage release instantaneously opens the circuit breaker. A continuous supply of power to the 2nd MX locks the circuit breaker in the OFF position.

Characteristics			
Power supply	V AC 50/60 Hz	24 - 48 - 100/130 - 200/250 - 277 - 380/480	
	V DC	12 - 24/30 - 48/60 - 100/130 - 200/250	
Operating threshold		0.7 to 1.1 Un	
Permanent locking function		0.85 to 1.1 Un	
Consumption (VA or W)		pick-up: 200 (80 ms)	hold: 4.5
Circuit breaker response time at Un		50 ms ±10	

Instantaneous voltage releases MN

The MN release instantaneously opens the circuit breaker when its supply voltage drops to a value between 35 % and 70 % of its rated voltage. If there is no supply on the release, it is impossible to close the circuit breaker, either manually or electrically. Any attempt to close the circuit breaker has no effect on the main contacts. Circuit breaker closing is enabled again when the supply voltage of the release returns to 85 % of its rated value.

Characteristics			
Power supply	V AC 50/60 Hz	24 - 48 - 100/130 - 200/250 - 380/480	
	V DC	24/30 - 48/60 - 100/130 - 200/250	
Operating threshold	opening	0.35 to 0.7 Un	
	closing	0.85 Un	
Consumption (VA or W)		pick-up: 200 (200 ms)	hold: 4.5
MN consumption with delay unit (VA or W)		pick-up: 400 (200 ms)	hold: 4.5
Circuit breaker response time at Un		90 ms ±5	

MN delay units

To eliminate circuit breaker nuisance tripping during short voltage dips, operation of the MN release can be delayed. This function is achieved by adding an external delay unit in the MN voltage-release circuit. Two versions are available, adjustable and non-adjustable.

Characteristics		
Power supply V AC 50-60 Hz /DC	non-adjustable	100/130 - 200/250
	adjustable	48/60 - 100/130 - 200/250 - 380/480
Operating threshold	opening	0.35 to 0.7 Un
	closing	0.85 Un
Consumption of delay unit alone (VA or W)	pick-up: 200 (200 ms)	hold: 4.5
Circuit breaker response time at Un	non-adjustable	0.25 s
	adjustable	0.5 s - 0.9 s - 1.5 s - 3 s

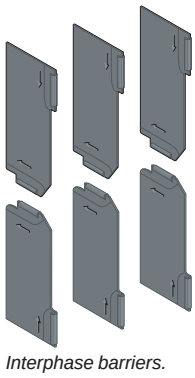
PB104836_ME

Compact NS with toggle locked using a fixed device and padlocks.

PB104835_ME

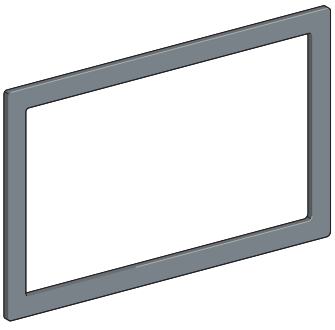
Compact NS with toggle locked using a removable device and padlocks.

DB128128



Interphase barriers.

DB128161



Escutcheon.

Device locking

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

Control device	Function	Means	Required accessories
Toggle	lock in OFF position	padlock	removable device
	lock in OFF or ON position	padlock	fixed device

Interphase barriers

These barriers are flexible insulated partitions used to reinforce isolation of connection points in installations with busbars, whether insulated or not. Barriers are installed vertically between front connection terminals.

Escutcheon CDP

Optional equipment mounted on the door of the cubicle, the escutcheon increases the degree of protection to IP40.

TOOLS

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- product discovery sites and their Flash animations.

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The technical guide

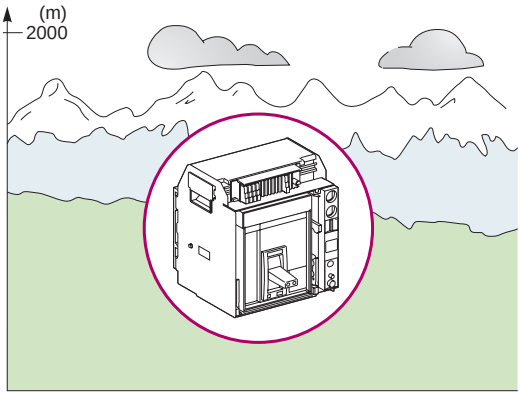
These technical guides help you comply with installation standards and rules i.e.: the electrical installation guide, the protection guide, the switchboard implementation guide, the technical booklets and the co-ordination tables all form genuine reference tools for the design of high performance electrical installations.
For example, the LV protection co-ordination guide - discrimination and cascading - optimises choice of protection and connection devices while also increasing markedly continuity of supply in the installations.

Installation recommendations
Contents

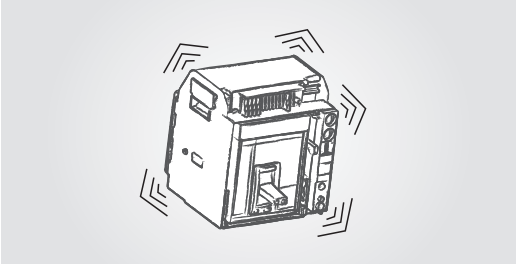
Operating conditions

Compact circuit breakers have been tested for operation in industrial atmospheres.
It is recommended that the equipment be cooled or heated to the proper operating temperature and kept free of excessive vibration and dust.

DB128162



DB128163



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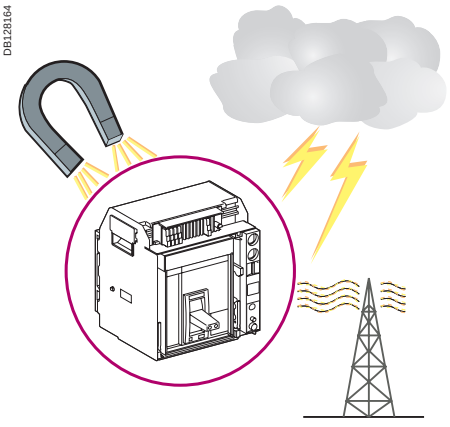


Altitude derating

Altitude does not significantly affect circuit-breaker characteristics up to 2000 m. Above this altitude, it is necessary to take into account the decrease in the dielectric strength and cooling capacity of air.
The following table gives the corrections to be applied for altitudes above 2000 metres. The breaking capacities remain unchanged.

Compact NS630b to 3200

Altitude (m)	2000	3000	4000	5000
Impulse withstand voltage Uimp (kV)	8	7.1	6.4	5.6
Rated insulation voltage (Ui)	800	710	635	560
Maximum rated operationnal voltage 50/60 Hz Ue (V)	690	690	635	560
Rated current 40 °C	1 x In	0.99 x In	0.96 x In	0.94 x In

Intermediate values may be obtained by interpolation.

Vibrations

Compact NS devices resist electromagnetic or mechanical vibrations.
Tests are carried out in compliance with standard IEC 60068-2-6 for the levels required by merchant-marine inspection organisations (Veritas, Lloyd's, etc.):
- 2 ➡ 13.2 Hz: amplitude ±1 mm
- 13.2 ➡ 100 Hz: constant acceleration 0.7 g.

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

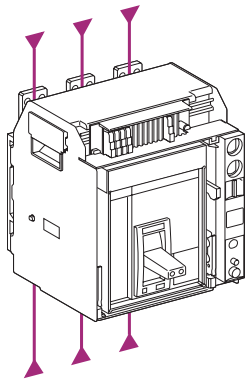
Electromagnetic disturbances

Compact NS devices are protected against:
- overvoltages caused by devices that generate electromagnetic disturbances
- overvoltages caused by an atmospheric disturbances or by a distribution-system outage (e.g. failure of a lighting system)
- devices emitting radio waves (radios, walkie-talkies, radar, etc.)
- electrostatic discharges produced by users.

Compact NS devices have successfully passed the electromagnetic-compatibility tests (EMC) defined by the following international standards:
- IEC 60947-2, appendix F
- IEC 60947-2, appendix B (trip units with Vigi earth-leakage function).

The above tests guarantee that:
- no nuisance tripping occurs
- tripping times are respected.

DB128165



Power supply

Compact NS circuit breakers can be supplied from either the top or the bottom without any reduction in performance. This capability facilitates connection when installed in a switchboard.

Weights

		Circuit breaker	Chassis
NS630b to 1600 manual operation	**3P**	14	14
	4P	18	18
NS630b to 1600 electrical operation	**3P**	14	16
	4P	18	21
NS1600b to 3200	**3P**	24	-
	4P	36	-

The table above presents the weights (in kg) of the circuit breakers and the main accesories, which must be summed to obtain the total weight of complete configurations.

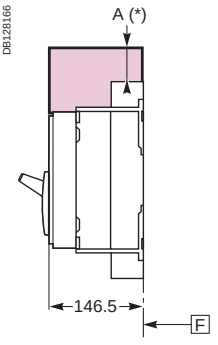
Installation in switchboards
Safety clearances and minimum distances

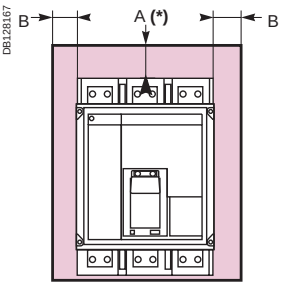
General rules

When installing a circuit breaker, minimum distances (safety clearances) must be maintained between the device and panels, bars and other protection devices installed nearby. These distances, which depend on the ultimate breaking capacity, are defined by tests carried out in accordance with standard IEC 60947-2.
If installation conformity is not checked by type tests, it is also necessary to:

- use insulated bars for circuit-breaker connections
- block off the busbars using insulating screens.

Compact NS630b to 3200 (fixed devices)

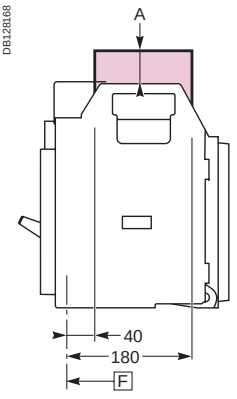


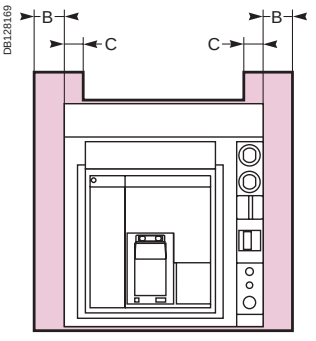


(*) *An overhead clearance of 50 mm is required to remove the arc chutes.*

Insulated parts		Metal parts	Live parts
NS630b to 1600			
A	0	120	180
B	0	10	60
NS1600b to 3200			
A	50	170	230
B	0	10	60

Compact NS630b to 1600 (withdrawable devices)



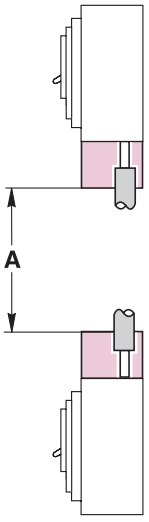


Insulated parts		Metal parts	Live parts
A	0	0	30
B	10	10	60
C	0	0	30

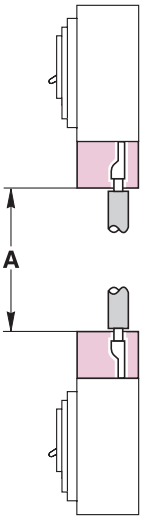
F *Datum*

Installation example

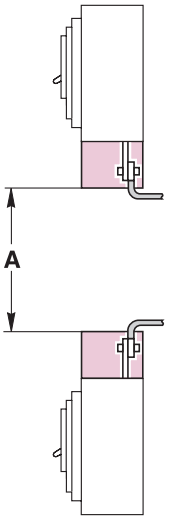
DB128170



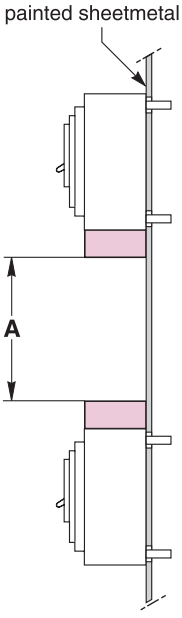
Direct connection by bare cables, devices with terminal shields.



Connection by cables with lugs, devices with terminal shields.



Connection by insulated bars, devices with terminal shields.



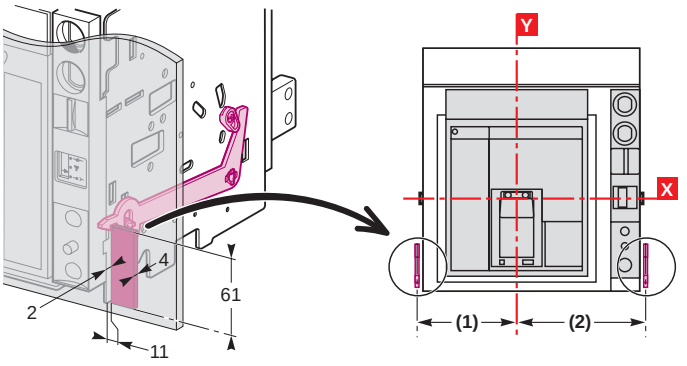
Rear connection or plug-in base, devices with terminal shields.

Minimum dimensions (mm) Compact circuit breaker	A
NS630b-1600	250
NS1600b-3200	300

Door interlock for Compact NS630b to 1600

Mounted on the left or right-hand side of the chassis, this locking device prevents opening of the door if the circuit breaker is in the connected or test positions. If the circuit breaker was connected with the door open, the door may be closed without having to disconnect the circuit breaker.

DB128026



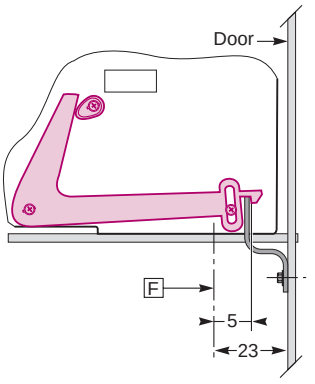
Dimensions (mm)

Type	(1)	(2)
NS630b to 1600 (3P)	135	168
NS630b to 1600 (4P)	205	168

Device in the connected or test positions

Door locked

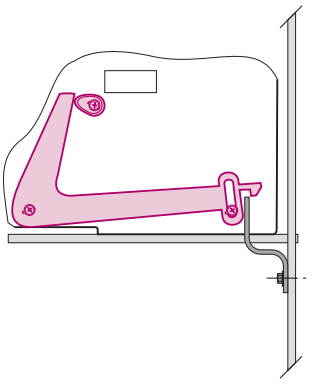
DB128028



Device in the disconnected position

Door not locked

DB128171



Note. *The door interlock may be mounted on either the left or right-hand side of the chassis.*

F *Datum*

Control wiring

Wiring of voltage releases

During pick-up, the power consumed is approximately 150 to 200 VA.
For low control voltages (12, 24, 48 V), maximum cable lengths are imposed by the voltage and the cross-sectional area of cables.

Recommended maximum cable lengths (meter).

		12 V		24 V		48 V	
		2.5 mm²	1.5 mm²	2.5 mm²	1.5 mm²	2.5 mm²	1.5 mm²
MN	U source 100 %	–	–	58	35	280	165
	U source 85 %	–	–	16	10	75	45
MX-XF	U source 100 %	21	12	115	70	550	330
	U source 85 %	10	6	75	44	350	210

***Note**: the indicated length is that of each of the two wires.*

24 V DC power-supply module

External 24 V DC power-supply module for Micrologic (F1-, F2+)

- do not connect the positive terminal (F2+) to earth
- the negative terminal (F1-) can be connected to earth, except in IT systems
- a number of Micrologic control units and M6C modules can be connected to the same 24 V DC power supply (the consumption of a Micrologic control unit or an M6C module is approximately 100 mA)
- do not connect any devices other than a Micrologic control unit or an M6C module if voltage > 480 V AC or in an environment with high level of electromagnetic desturbance
- the maximum length for each conductor is ten metres. For greater distances, it is advised to twist the supply wires together
- the 24 V DC supply wires must cross the power cables perpendicularly. If this is difficult, it is advised to twist the supply wires together
- the technical characteristics of the external 24 V DC power-supply module for Micrologic control units are indicated on page A-28.

Communication bus

- do not connect the positive terminal (E1) to earth
- the negative terminal (E2) can be connected to earth
- a number of "device" or "chassis" communication modules can be connected to the same 24 V DC power supply (the consumption of each module is approximately 30 mA).

***Note:** wiring of ZSI: it is recommended to use twisted shielded cable. The shield must be connected to earth at both ends.*

Temperature derating
Compact NS devices equipped with electronic trip units

Compact circuit breakers have been tested for operation in industrial atmospheres.
It is recommended that the equipment be cooled or heated to the proper operating temperature and kept free of excessive vibration and dust.

Compact NS630b to NS1600 (1)

The table below indicates the maximum rated-current value for each type of connection, depending on the ambient temperature.
For mixed connections, use the same derating values as for horizontal connections.

Version	Fixed device													
Connection	Front or horizontal rear							Vertical rear						
temp. Ti (2)	40	45	50	55	60	65	70	40	45	50	55	60	65	70
NS630b N/L	630	630	630	630	630	630	630	630	630	630	630	630	630	630
NS800 N/L	800	800	800	800	800	800	800	800	800	800	800	800	800	800
NS1000 N/L	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
NS1250 N	1250	1250	1250	1250	1250	1240	1090	1250	1250	1250	1250	1250	1250	1180
NS1600 N	1600	1600	1560	1510	1470	1420	1360	1600	1600	1600	1600	1600	1510	1460

Version	Withdrawable device													
Connection	Front or horizontal rear							Vertical rear						
temp. Ti (2)	40	45	50	55	60	65	70	40	45	50	55	60	65	70
NS630b N/L	630	630	630	630	630	630	630	630	630	630	630	630	630	630
NS800 N/L	800	800	800	800	800	800	800	800	800	800	800	800	800	800
NS1000 N/L	1000	1000	1000	1000	1000	1000	920	1000	1000	1000	1000	1000	1000	990
NS1250 N	1250	1250	1250	1250	1250	1170	1000	1250	1250	1250	1250	1250	1250	1090
NS1600 N	1600	1600	1520	1480	1430	1330	1160	1600	1600	1600	1560	1510	1420	1250

Compact NS1600b to 3200

Version	Fixed device													
Connection	Front or horizontal rear							Vertical rear						
temp. Ti (2)	40	45	50	55	60	65	70	40	45	50	55	60	65	70
NS1600b N	1600	1600	1600	1600	1500	1450	1400	1600	1600	1600	1600	1600	1550	1500
NS2000 N	2000	2000	2000	2000	1900	1800	1700	2000	2000	2000	2000	2000	1900	1800
NS2500 N	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500
NS3200 N	-	-	-	-	-	-	-	3200	3200	3200	3180	3080	2970	2860

(1) For a circuit breaker mounted in horizontal position, the derating to be applied is equivalent to that of a front or horizontal rear connected circuit breaker.
(2) Ti: temperature around the circuit breaker and its connections.

Power dissipation / Resistance
Compact NS devices equipped with electronic trip units

The values indicated in the tables opposite are typical values.

Power dissipated per pole (P/pole) in Watts (W)
The value indicated in the table is the power dissipated at I_N, 50/60 Hz, for a three-pole or four-pole circuit breaker (these values can be higher than the power calculated on the basis of the pole resistance). Measurement and calculation of the dissipated power are carried out in compliance with the recommendations of Annex G of standard IEC 60947-2.

Resistance per pole (R/pole) in milliohms (mΩ)
The value of the resistance per pole is provided as a general indication for a new device.
The value of the contact resistance must be determined on the basis of the measured voltage drop, in accordance with the manufacturer's test procedure (expert card ABT no. FE 05e).

***Note:** this measurement is not sufficient to determine the quality of the contacts, i.e. the capacity of the circuit breaker to carry its rated current.*

Compact NS630b to 1600

Version	Fixed device					
	N		L		LB	
	R/pole	P/pole	R/pole	P/pole	R/pole	P/pole
NS630b	0.026	10	0.039	15	0.056	15
NS800	0.026	15	0.039	20	0.056	20
NS1000	0.026	22	0.039	34		
NS1250	0.026	44				
NS1600	0.026	74				

Version	Withdrawable device					
	N		L		LB	
	R/pole	P/pole	R/pole	P/pole	R/pole	P/pole
NS630b	0.038	19	0.072	34	0.086	34
NS800	0.038	30	0.072	40	0.086	40
NS1000	0.038	50	0.072	77		
NS1250	0.036	84				
NS1600	0.036	154				

Compact NS1600b to 3200

Version	Fixed device	
	N	
	R/pole	P/pole
NS1600b	0.019	84
NS2000	0.013	84
NS2500	0.008	100
NS3200	0.008	227

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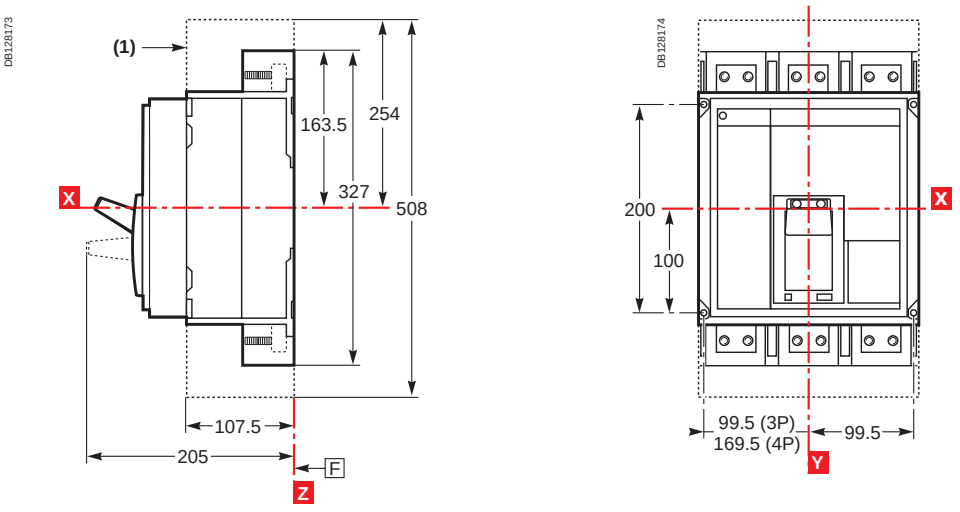
Last but not least, they optimise use of our products while also complying with standards and proper procedures.

Dimensions and connection
Contents

Compact NS630b to 1600 (fixed version)
Dimensions

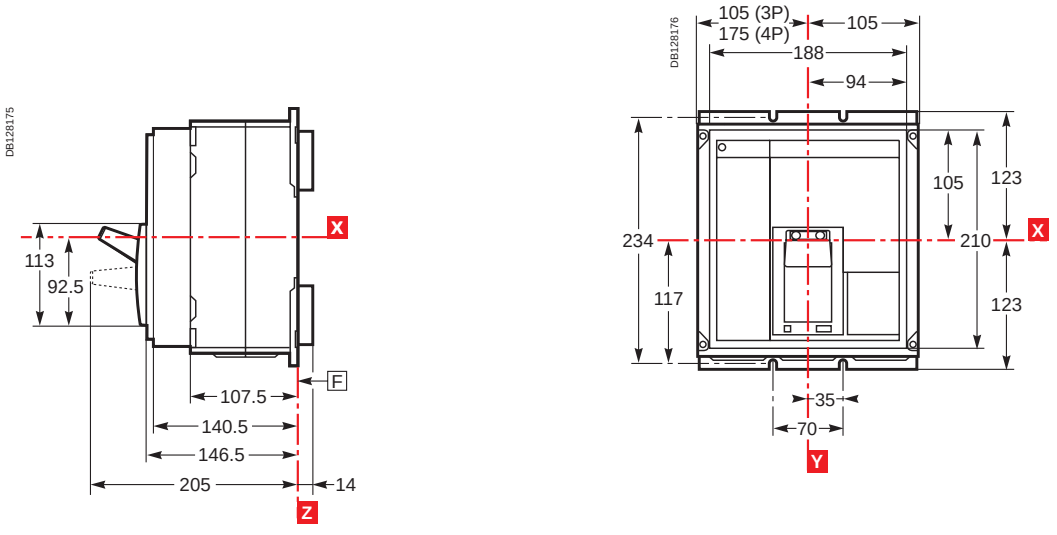
Manual control

Front connection (N, L)



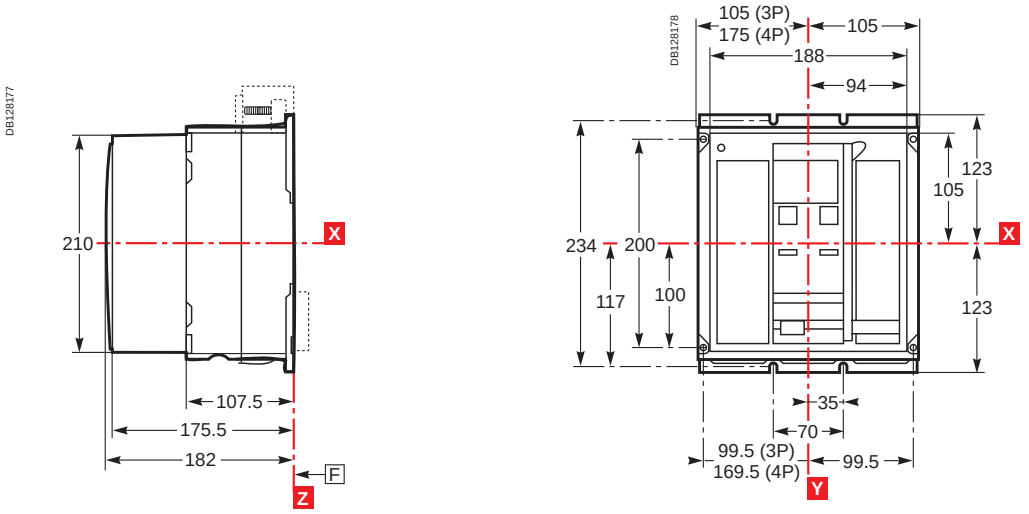
(1) terminal shields are optional

Rear connection (N, L, LB)



Electrical control

Front and rear connection (N, L, LB)

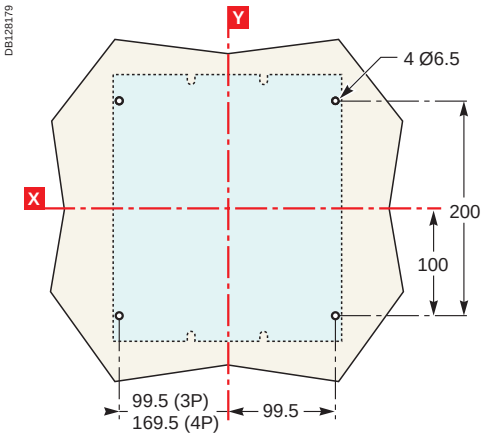


F : Datum

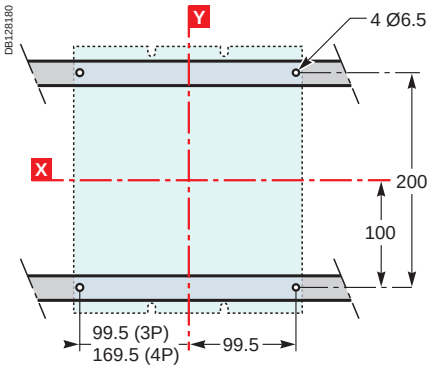
Note.
Dimensions for front and rear connection on electrically operated devices are identical to those for manually operated devices.

Front connection

On backplate



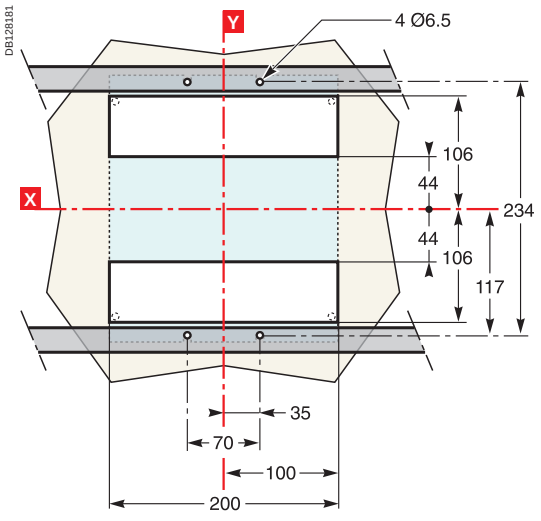
On rails



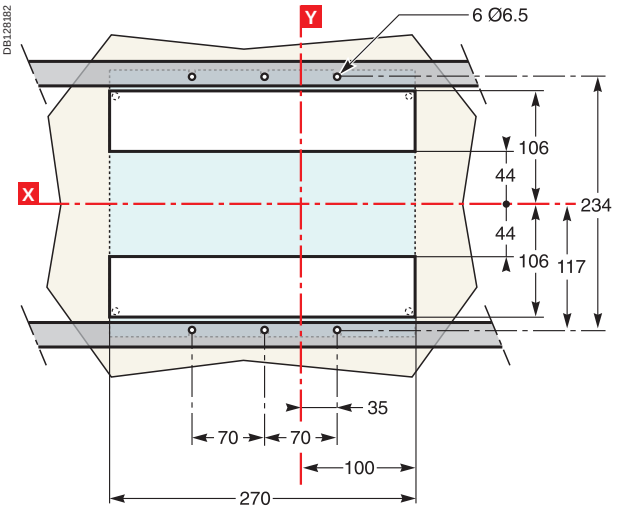
Rear connection

On backplate or rails

3P



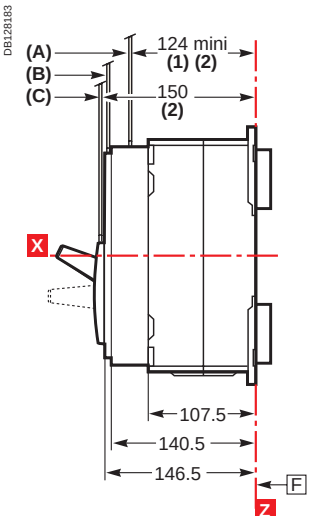
4P



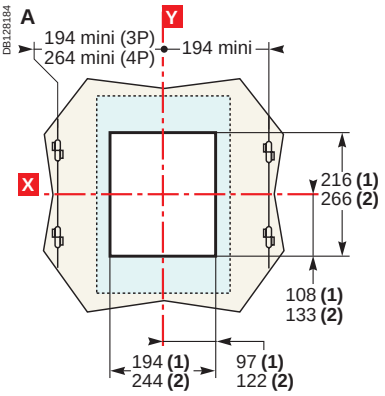
Note.
Mounting parameters for electrically operated devices are identical to those for manually operated devices.
X *and* ***Y*** *are the symmetry planes for a 3-pole device*
Z *is the back plane of the device.*

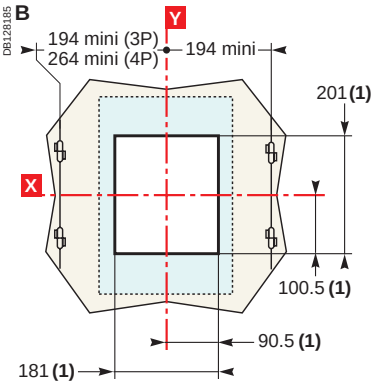
Compact NS630b to 1600 (fixed version)
Front-panel cutouts

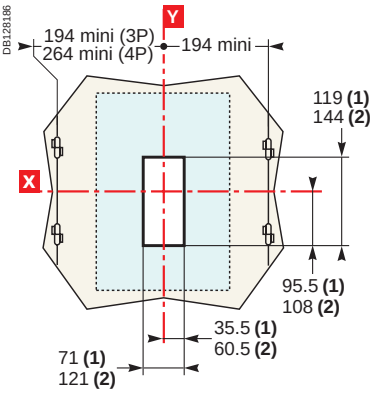
Toggle control



Door cutout

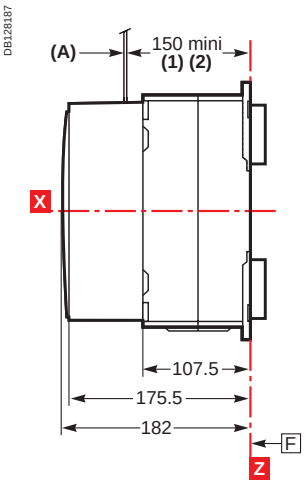




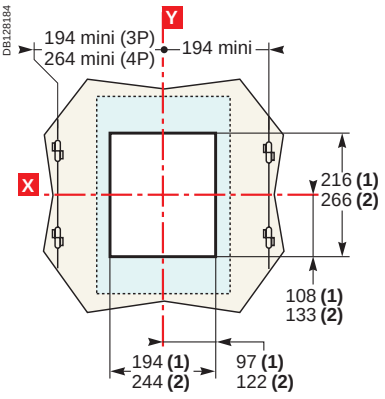


F : Datum.
(1) Without escutcheon.
(2) With escutcheon.

Electrical control



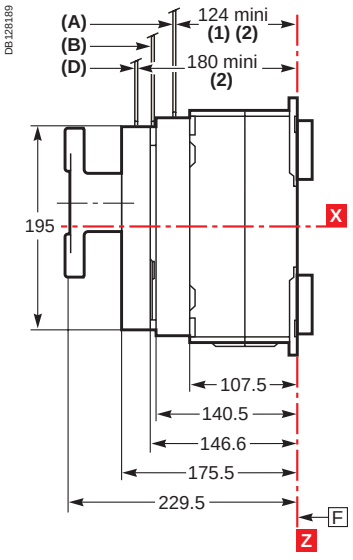
Door cutout
A

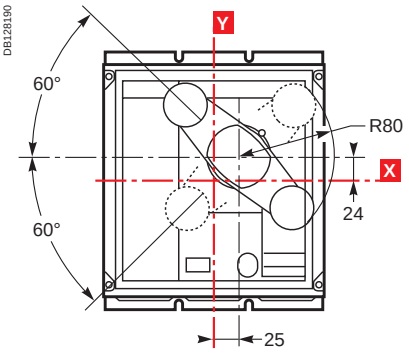


F : Datum.
(1) Without escutcheon.
(2) With escutcheon.

Direct rotary handle

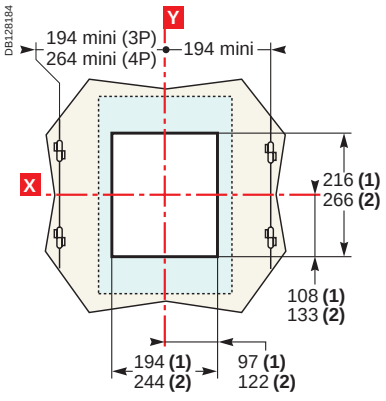
Dimensions



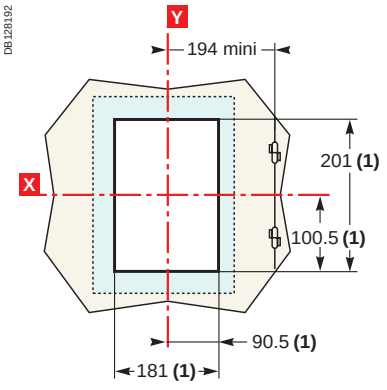


Door cutout

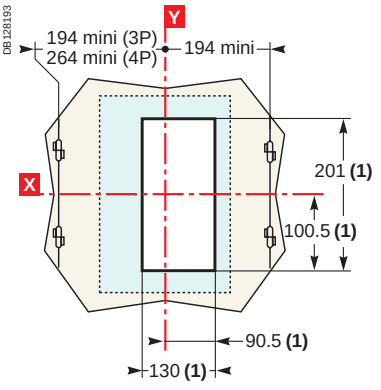
A



B



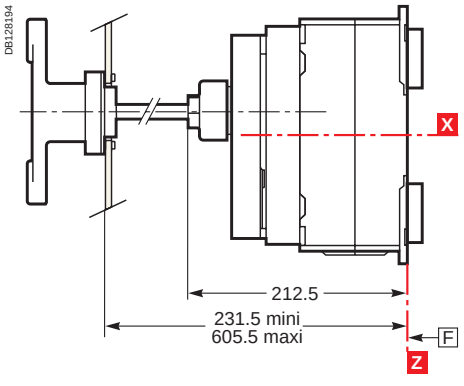
D



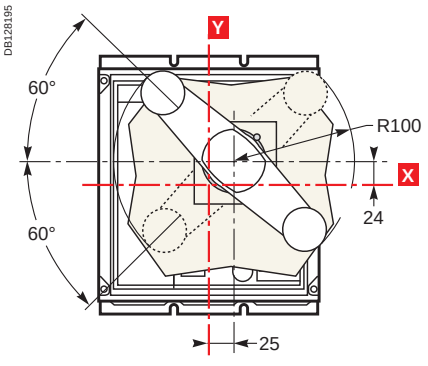
***(1)** Without escutcheon.*
***(2)** With escutcheon.*

Extended rotary handle

Dimensions

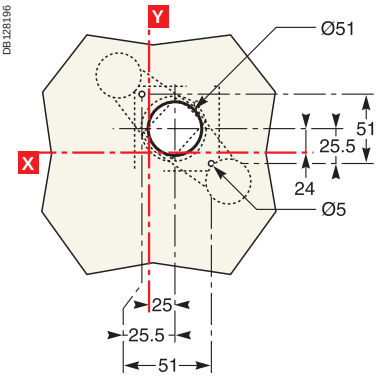


F : *Datum*



Note.
***X** and **Y** are the symmetry planes for a 3-pole device*
***Z** is the back plane of the device.*

Door cutout

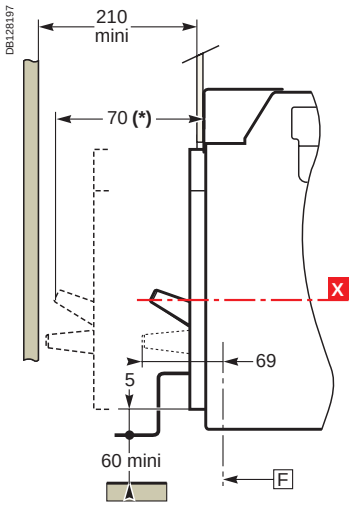


Compact NS630b to 1600 (withdrawable version)

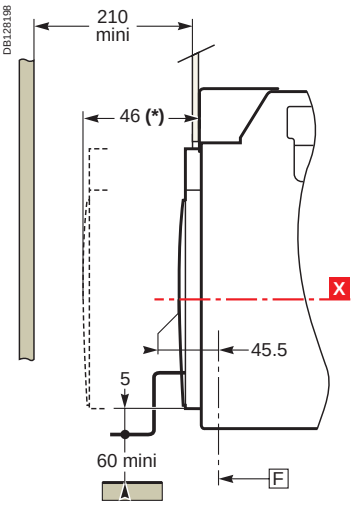
Dimensions, mounting and cutouts

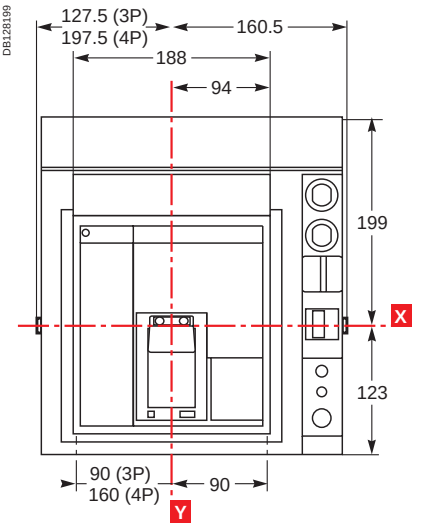
Dimensions

Manual control



Electrical control

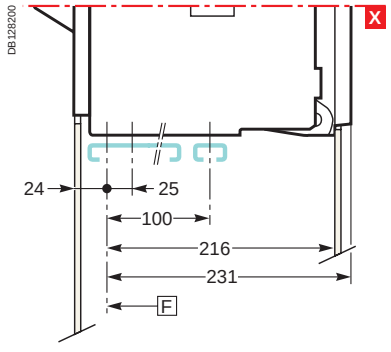


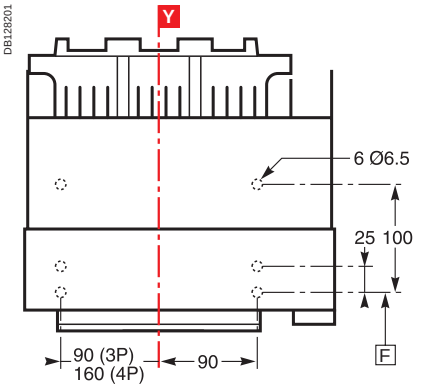


***(*)** Withdrawable position*

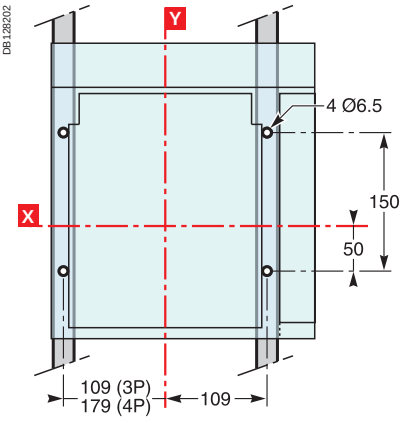
Mounting

Bottom mounting on base plate or rails



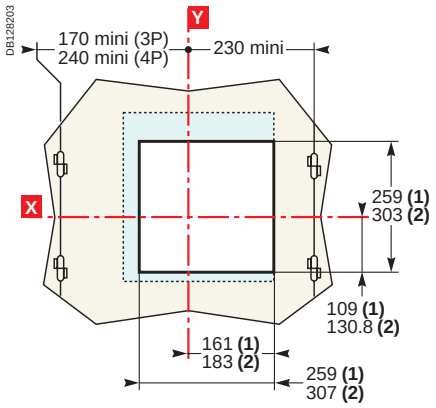


Vertical on uprights or backplate

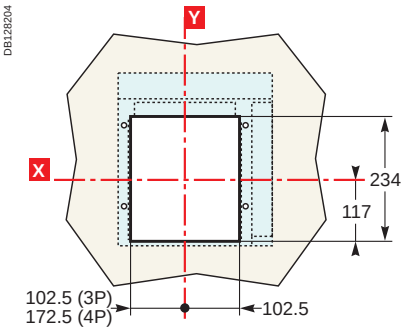


Cutouts

Door cutout



Rear panel cutout

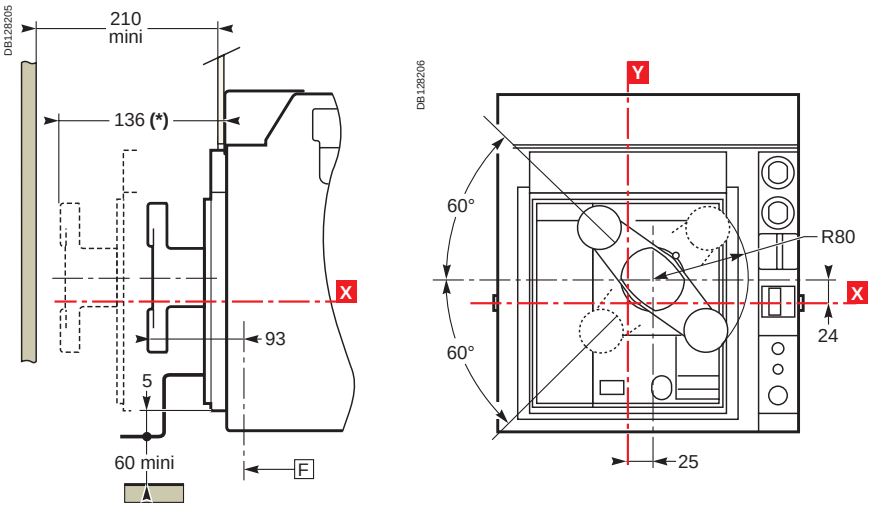


Note.
***X** and **Y** are the symmetry planes for a 3-pole device.*

F : *Datum*

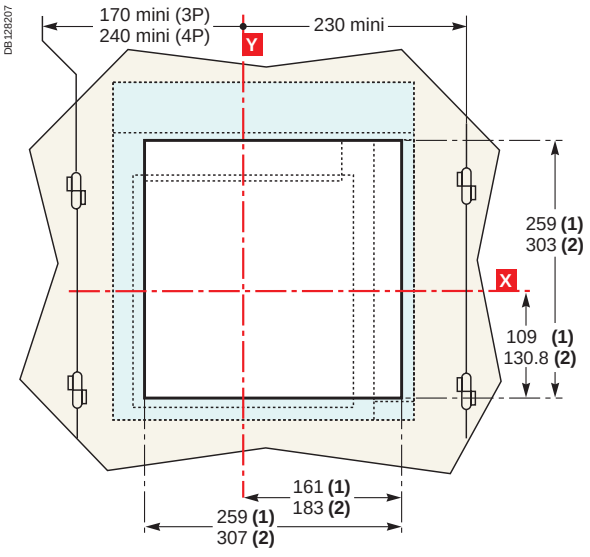
Direct rotary handle

Dimensions



(*) Withdrawable position.

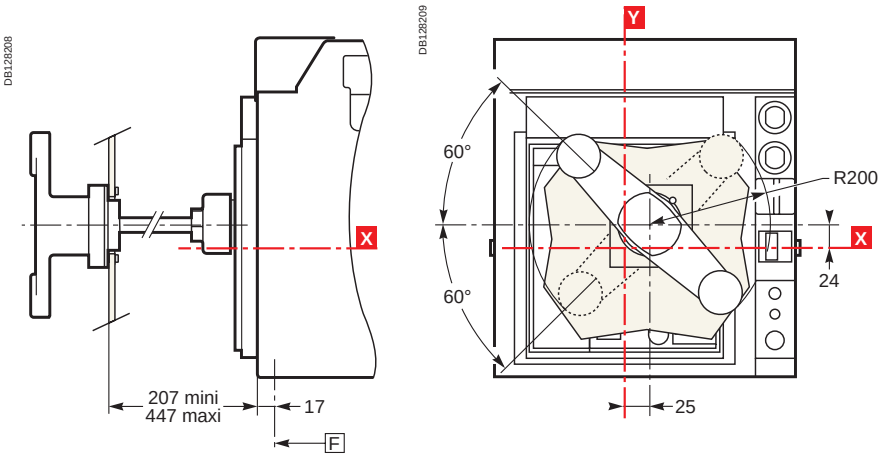
Door cutout



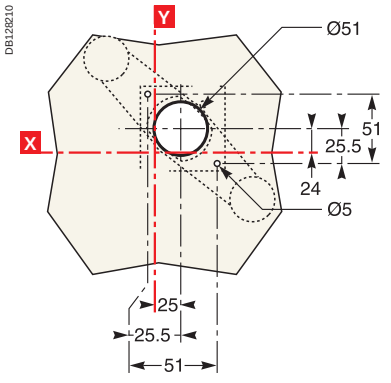
(1) Without escutcheon.
(2) With escutcheon.

Extended rotary handle

Dimensions



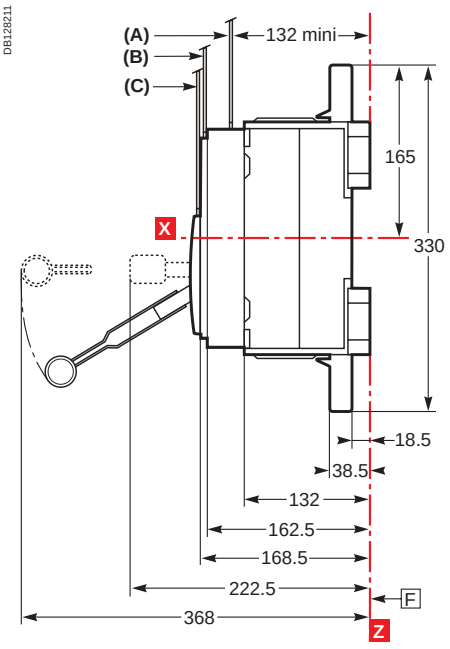
Door cutout

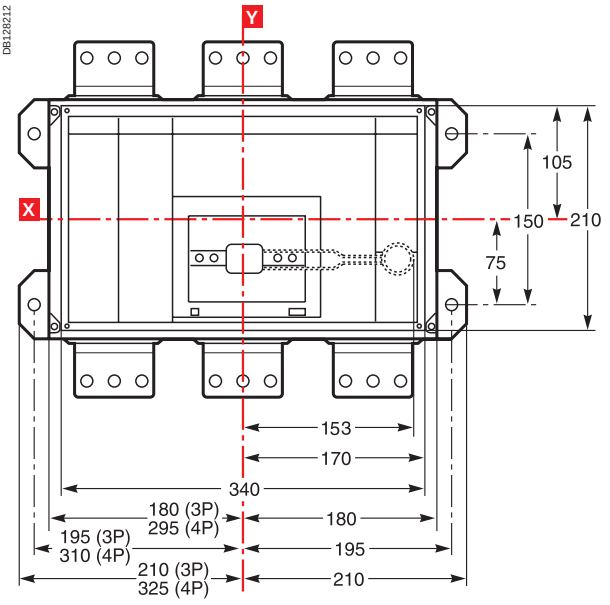


Note.
X and Y are the symmetry planes for a 3-pole device.

Compact NS1600b to 3200 (fixed version)
Dimensions

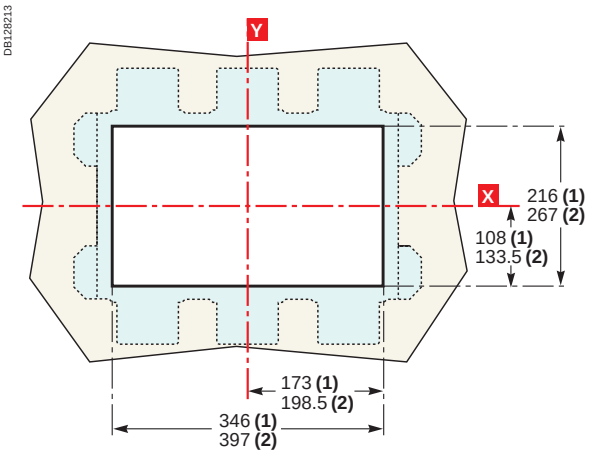
Dimensions



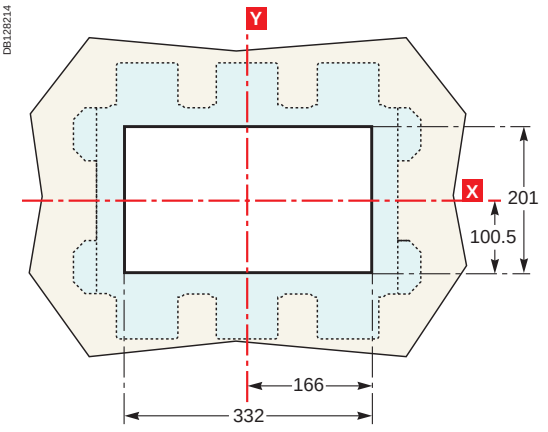


Door cutout (A, B, C)

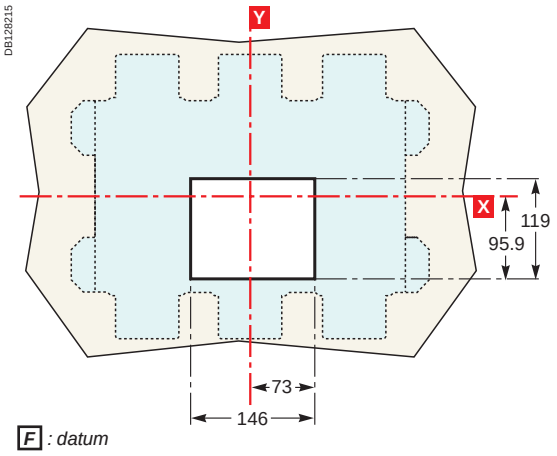
A



B



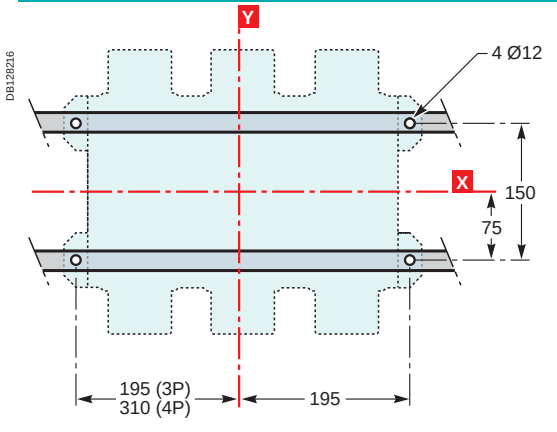
C



F : datum

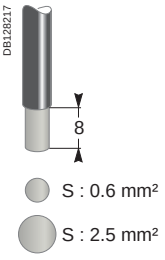
(1) Without escutcheon.
(2) With escutcheon.

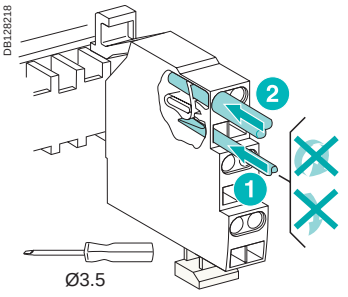
Mounting on rails



Note.
X and Y are the symmetry planes for a 3-pole device

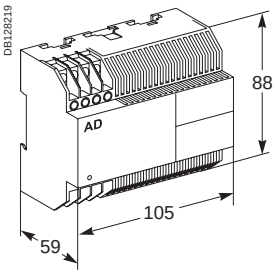
Control-wire connections to terminal block

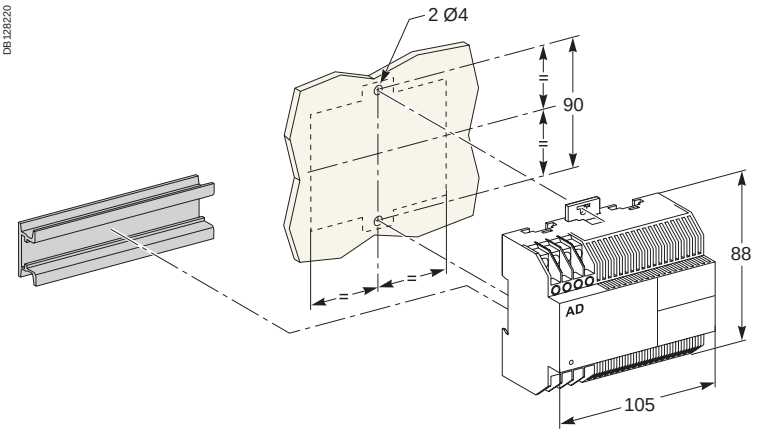




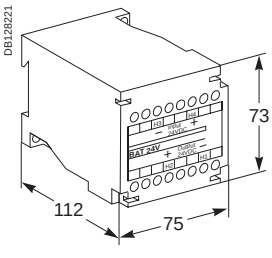
Only one wire per terminal.

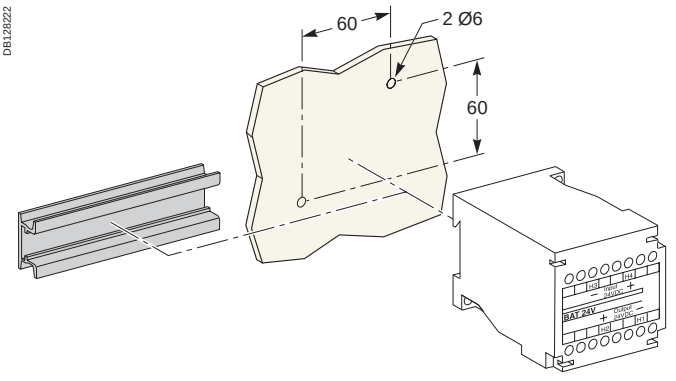
External power-supply module (AD)





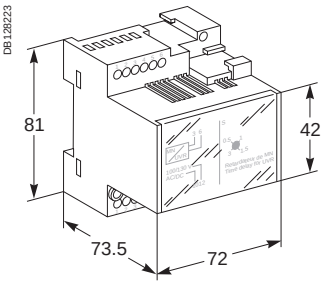
Battery module (BAT)

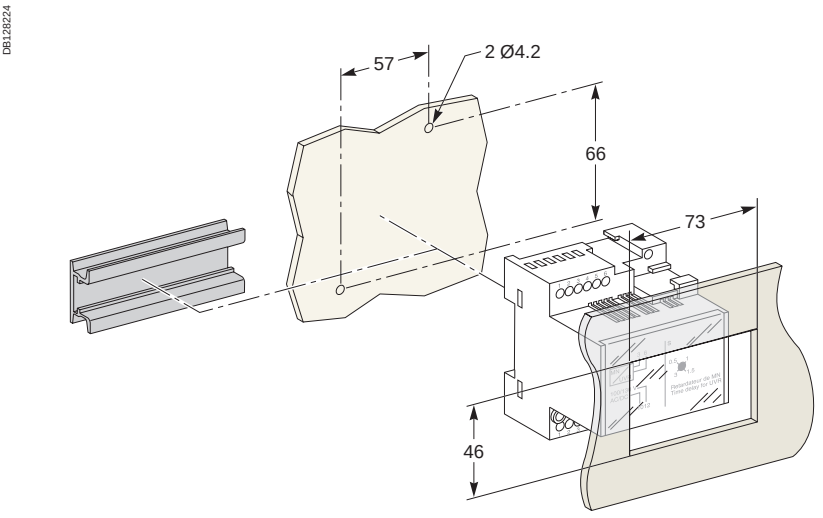




Compact NS630b to 3200
External modules

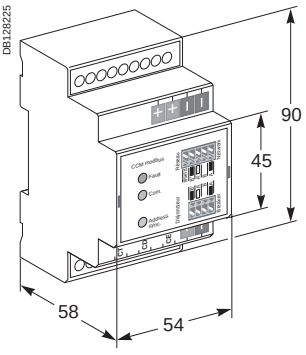
MN delay unit





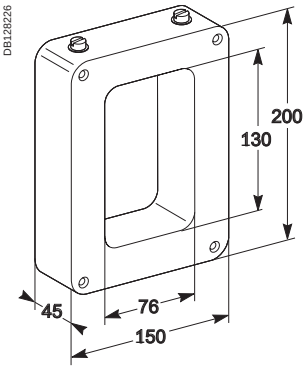
Chassis communication module

Modbus

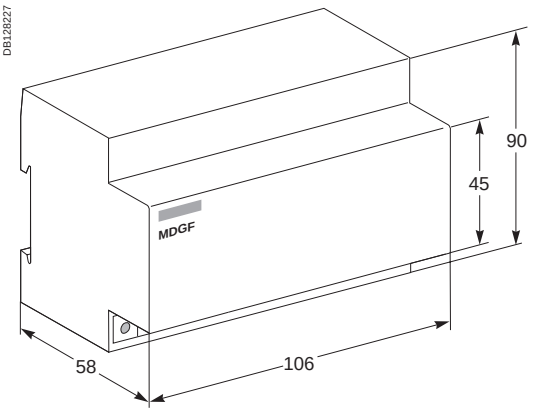


External sensor for source ground return (SGR) protection

External sensor

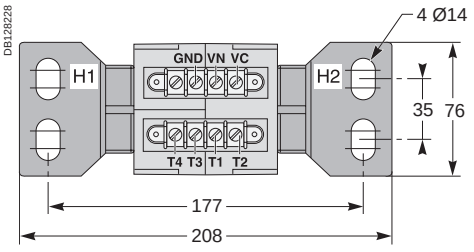


"MDGF" summing module

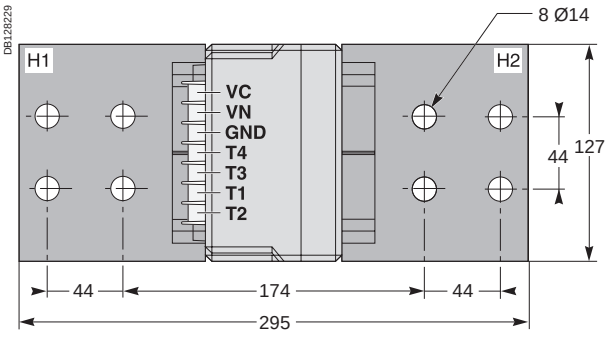


External sensor for neutral

400/1600 A (NS630b to 1600)

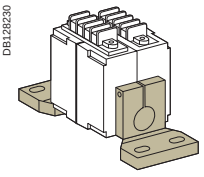


1000/4000 A (NS1600b to 3200)

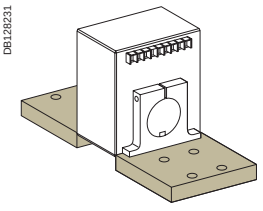


Installation

400/1600 (NS630b to NS1600)



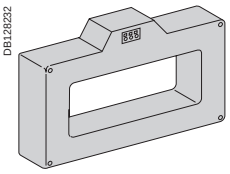
1000/4000 A (NS1600b to NS3200)

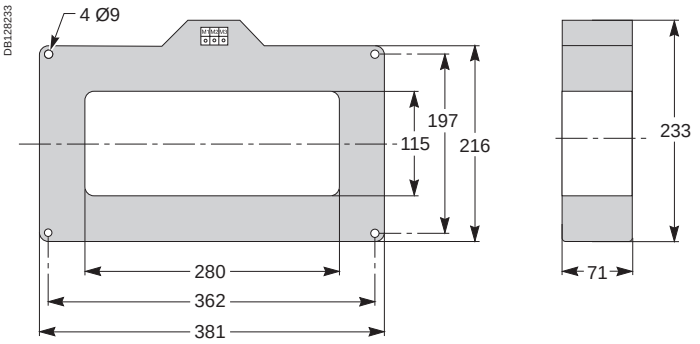


Compact NS630b to 3200
External modules (cont.)

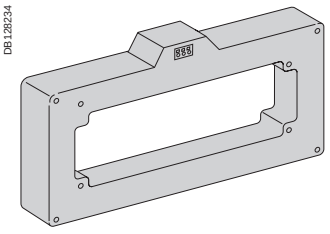
Rectangular sensor for earth leakage protection (Vigi)

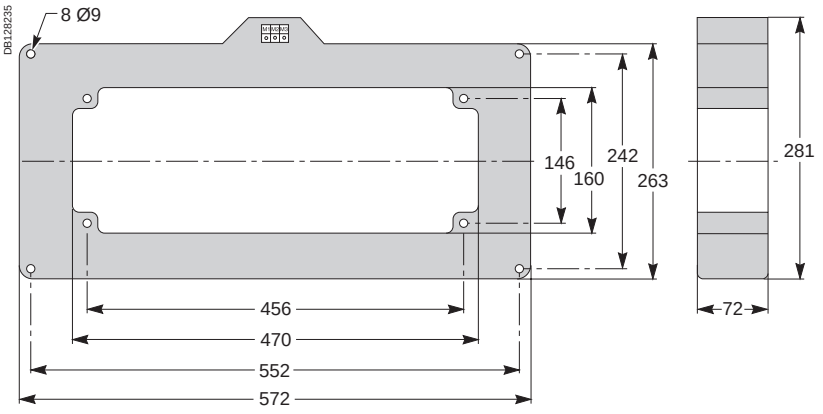
280 x 115 mm window





470 x 160 mm window



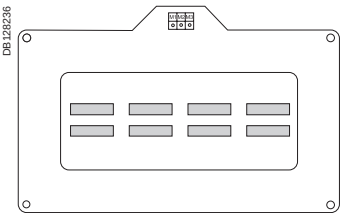


Busbars	I ⩽ 1600 A	I ⩽ 3200 A
Window (mm)	280 x 115	470 x 160
Weight (kg)	14	18

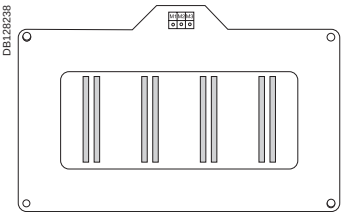
Busbars path

280 x 115 mm window

Busbars spaced 70 mm centre-to-centre



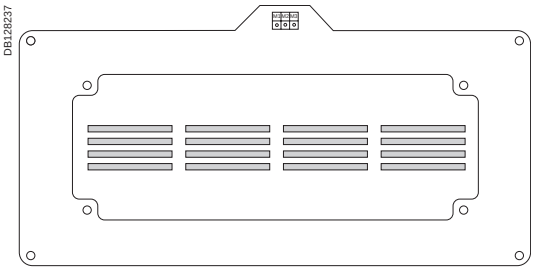
2 bars 50 x 10



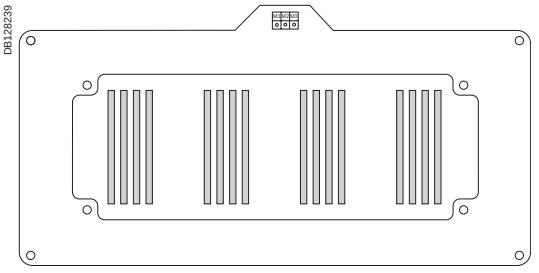
2 bars 100 x 5

470 x 160 mm window

Busbars spaced 115 mm centre-to-centre



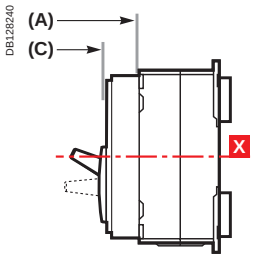
4 bars 100 x 5



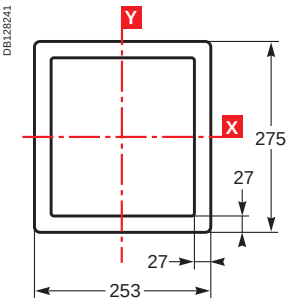
4 bars 125 x 5

Escutcheon

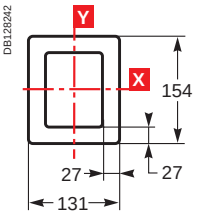
NS630b to NS1600 (fixed control)



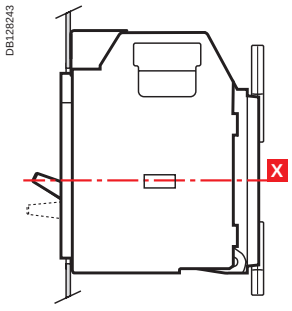
A

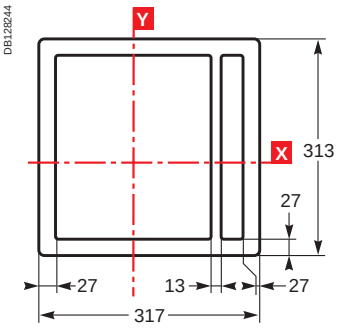


C

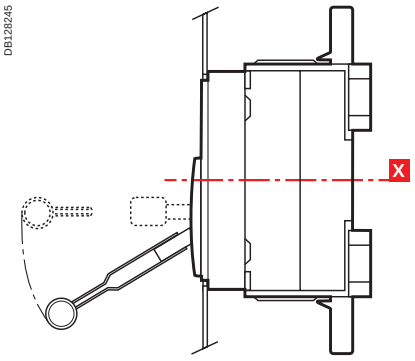


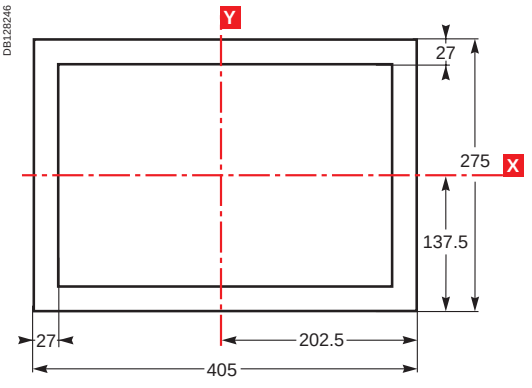
NS630b to NS1600 (withdrawable control)





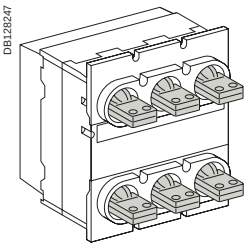
NS1600b to NS3200 (fixed control)

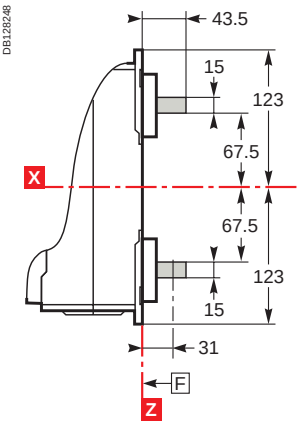


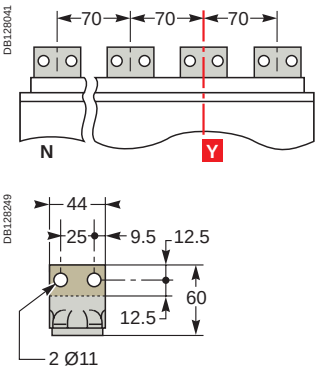


Compact NS630b to 1600 (fixed version)
Bars

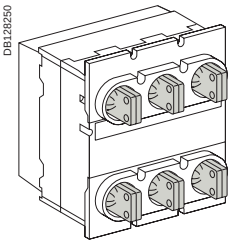
Horizontal rear connection

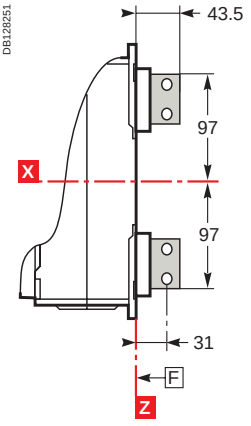


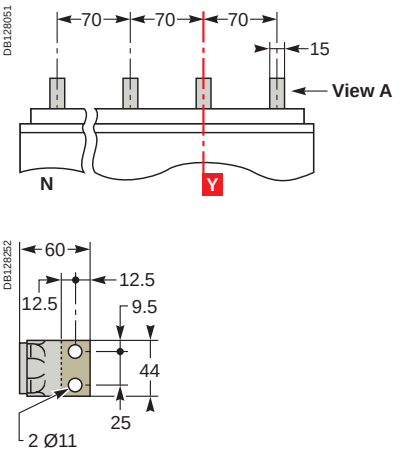




Vertical rear connection

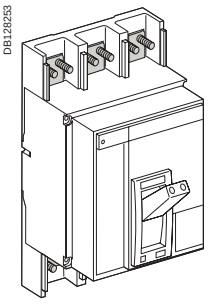


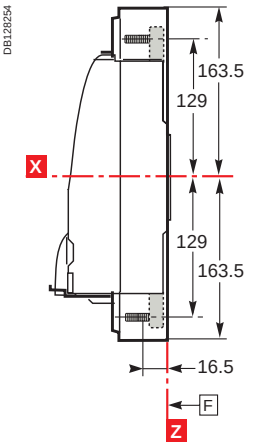


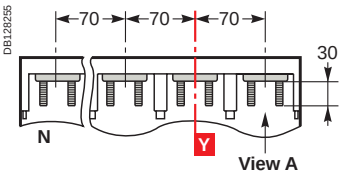


View A detail.

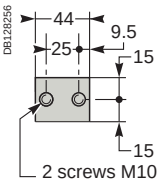
Front connection



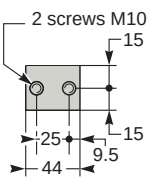




Top terminal



Bottom terminal

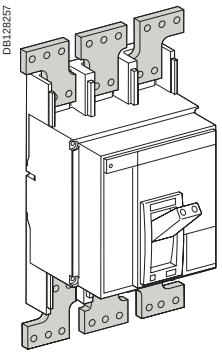


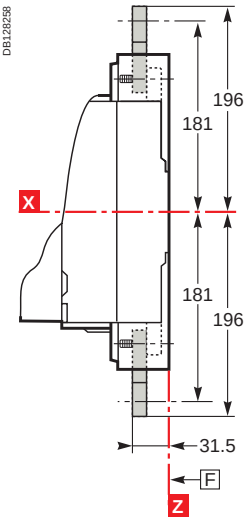
View A detail.

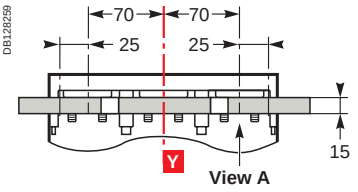
F : *Datum.*

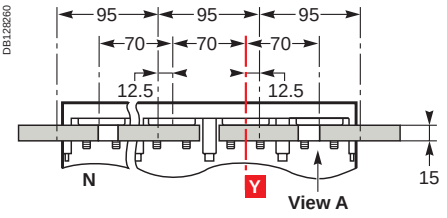
Note.
Recommended connection screws: ***M10*** *class 8.8.*
Tightening torque: ***50 Nm*** *with contact washer.*

Front connection with spreaders

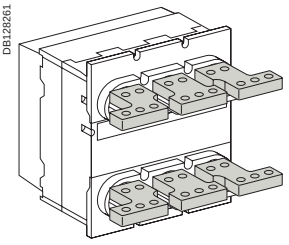


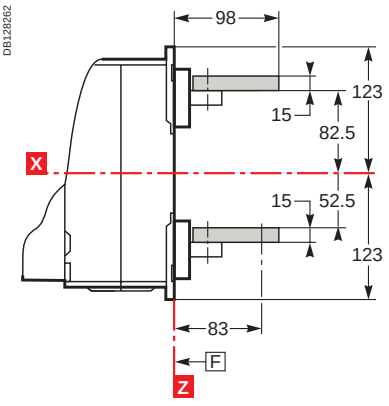


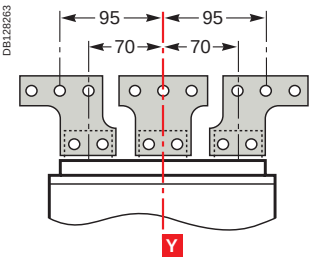


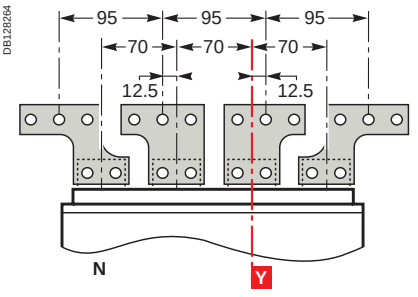


Rear connection with spreaders



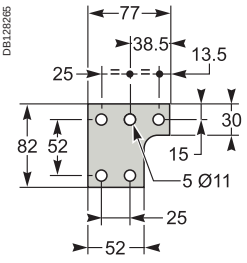




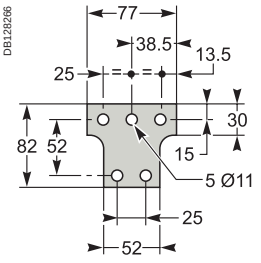


Spreader detail

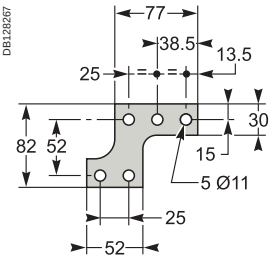
Middle left or middle right spreader for 4P



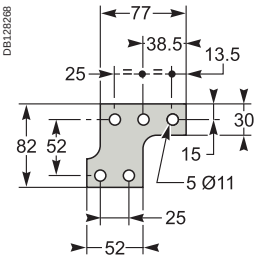
Middle spreader for 3P



Left or right spreader for 4P



Left or right spreader for 3P



View A detail.

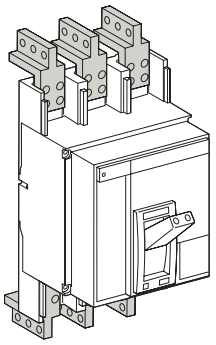
F : *Datum.*

Note.
X *and* ***Y*** *are the symmetry planes for a 3-pole device.*

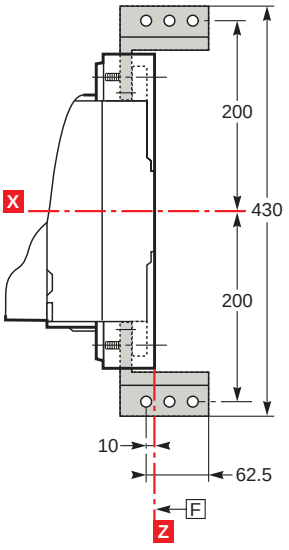
Compact NS630b to 1600 (fixed version)
Bars

Front connection with vertical-connection adapters

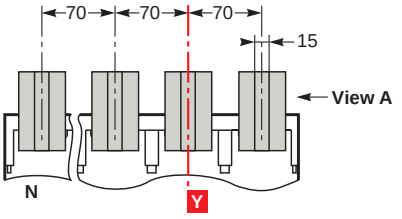
DB128269



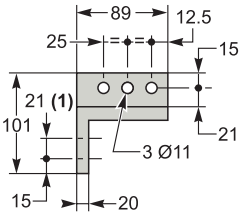
DB128270



DB128152



DB128271

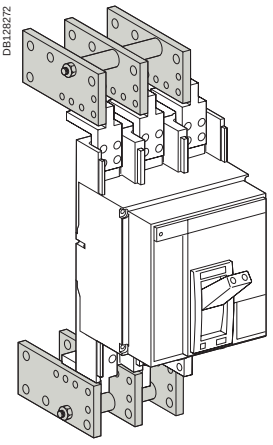


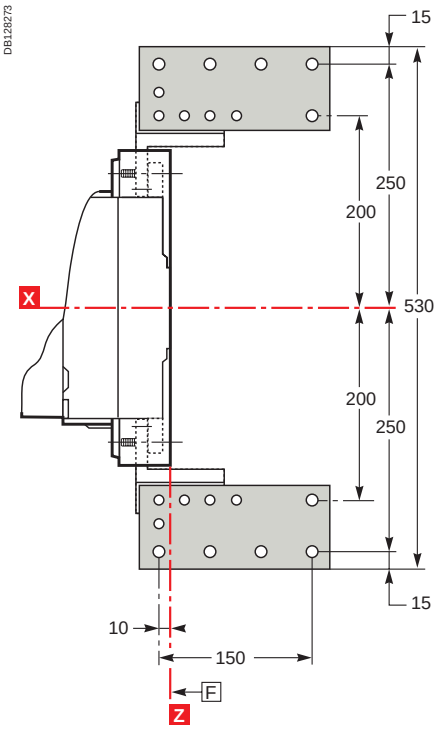
View A detail.

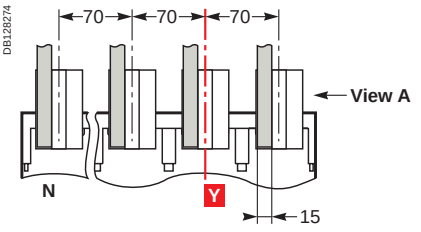
F : *Datum.*

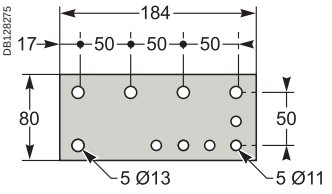
Note.
(1) *two mounting possibilities for vertical-connection adapters (pitch 21 mm).*
Recommended connection screws: ***M10*** *class 8.8.*
Tightening torque: ***50 Nm*** *with contact washer.*

Front connection with vertical-connection adapters and cable-lug adapters



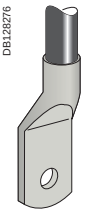


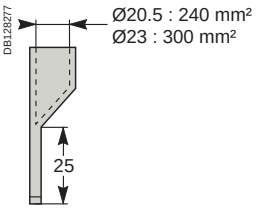


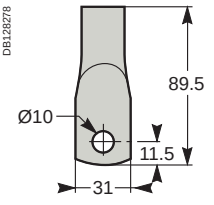


View A detail.

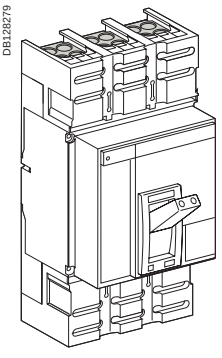
Lugs

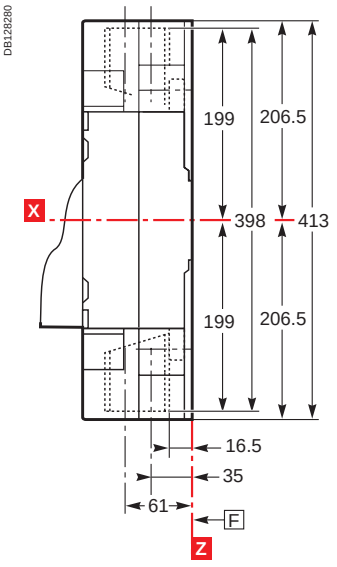


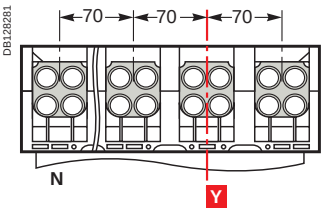


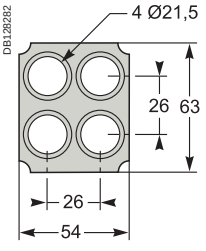


Fixed circuit breaker with 4-cable bare-cable connectors (240 mm²)





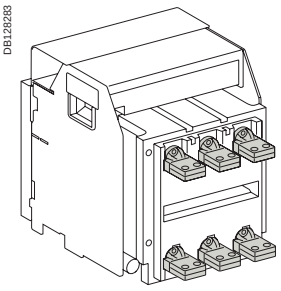


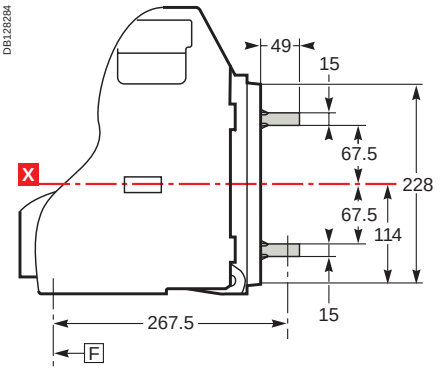


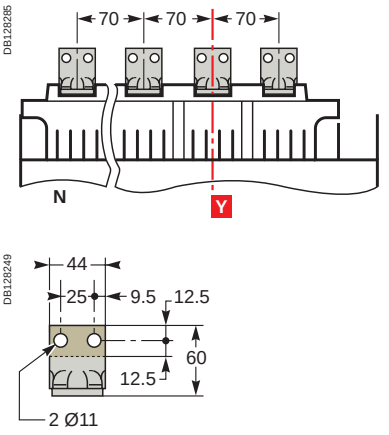
F : *Datum.*

Compact NS630b to 1600 (plug-in and withdrawable versions)
Bars

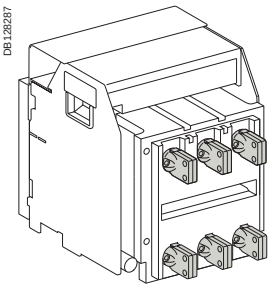
Horizontal rear connection

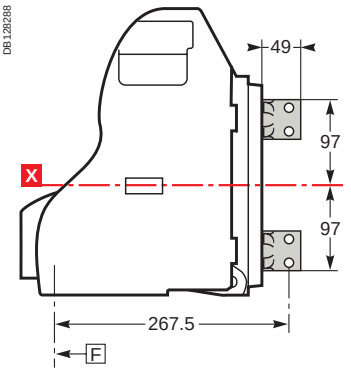


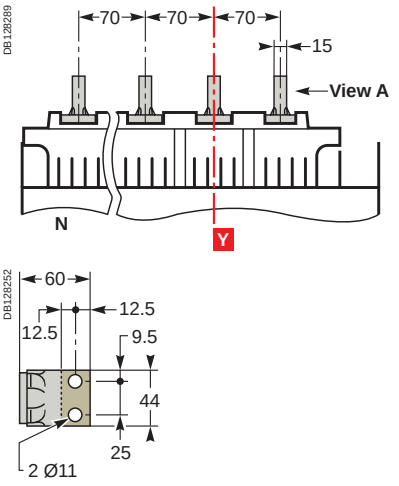




Vertical rear connection

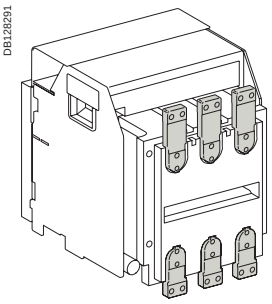


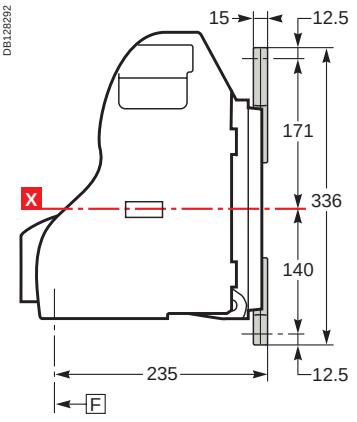


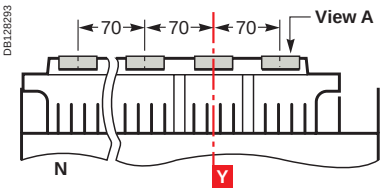


View A detail.

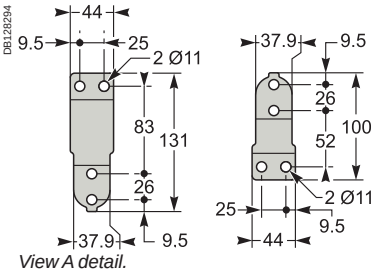
Front connection







Top terminal Bottom terminal

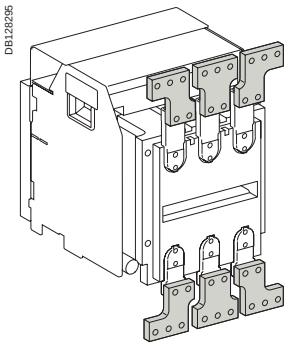


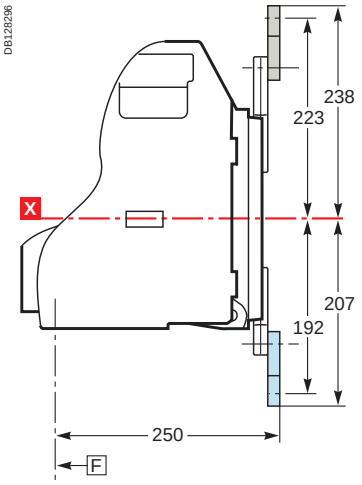
View A detail.

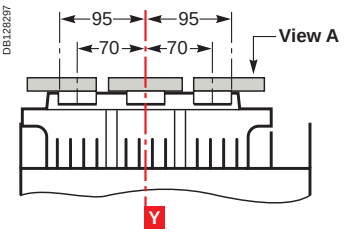
F : *Datum.*

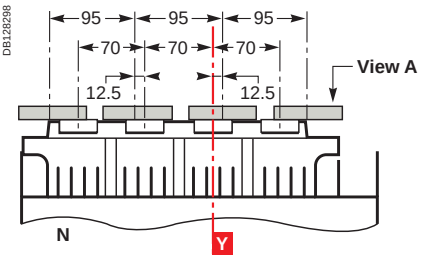
Note.
Recommended connection screws: ***M10*** *class 8.8.*
Tightening torque: ***50 Nm*** *with contact washer.*

Front connection with spreaders



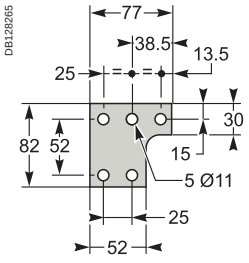




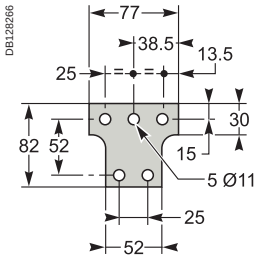


Spreader detail

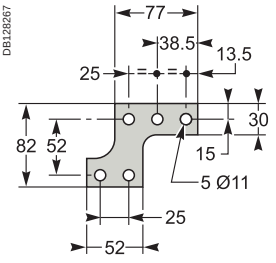
Middle left or middle right spreader for 4P



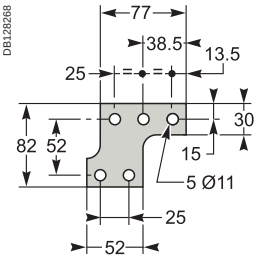
Middle spreader for 3P



Left or right spreader for 4P



Left or right spreader for 3P



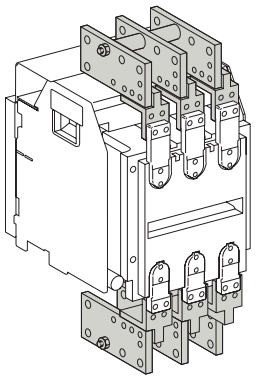
View A detail.

F : *Datum.*

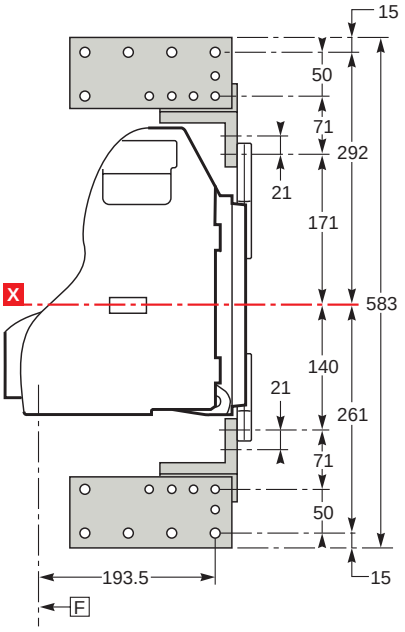
Compact NS630b to 1600 (plug-in and withdrawable versions)
Cables with lugs

Front connection with vertical-connection adapters and cable-lug adapters

DB128303



DB128304



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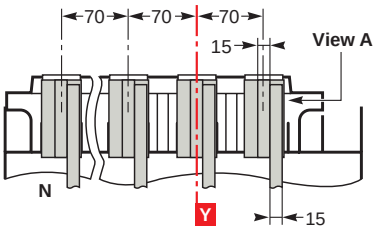
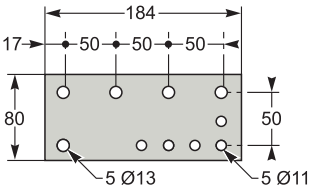


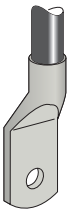
DB128275



View A detail.

Lugs

DB128276



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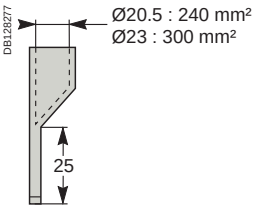

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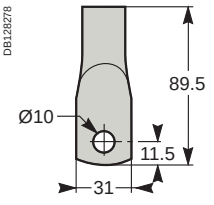
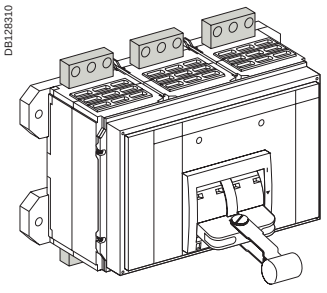


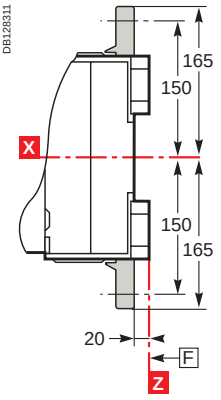
F : *Datum.*

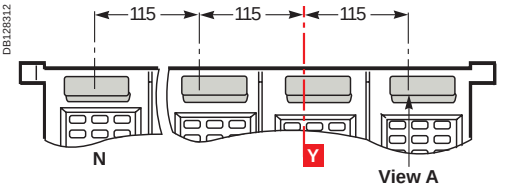
Note.
X *and* ***Y*** *are the symmetry planes for a 3-pole device.*
Recommended connection screws: ***M10*** *class 8.8.*
Tightening torque: ***50 Nm*** *with contact washer.*

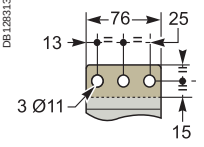
Compact NS1600b to 3200 (fixed version)

Front connection (NS1600b to 2500)



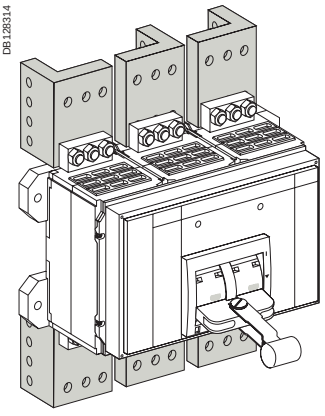


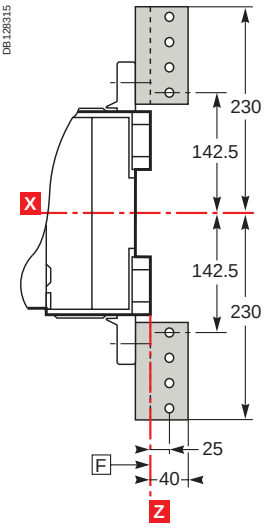


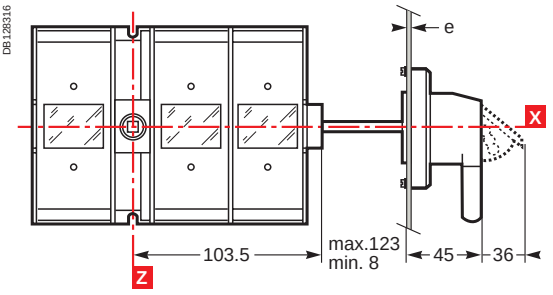


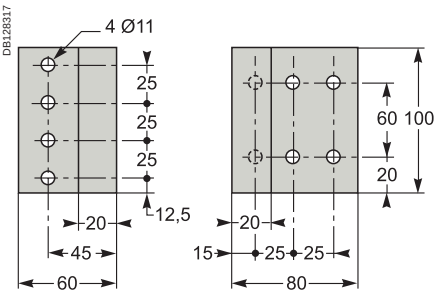
View A detail.

Front connection with vertical-connection adapters (NS1600b to 2500)



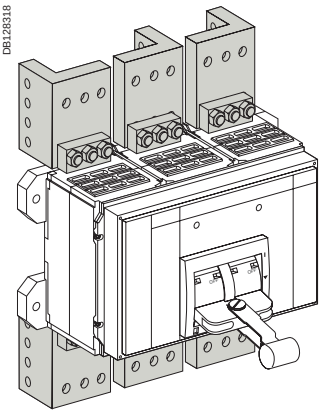


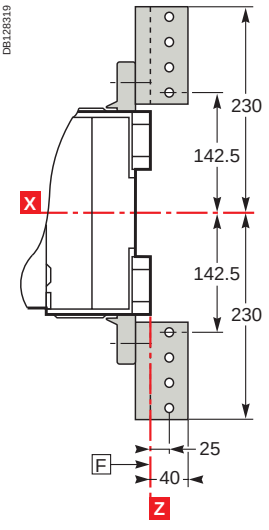


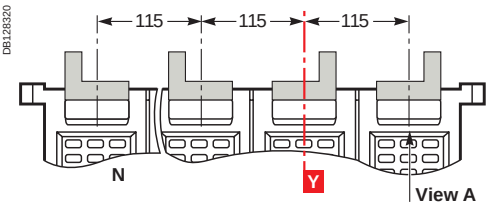


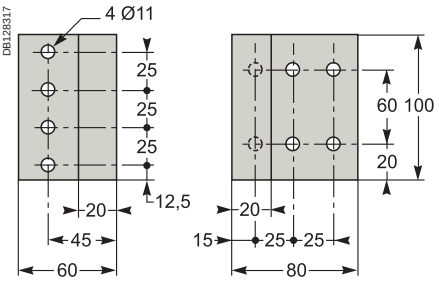
View A detail.

Front connection (NS3200)









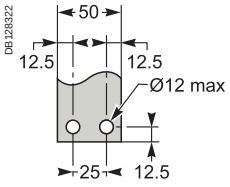
View A detail.

Note.
*Recommended connection screws: **M10** class 8.8.*
*Tightening torque: **50 Nm** with contact washer.*

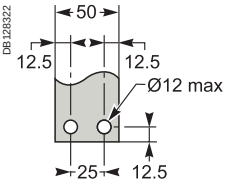
Power connections for Compact NS630b to 1600

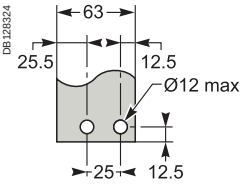
Recommended drilling dimensions

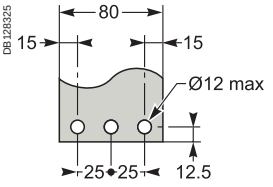
Rear connection

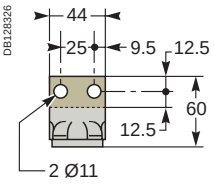


Rear connection with spreaders

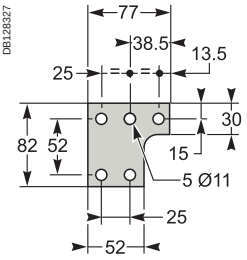




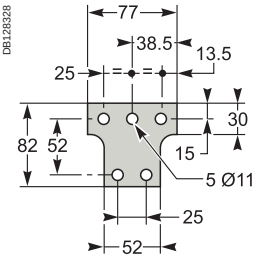




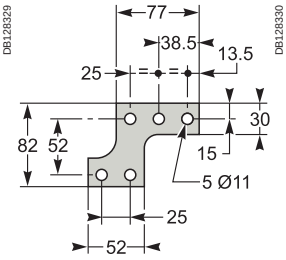
Middle left or middle right spreader for 4P



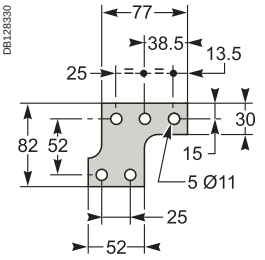
Middle spreader for 3P



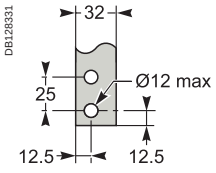
Left or right spreader for 4P

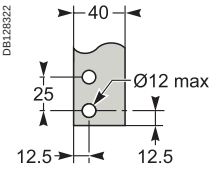


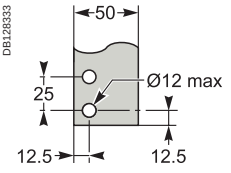
Left or right spreader for 3P

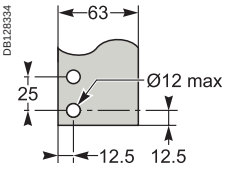


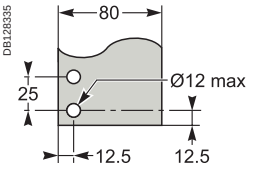
Vertical rear connection

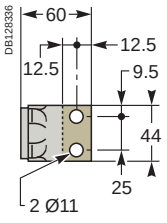




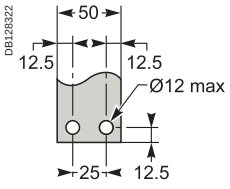




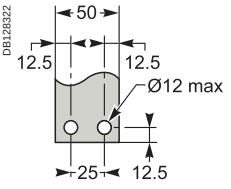


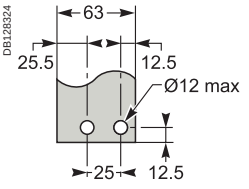


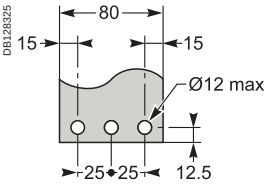
Front connection



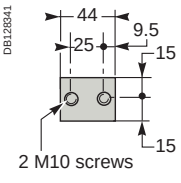
Front connection with vertical-connection adapter



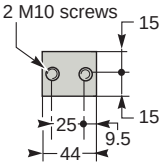


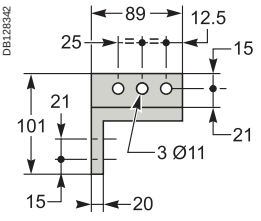


Top terminal



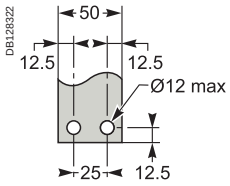
Bottom terminal

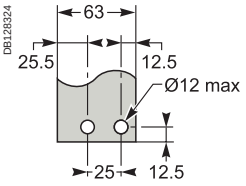


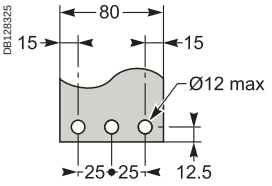


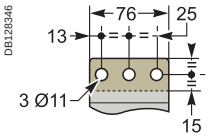
Power connections for Compact NS1600b to 3200
Recommended drilling dimensions

Front connection (NS1600b to 2500)

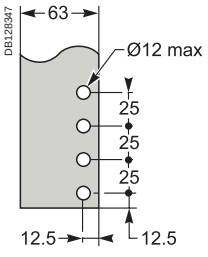


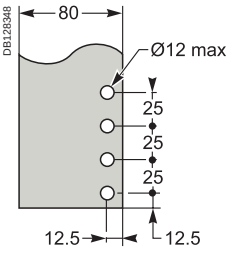


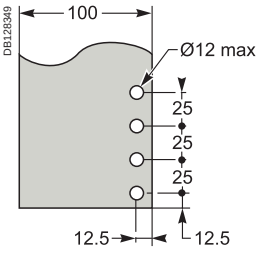


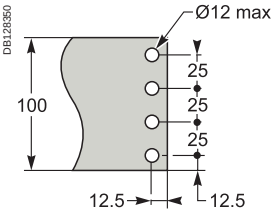


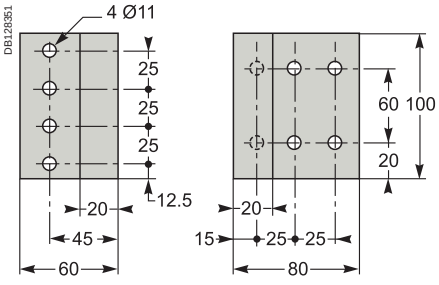
Front connection with vertical-connection adapter (NS1600b to 2500)



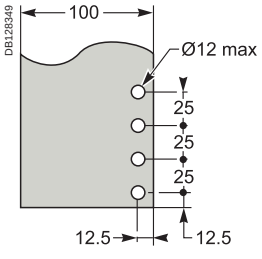


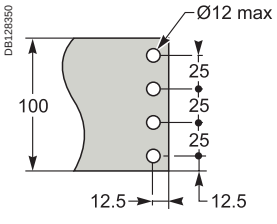


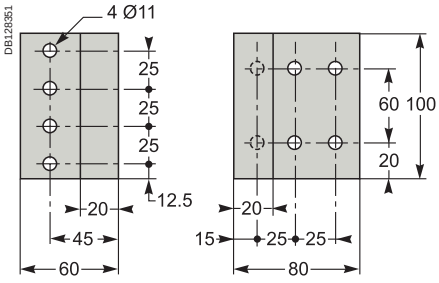




Front connection (NS3200)



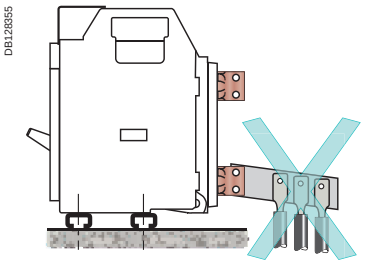




Power connections for Compact NS630b to 3200

Conductor materials and electrodynamic stresses

Compact circuit breakers can be connected indifferently with bare-copper, tinned-copper and tinned-aluminium conductors (flexible or rigid bars, cables.
In the event of a short-circuit, thermal and electrodynamic stresses will be exerted on the conductors. They must therefore be correctly sized and maintained in place using supports.
Electrical connection points on all types of devices (switch-disconnectors, contactors, circuit breakers, etc.) should not be used for mechanical support.
Any partition between upstream and downstream connections of the device must be made of non-magnetic material.

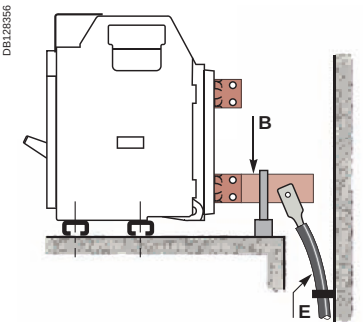


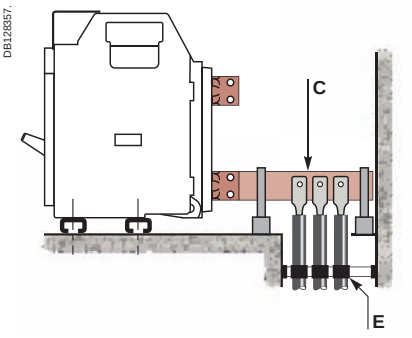
Ties for flexible bars and cables

The table below indicates the maximum distance between ties depending on the prospective short-circuit current.
The maximum distance between ties attached to the switchboard frame is 400 mm.

Type of tie	"Panduit" ties Width: 4.5 mm Maximum load: 22 kg Colour: white			"Sarel" ties Width: 9 mm Maximum load: 90 kg Colour: black				
Maximum distance between ties (mm)	200	100	50	350	200	100	70	50 (double ties)
Short-circuit current (kA rms)	10	15	20	20	27	35	45	100

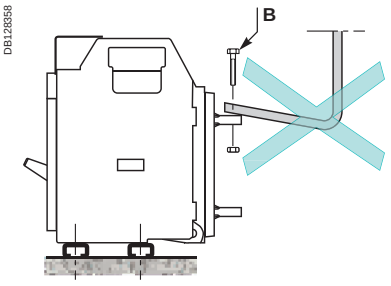
Note. *For cables ≥ 50 mm², use 9 mm-wide ties.*





Connection of bars

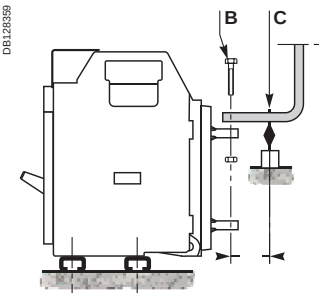
Bars must be adjusted to ensure correct positioning on the terminals before bolting **(B).**
Bars must rest on a support firmly attached to the switchboard frame, such that the circuit-breaker terminals do not bear any weight **(C)**.

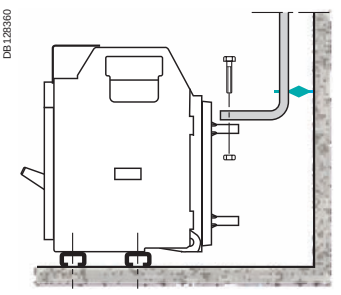


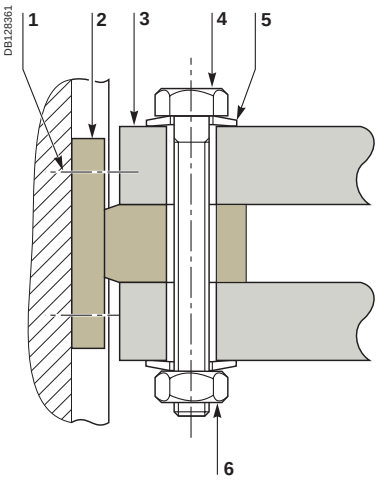
Electrodynamic forces

The first spacer between bars must be positioned within a maximum distance (see table below) of the connection point to the circuit breaker. This distance is calculated to resist the electrodynamic stresses exerted between the bars of each phase during a short-circuit.

Maximum distance A between the circuit-breaker connection and the first spacer between bars, depending on the short-circuit current						
Isc (kA)	30	50	65	80	100	150
Distance (mm)	350	300	250	150	150	150





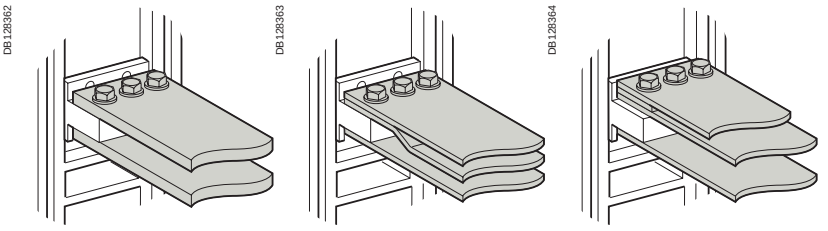


1 *terminal screws, factory tightened to 13 Nm*
2 *circuit-breaker terminal*
3 *bars*
4 *bolt*
5 *washer*
6 *nut*

Connections

The quality of bar connections depends, among other things, on the tightening torques used for the nuts and bolts. Over-tightening may have the same consequences as under-tightening.
The correct tightening torques for the connection of bars to the circuit-breaker terminals are indicated in the table below.
The values below are for copper bars (Cu ETP-NFA51-100) and steel nuts and bolts (class 8.8).
The same values apply to AGS-T52 quality aluminium bars
(French standard NFA 02-104 and American National Standard H-35-1).

Examples of bar connections

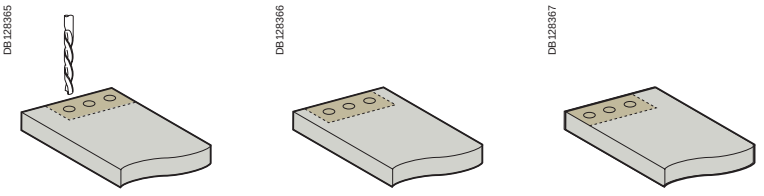


Tightening torque for bars

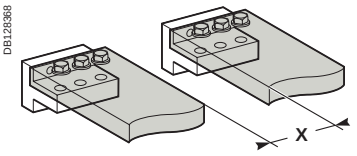
Rated diameter (mm)	Drilling (mm) diameter	Tightening torque (Nm) with flat or grower washers	Tightening torque (Nm) with contact or split washers
10	11	37.5	50

Bar drilling

Examples



Insulation distance

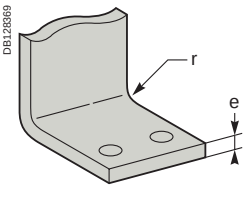


Dimensions (mm)

Utilisation voltage	X minimum
Ui ⩽ 600 V	8 mm
Ui ⩽ 1000 V	14 mm

Bar bending

Bars must be bent according to the table below. A tighter bend may cause cracks.



Dimensions (mm)

e	Radius r	
	Minimum	Recommended
5	5	7.5
10	15	18 to 20

Power connections for Compact NS630b to 3200

Sizing of bars

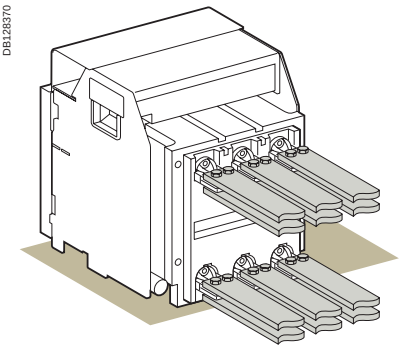
The following tables are based on the following assumptions:

- maximum permissible temperature of bars is 100 °C
- Ti: temperature around the circuit breaker and its connections
- busbars made of copper and not painted.

Note.

The values presented in the tables are the result of trials and theoretical calculations on the basis of the assumptions mentioned above.
These tables are intended as an aid in designing connections, however, the actual values must be confirmed by tests on the installation.

Front or horizontal rear connections

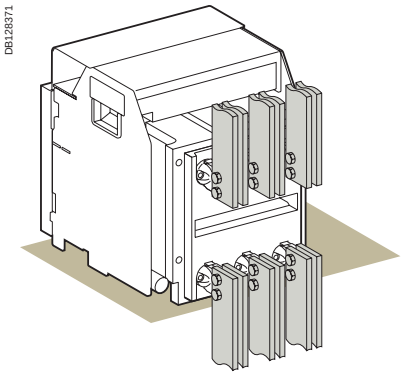


Compact	Maximum service current	Ti: 40 °C Number of bars		Ti: 50 °C Number of bars		Ti: 60 °C Number of bars	
		5 mm thick	10 mm thick	5 mm thick	10 mm thick	5 mm thick	10 mm thick
NS630b	**400**	2b.30 x 5	1b.30 x 10	2b.30 x 5	1b.30 x 10	2b.30 x 5	1b.30 x 10
NS630b	**630**	2b.40 x 5	1b.40 x 10	2b.40 x 5	1b.40 x 10	2b.40 x 5	1b.40 x 10
NS800	**800**	2b.50 x 5	1b.50 x 10	2b.50 x 5	1b.50 x 10	2b.50 x 5	1b.63 x 10
NS1000	**1000**	3b.50 x 5	1b.63 x 10	3b.50 x 5	2b.50 x 10	3b.63 x 5	2b.50 x 10
NS1250	**1250**	3b.50 x 5	2b.40 x 10	3b.50 x 5	2b.50 x 10	3b.63 x 5	2b.50 x 10
		2b.80 x 5	2b.40 x 10	2b.80 x 5			
NS1600/1600b	**1400**	2b.80 x 5	2b.40 x 10	2b.80 x 5	2b.50 x 10	3b.80 x 5	2b.63 x 10
NS1600/1600b	**1600**	3b.80 x 5	2b.63 x 10	3b.80 x 5	2b.63 x 10	3b.80 x 5	3b.50 x 10
NS2000	**1800**	3b.80 x 5	2b.63 x 10	3b.80 x 5	2b.63 x 10	3b.100 x 5	2b.80 x 10
NS2000	**2000**	3b.100 x 5	2b.80 x 10	3b.100 x 5	2b.80 x 10	3b.100 x 5	3b.63 x 10
NS2500	**2200**	3b.100 x 5	2b.80 x 10	3b.100 x 5	2b.80 x 10	4b.80 x 5	2b.100 x 10
NS2500	**2500**	4b.100 x 5	2b.100 x 10	4b.100 x 5	2b.100 x 10	4b.100 x 5	3b.80 x 10
NS3200	**2800**	4b.100 x 5	3b.80 x 10	4b.100 x 5	3b.80 x 10	5b.100 x 5	3b.100 x 10
NS3200	**3000**	5b.100 x 5	3b.80 x 10	6b.100 x 5	3b.100 x 10	8b.100 x 5	4b.80 x 10
NS3200	**3200**	6b.100 x 5	3b.100 x 10	8b.100 x 5	3b.100 x 10		4b.100 x 10

Note.

With Compact NS630b to NS1600, it is recommended to use 50 mm wideness bars (see "Recommended busbars drilling").

Vertical rear connections



Compact	Maximum service current	Ti: 40 °C Number of bars		Ti: 50 °C Number of bars		Ti: 60 °C Number of bars	
		5 mm thick	10 mm thick	5 mm thick	10 mm thick	5 mm thick	10 mm thick
NS630b	**400**	2b.30 x 5	1b.30 x 10	2b.30 x 5	1b.30 x 10	2b.30 x 5	1b.30 x 10
NS630b	**630**	2b.40 x 5	1b.40 x 10	2b.40 x 5	1b.40 x 10	2b.40 x 5	1b.40 x 10
NS800	**800**	2b.50 x 5	1b.50 x 10	2b.50 x 5	1b.50 x 10	2b.50 x 5	1b.50 x 10
NS1000	**1000**	2b.50 x 5	1b.50 x 10	2b.50 x 5	1b.50 x 10	2b.63 x 5	1b.63 x 10
NS1250	**1250**	2b.63 x 5	1b.63 x 10	3b.50 x 5	2b.40 x 10	3b.50 x 5	2b.40 x 10
NS1600	**1400**	2b.80 x 5	1b.80 x 10	2b.80 x 5	2b.50 x 10	3b.63 x 5	2b.50 x 10
NS1600	**1600**	3b.63 x 5	2b.50 x 10	3b.63 x 5	2b.50 x 10	3b.80 x 5	2b.63 x 10

TOOLS

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This international site allows you to access all the Schneider Electric products in just 2 clicks via comprehensive range data-sheets, with direct links to:

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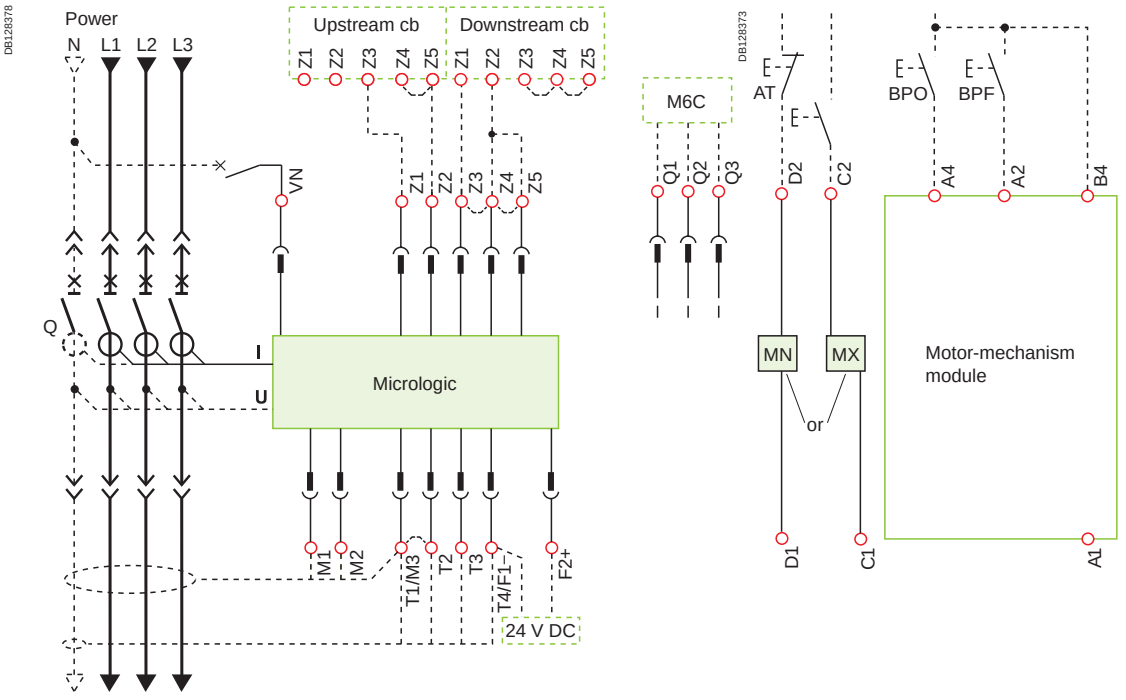
Electrical diagrams
Contents

Compact NS630b to 1600
Fixed circuit breakers

The diagram is shown with circuits de-energised, all devices open, connected and charged and relays in the normal position.

Power | **Control unit** | **Remote operation**



Basic	A	E	P	Control unit
■	■	■	■	E1-E6 communication
	■	■	■	Z1-Z5 zone selective interlocking: Z1 = ZSI OUT SOURCE Z2 = ZSI OUT ; Z3 = ZSI IN SOURCE Z4 = ZSI IN ST (short time) Z5 = ZSI IN GF (earth fault)
	■		■	M1 = Vigi module input (Micrologic 7)
	■	■	■	T1, T2, T3, T4 = external neutral;
			■	M2, M3 = Vigi module input (Micrologic 7)
	■	■	■	F2+, F1– external 24 V DC power supply
		■	■	VN external voltage connector (must be connected to the neutral with a 3P circuit breaker)
			■	**M6C** : 6 programmable contacts (to be connected to the external module M6C) ext. 24 V DC power supply required

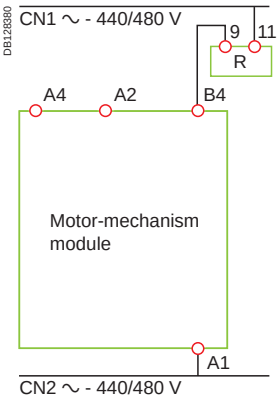
E; energy
A : digital ammeter.
P : A + power meter + additional protection.

Remote operation

MN : undervoltage release
or
MX : shunt release

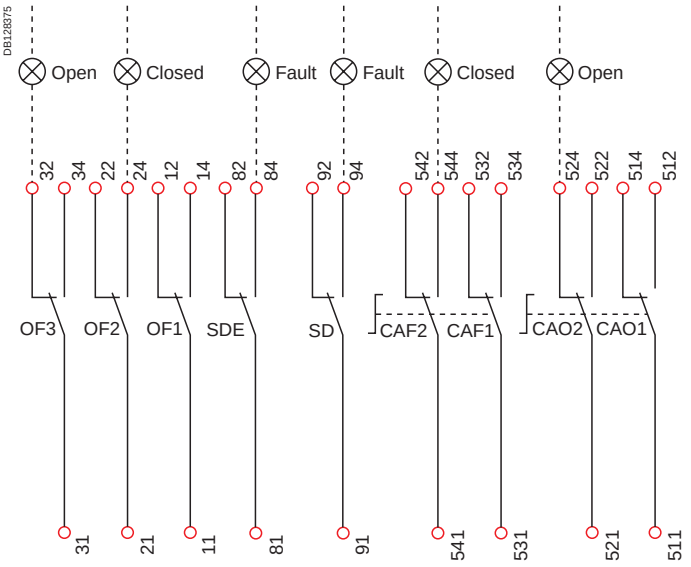
Motor-mechanism module (*)
A4 : electrical opening order
A2 : electrical closing order
B4, A1 : power supply for control devices and gear motor

(*) Spring-charging motor 440/480 V AC
(380 V motor + additional resistor)

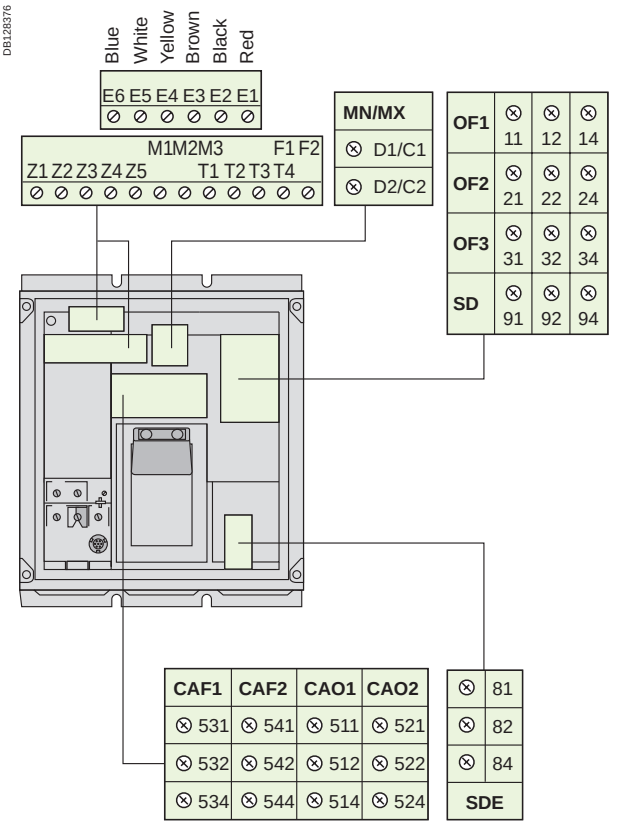


Compact NS630b to 1600
Fixed circuit breakers

Indication contacts



Terminal-block marking (manual operation)



Indication contacts

OF3 / OF2 / OF1 : indication contacts

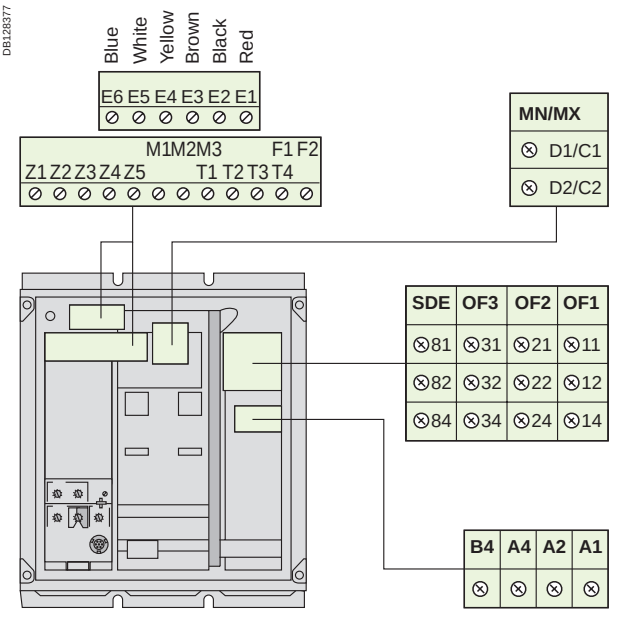
SDE : fault-trip indication contact (short-circuit, overload, earth fault)

SD : trip indication contact (manual operation)

CAF2/CAF1 * : early-make contact (rotary handle)

CAO2 / CAO1 : early-break contact (rotary handle)

Terminal-block marking (electrical operation)

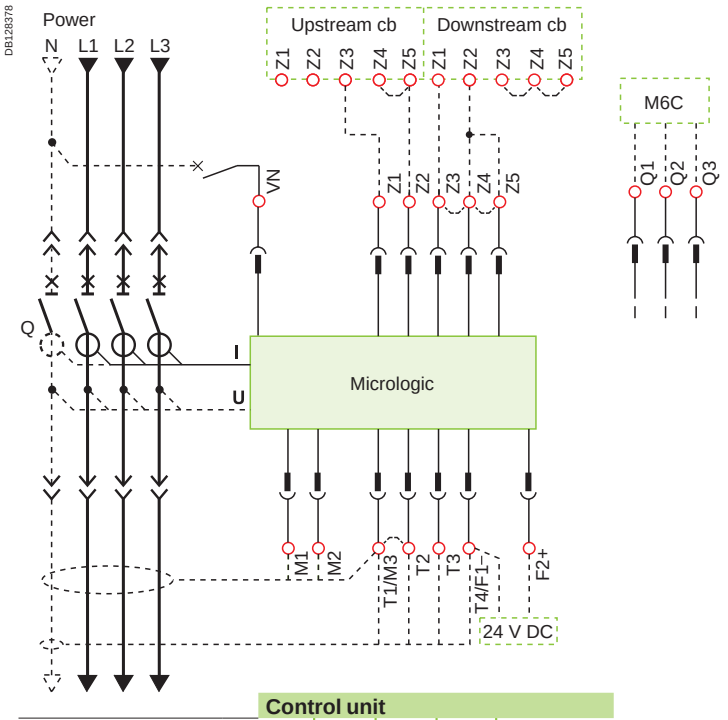


** CAF2 option is not compatible with M6C option.*

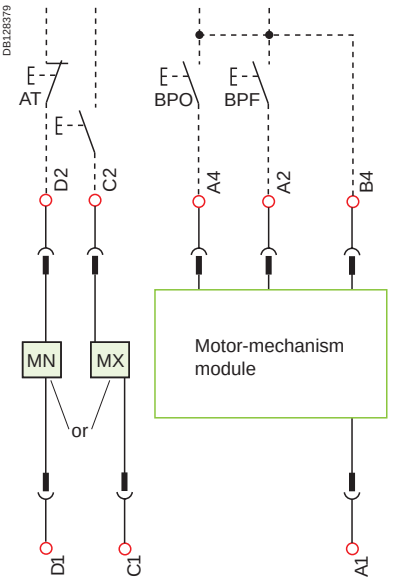
Compact NS630b to 1600
Plug-in / withdrawable circuit breakers

The diagram is shown with circuits de-energised, all devices open, connected and charged and relays in the normal position.

Power / Control unit



Remote operation



Terminal-block marking

Control unit

Com	UC1	UC2	UC3	M6C / CAF2	
E5 E6	Z5 M1	M2 M3	F2+	Q3	544
E3 E4	Z3 Z4	T3 T4	VN	Q2	542
E1 E2	Z1 Z2	T1 T2	F1 –	Q1	541

Remote operation

MN / MX		MT2	MT1
D2 / C2		A4	A2
			B4
D1 / C1			A1

Basic	A	E	P		Control unit
■	■	■	■	**Com**:	E1-E6 communication
	■	■	■	**UC1**:	Z1-Z5 zone selective interlocking: Z1 = ZSI OUT SOURCE Z2 = ZSI OUT; Z3 ZSI IN SOURCE Z4 = ZSI IN ST (short time) Z5 = ZSI IN GF (earth fault)
	■		■		M1 = Vigi module input (Micrologic 7)
	■	■	■	**UC2**:	T1, T2, T3, T4 = external neutral;
			■		M2, M3 = Vigi module input (Micrologic 7)
	■	■	■	**UC3**:	F2+, F1- external 24 V DC power supply
		■	■		VN external voltage connector (must be connected to the neutral with a 3P circuit breaker)
			■	**M6C**:	6 programmable contacts (to be connected to the external module M6C) ext. 24 V DC power supply required

A : digital ammeter.
P : A + power meter + additional protection.

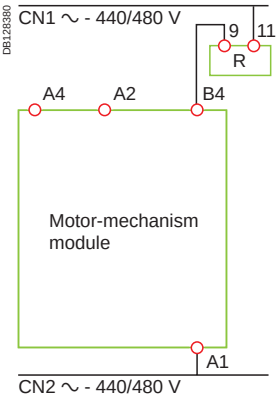
Remote operation

MN : undervoltage release
or
MX : shunt release

Motor-mechanism module (*)
MT2 : **A4** : electrical opening order

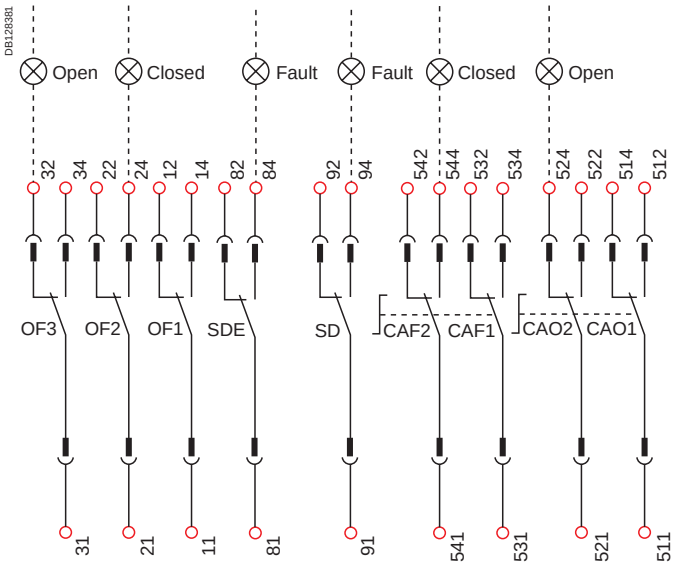
MT1 : **A2** : electrical closing order
B4, A1 : power supply for control devices and gear motor (MCH)

(*) Spring-charging motor 440/480 V AC
(380 V motor + additional resistor)

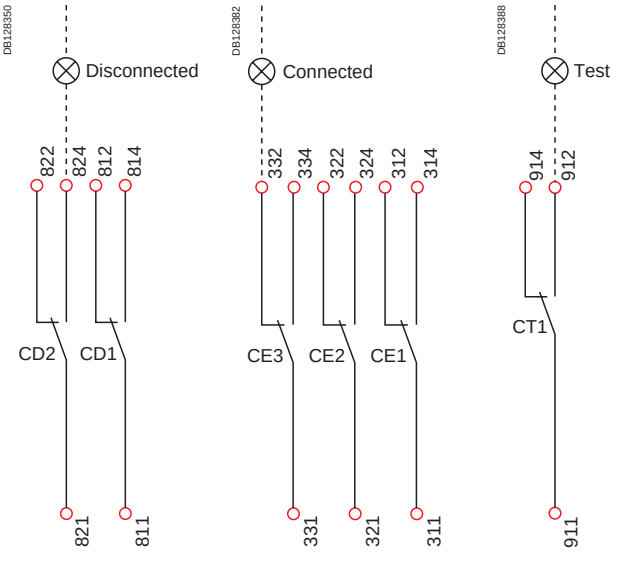


Compact NS630b to 1600
Plug-in / withdrawable circuit breakers

Indication contacts



Carriage switches



Indication contacts

M6C / CAF2	CAF1	SDE	SD	CAO2	CAO1	OF3	OF2	OF1
Q3 544	534	84	94	524	514	34	24	14
Q2 542	532	82	92	522	512	32	22	12
Q1 541	531	81	91	521	511	31	21	11

Carriage switches

CD2	CD1	CE3	CE2	CE1	CT1
824	814	334	324	314	914
822	812	332	322	312	912
821	811	331	321	311	911

Indication contacts

OF3 / OF2 / OF1 : indication contacts

SDE : fault-trip indication contact (short-circuit, overload, earth fault)

SD : trip indication contact (manual operation)

CAF2/CAF1 * : early-make contact (rotary handle)

CAO2 / CAO1 : early-break contact (rotary handle)

Carriage switches

CD2 : disconnected position
CD1

CE3 : connected position
CE2
CE1

CT1 : test position

** CAF2 option is not compatible with M6C option.*

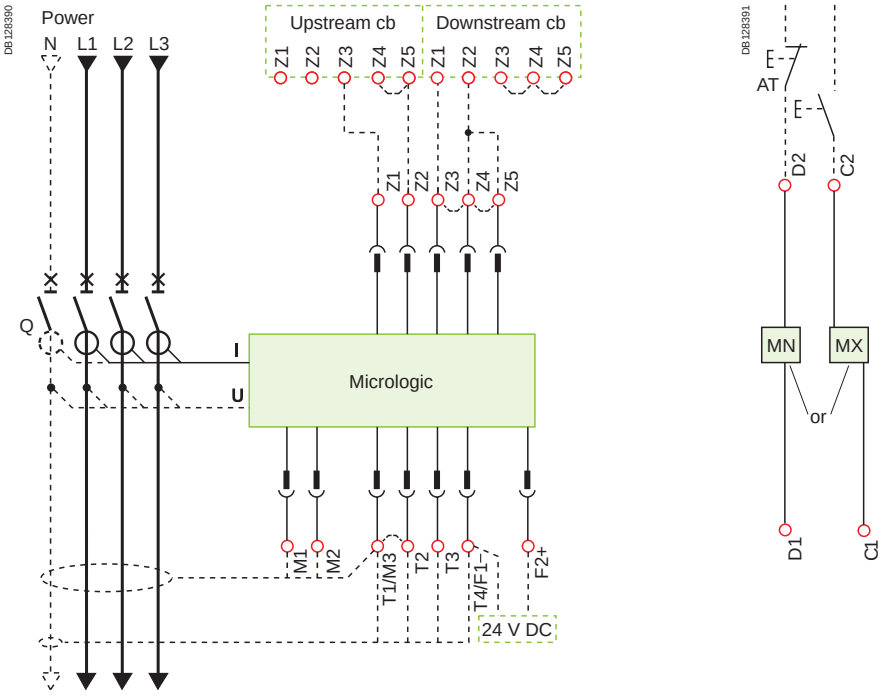
Legend

Connected (only one wire per connection point).

Compact NS1600b to 3200
Fixed circuit breakers

The diagram is shown with circuits de-energised, all devices open, connected and charged and relays in the normal position.

Power | **Control unit** | **Remote operation**



– (basic)	A	E	Control unit
■	■	■	E1-E6 communication
	■	■	Z1-Z5 zone selective interlocking: Z1 = ZSI OUT SOURCE Z2 = ZSI OUT ; Z3 = ZSI IN SOURCE Z4 = ZSI IN ST (short time) Z5 = ZSI IN GF (earth fault) M1 = Vigi module input (Micrologic 7)
	■	■	T1, T2, T3, T4 = external neutral; M2, M3 = Vigi module input (Micrologic 7)
	■	■	F2+, F1- external 24 V DC power supply

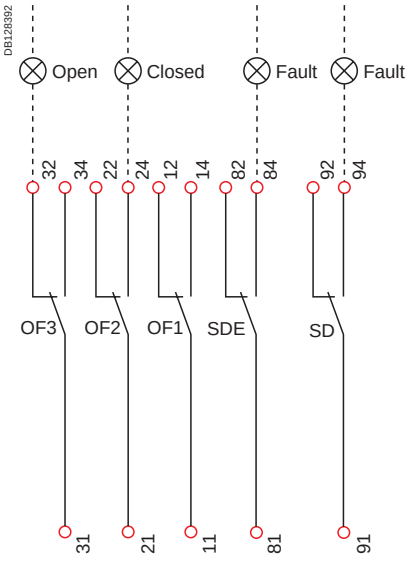
–: basic Micrologic control unit.
***A**: digital ammeter.*

Remote operation

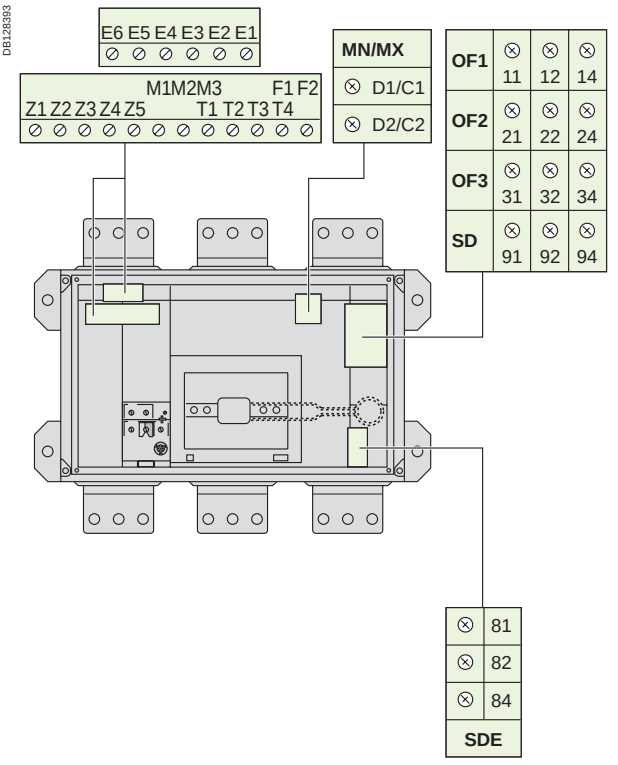
MN : undervoltage release
or
MX : shunt release

Compact NS1600b to 3200
Fixed circuit breakers

Indication contacts



Terminal-block marking



Indication contacts

OF3 / OF2 / OF1 : ON / OFF indication contacts

SDE : fault-trip indication contact (short-circuit, overload, earth fault)

SD : trip indication contact

Compact NS630b to 3200
Earth-fault and earth-leakage protection
Neutral protection
Zone selective interlocking

External sensor (CT) for residual earth-fault protection

Connection of current-transformer secondary circuit for external neutral

Compact equipped with a Micrologic 6 A/E/P: (1)

- shielded cable with 2 twisted pairs
- T1 twisted with T2
- maximum length 4 meters
- cable cross-sectional area 0.4 to 1.5 mm^2
- recommended cable: Belden 9552 or equivalent.

For proper wiring of neutral CT, refer to instruction Bulletin 48041-082-03 shipped with it.

Do not remove Micrologic factory-installed jumper between T1 and T2 unless neutral CT is connected.

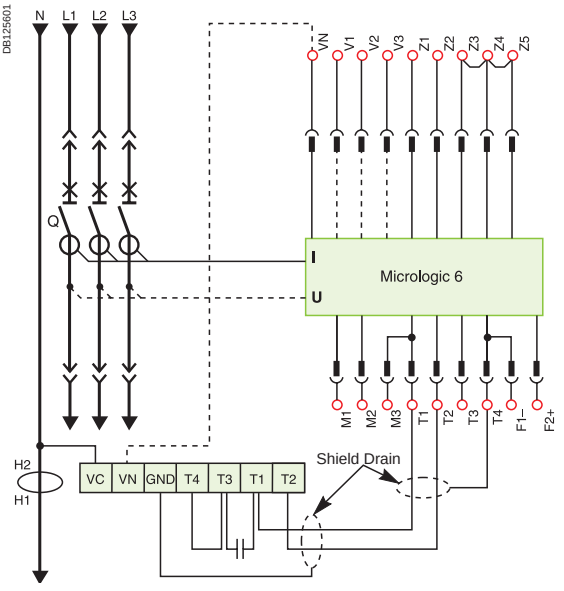
If supply is via the top, follow the shematics.

If supply is via the bottom, control wiring is identical; for the power wiring, H1 is connected to the source side, H2 to the load side.

For four-pole versions, for residual earth-fault protection, the current transformer for the external neutral is not necessary.

Connection for signal VN is required only for power measurements (3 Ø, 4 wires, 4CTs).

(1) Only for NS630b to 1600.



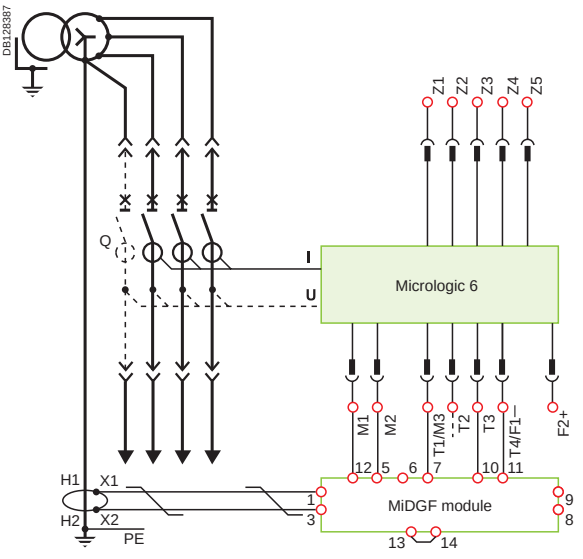
External transformer for source ground return (SGR) earth-fault protection

Connection of the secondary circuit

Compact equipped with a Micrologic 6 A, E, P (1):

- unshielded cable with 1 twisted pair
- maximum length 150 metres
- cable cross-sectional area 0.4 to 1.5 mm^2
- recommended cable: Belden 9409 or equivalent.

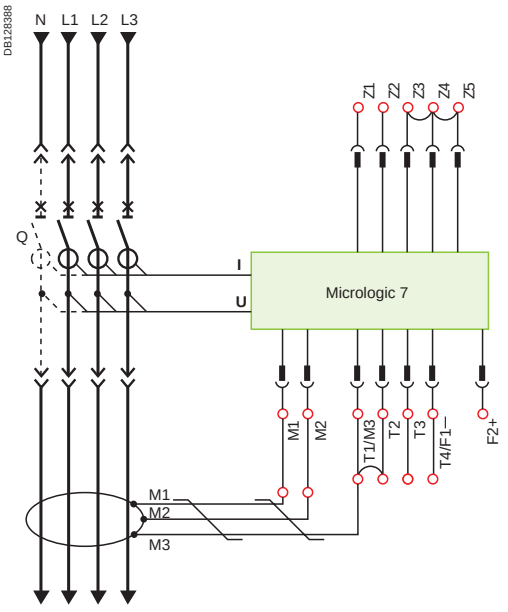
(1) Only for NS630b to 1600.



Compact NS630b to 3200
Earth-fault and earth-leakage protection
Neutral protection
Zone selective interlocking

Earth-leakage protection

Connection of the rectangular-sensor secondary circuit
Compact equipped with a Micrologic 7 A/P:
use the cable shipped with the rectangular sensor.

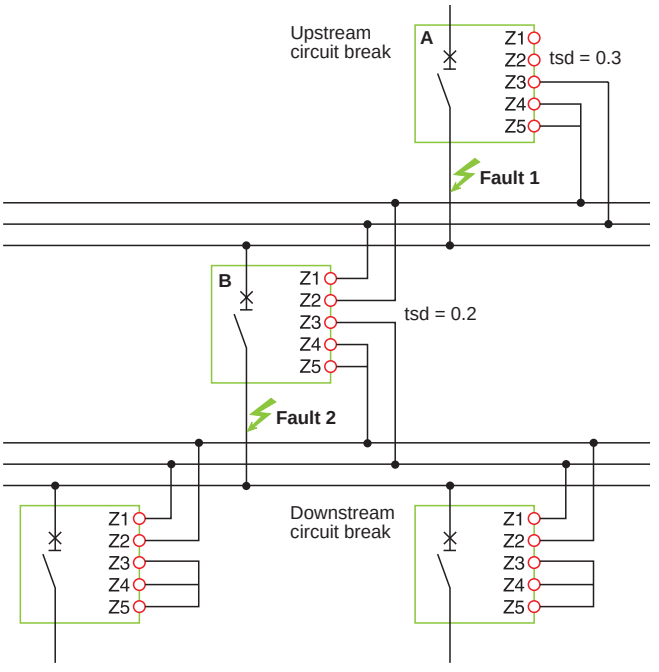


Neutral protection

■ three pole circuit breaker:
□ neutral protection is impossible with Micrologic A
□ with Micrologic E, P, an external neutral transformer is necessary; the connection diagram is the same as for residual earth-fault protection.
■ four pole circuit breaker:
□ Compact equipped with Micrologic A
□ the current transformer for external neutral is not necessary.

Zone selective interlocking

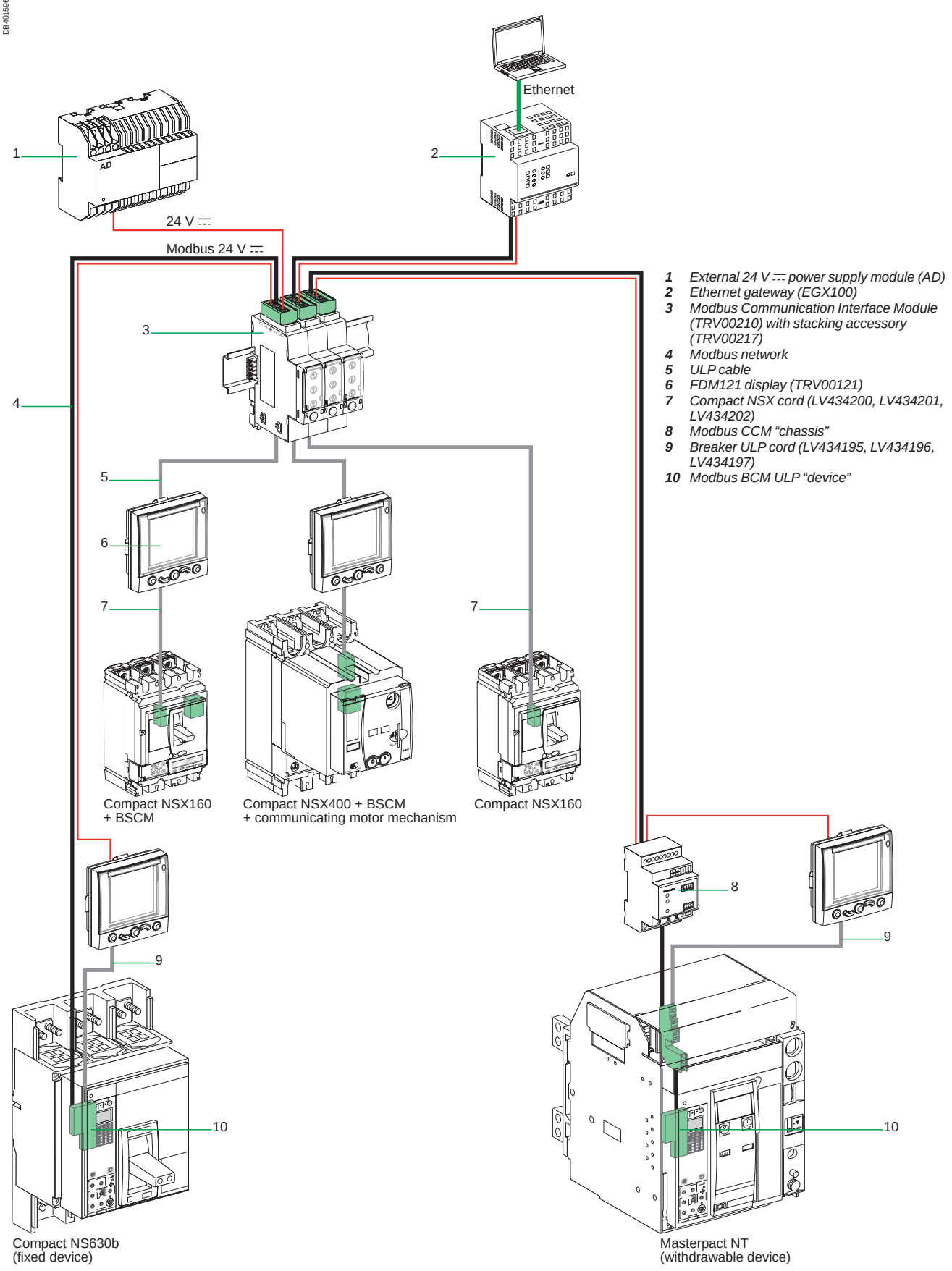
Zone-selective interlocking is used to reduce the electrodynamic forces exerted on the installation by shortening the time required to clear faults, while maintaining time discrimination between the various devices.
A pilot wire interconnects a number of circuit breakers equipped with Micrologic A/E/P control units, as illustrated in the diagram above.
The control unit detecting a fault sends a signal upstream and checks for a signal arriving from downstream. If there is a signal from downstream, the circuit breaker remains closed for the full duration of its tripping delay. If there is no signal from downstream, the circuit breaker opens immediately, regardless of the tripping-delay setting.
Fault 1.
Only circuit breaker A detects the fault. Because it receives no signal from downstream, it immediately opens in spite of its tripping delay set to 0.3.
Fault 2.
Circuit breakers A and B detect the fault. Circuit breaker A receives a signal from B and remains closed for the full duration of its tripping delay set to 0.3. Circuit breaker B does not receive a signal from downstream and opens immediately, in spite of its tripping delay set to 0.2.



Wiring
■ Maximum impedance: 2.7 Ω / 300 m.
■ Capacity of connectors: 0.4 to 2.5 mm^2.
■ Wires: single or multicore.
■ Maximum lenght: 3000 m.
■ Limits to device interconnection:
□ the common ZSI - OUT (Z1) and the output ZSI - OUT (Z2) can be connected to a maximum of 10 upstream device
□ a maximum of 100 downstream devices may be connected to the common ZSI - IN (Z3) and to an input ZSI - IN CR (Z4) or GF (Z5).

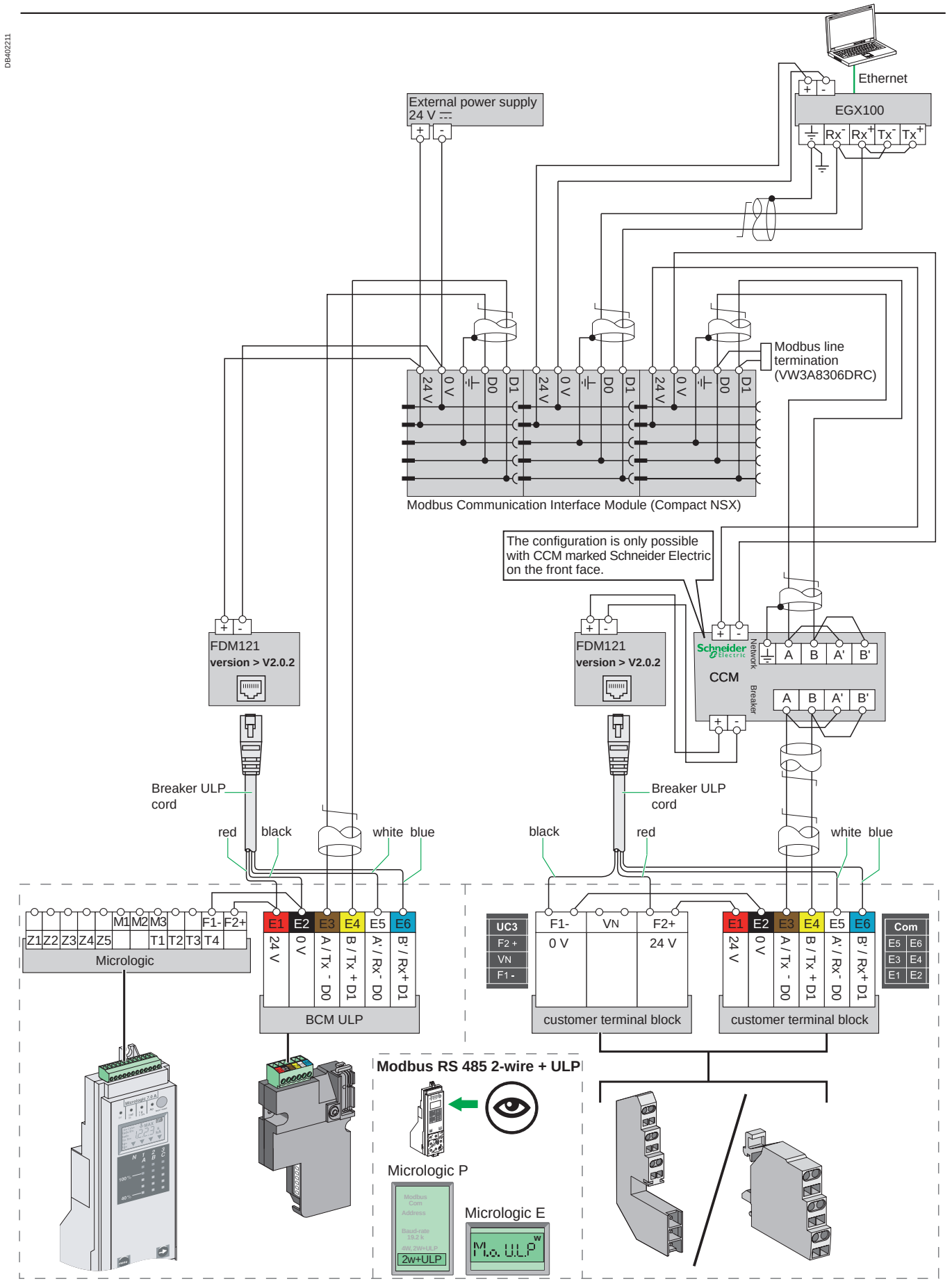
Compact NS630b to 3200
Communication

Connection of circuit breakers to the Modbus communication network



1 *External 24 V ⎓ power supply module (AD)*
2 *Ethernet gateway (EGX100)*
3 *Modbus Communication Interface Module (TRV00210) with stacking accessory (TRV00217)*
4 *Modbus network*
5 *ULP cable*
6 *FDM121 display (TRV00121)*
7 *Compact NSX cord (LV434200, LV434201, LV434202)*
8 *Modbus CCM "chassis"*
9 *Breaker ULP cord (LV434195, LV434196, LV434197)*
10 *Modbus BCM ULP "device"*

Compact NS630b to 3200
Communication

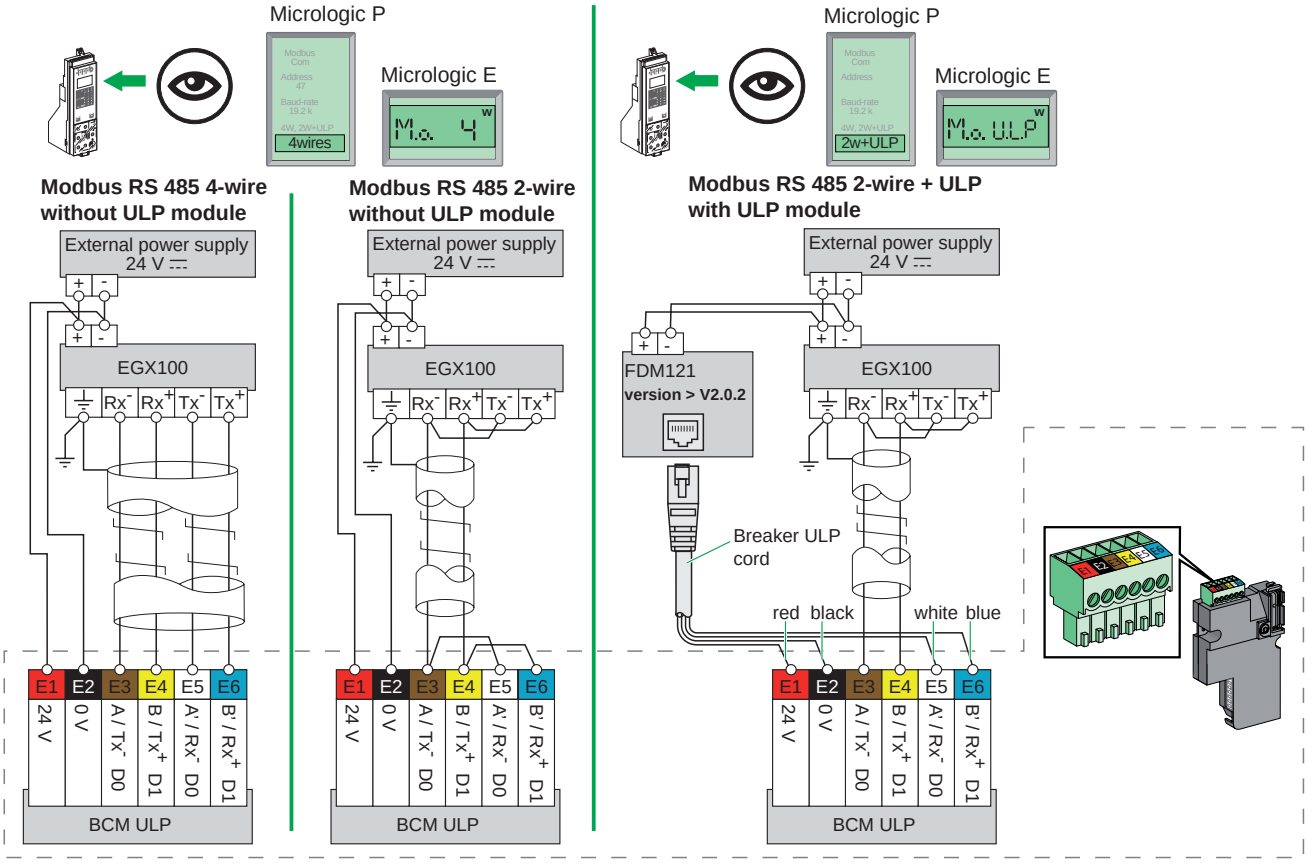


Compact NS630b to 3200 fixed

Wiring of the COM option (Modbus BCM ULP Module) with or without ULP module

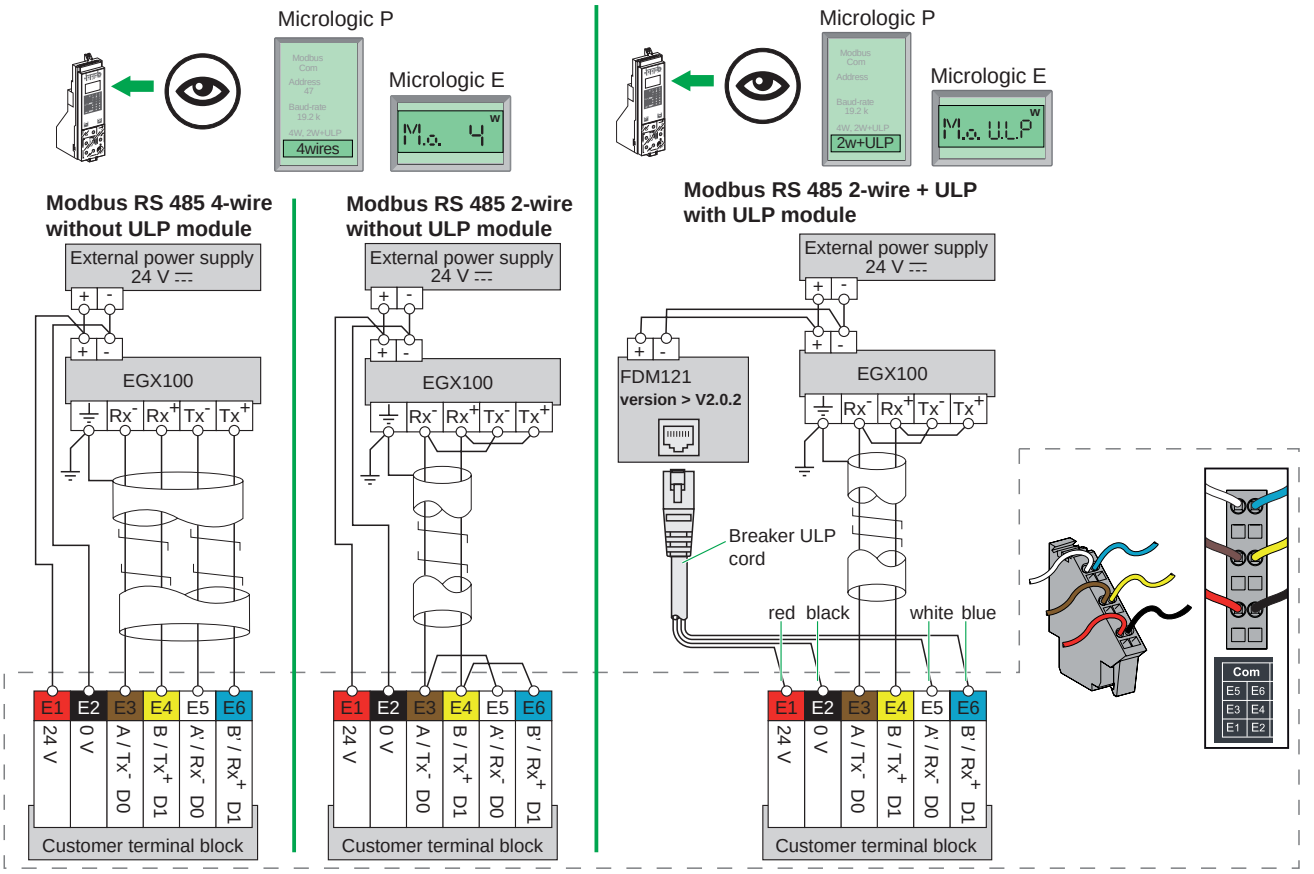
Fixed, manually operated Compact NS

DB402082



Fixed, electrically operated Compact NS

DB402084

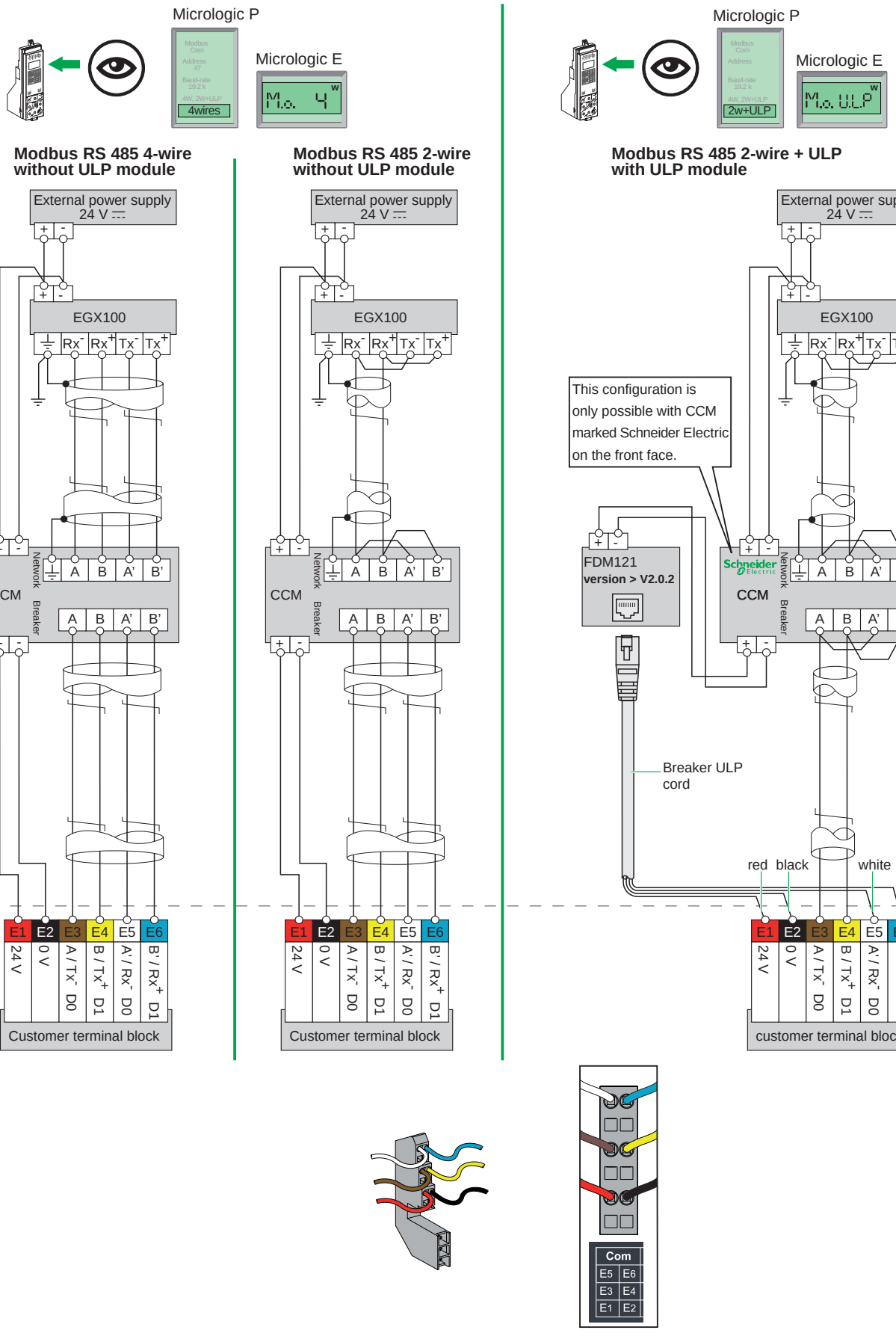


Withdrawable Compact NS630b to 3200

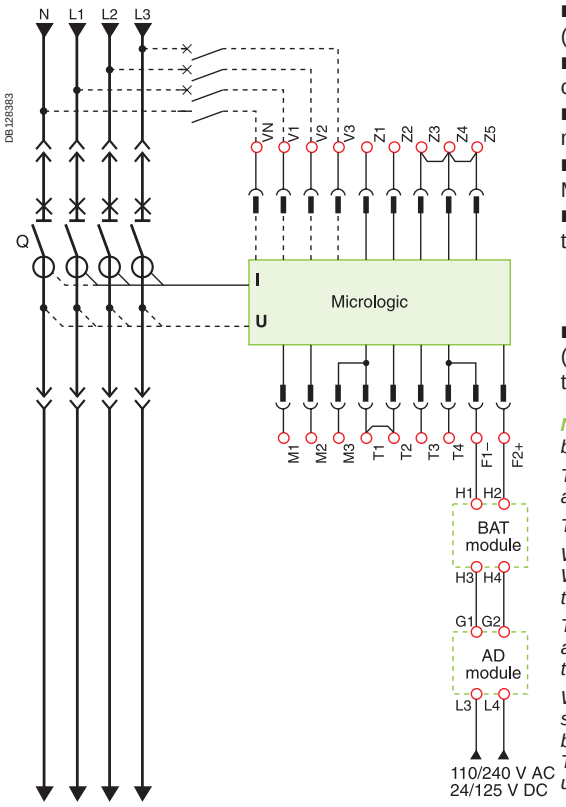
Wiring of the COM option (Modbus BCM ULP and CCM modules) with or without ULP module

Withdrawable Compact NS

DB401477



Compact NS630b to 3200
Connection of the 24 V DC external power supply AD module



- The 24 V DC external power-supply (AD module) for the Micrologic control unit (F1- F2+) is not required for basic protections LSIG.
- The 24 V DC external power-supply (AD module) for the BCM ULP communication module (E1-E2) is required.
- The 24 V DC external power-supply (AD module) for the FDM121 front display module (0V +24) is required.
- The 24 V DC external power-supply (AD module) for the programmable contact M2C/M6C is required.
- The same 24 V DC external power-supply (AD module) can be connected to Micrologic control unit, BCM ULP and FDM121, M2C/M6C.
  - *If voltage > 480 V AC or in an environment with a high level of electromagnetic disturbances, use separate power supply: 1 power supply for Micrologic (F1- F2+) and M2C/M6C, another power supply for BCM ULP and FDM121.*
- With Micrologic A/E, it is recommended to connect 24 V DC external power-supply (AD module) to the Micrologic control unit (F1- F2+) in order to keep available the display and the energy metering, even if Current < 20 % In.

Note: *In case of using the 24 V DC external power supply (AD module), maximum cable length between 24 V DC (G1, G2) and the control unit (F1-, F2+) must not exceed 10 meters.*

The BAT battery module, mounted in series upstream of the AD module, ensures an uninterrupted supply of power if the AD module power supply fails.

The internal voltage taps are connected to the botton side of the circuit breaker.

With Micrologic P/H, external voltage taps are possible using the PTE option. With this option, the internal voltage taps are disconnected and the voltage taps are connected to terminals VN, V1, V2, V3.

The PTE option is required for voltages less than 220 V and greater than 690 V (in which case a voltage transformer is compulsory). For three-pole devices, the system is supplied with terminal VN connected only to the control unit (Micrologic P).

When the PTE option is implemented, the voltage measurement input must be protected against short-circuits. Installed as close as possible to the busbars, this protection function is ensured by a P25M circuit breaker (1 A rating) with an auxiliary contact (cat. no. 21104 and 21117). This voltage measurement input is reserved exclusively for the control unit and must not ever be used to supply other circuits outside the switchboard.

Connection

The maximum length for each conductor supplying power to the trip unit or M6C module is 10 m.

Do not ground F2+, F1-, or power supply output:

- the positive terminal (F2+) on the trip unit must not be connected to earth ground
- the negative terminal (F1-) on the trip unit must not be connected to earth ground
- the output terminals (- and +) of the 24 V DC power supply must not be grounded.

Reduce electromagnetic interference:

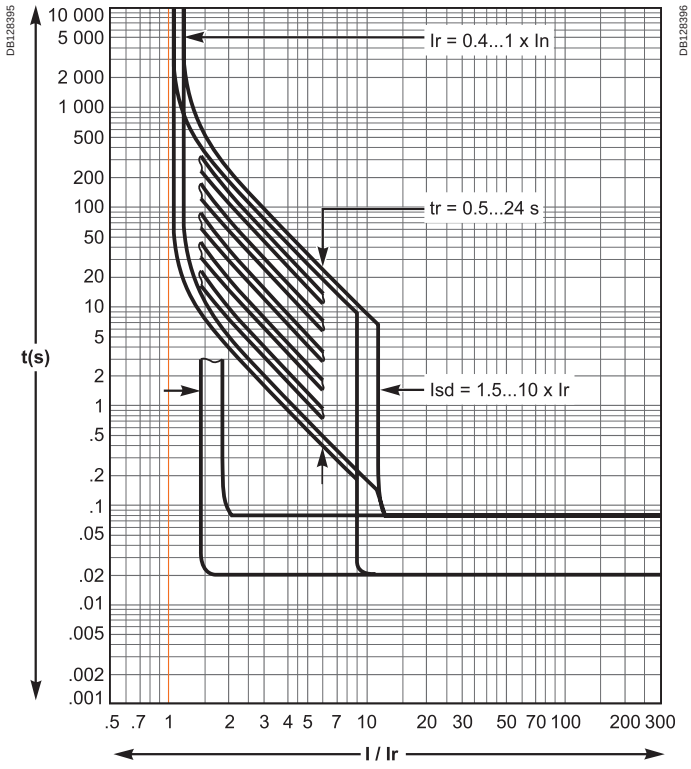
- the input and output wires of the 24 V DC power supply must be physically separated as much as possible
- if the 24 V DC power supply wires cross power cables, they must cross perpendicularly. If this is not physically possible, the power supply conductors must be twisted together
- Power supply conductors must be cut to length. Do not loop excess conductor.

Additional characteristics
Contents

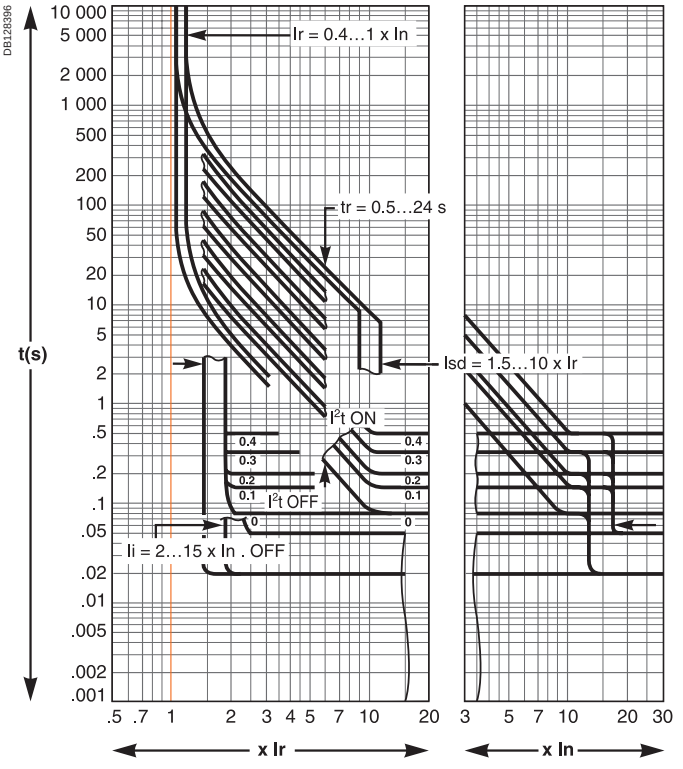
Tripping curves
Compact NS630b to 3200

Micrologic electronic control units

Micrologic 2.0

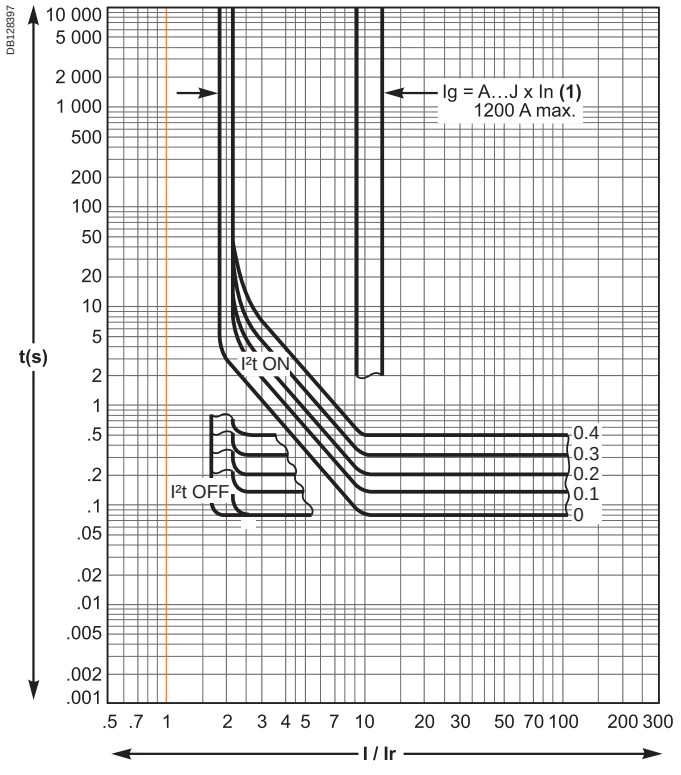


Micrologic 5.0, 6.0, 7.0



Options for Micrologic electronic control units

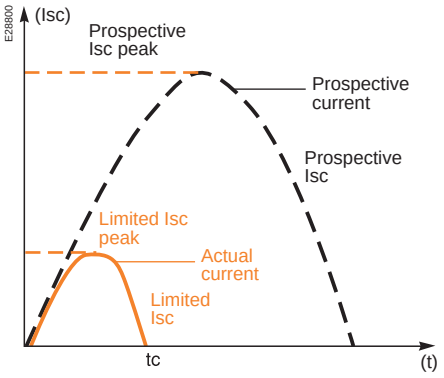
Earth-fault protection (Micrologic 6.0)



(1)

Ig = In x...	A	B	C	D	E	F	G	H	J
Ig < 400 A	0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
400 A ≤ Ig ≤ 1200 A	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
Ig > 1200 A	500	640	720	800	880	960	1040	1120	1200

The limiting capacity of a circuit breaker is its aptitude to limit short-circuit currents.



The exceptional limiting capacity of the Compact NS range is due to the rotating double-break technique (very rapid natural repulsion of contacts and the appearance of two arc voltages in-series with a very steep wave front).

Ics = 100 % Icu

The exceptional limiting capacity of the Compact NS range greatly reduces the forces created by fault currents in devices.
The result is a major increase in breaking performance. In particular, the service breaking capacity Ics is equal to 100% of Icu.
The Ics value, defined by IEC standard 60947-2, is guaranteed by tests comprising the following operations:

- ■ break three times consecutively a fault current equal to 100 % of Icu
- ■ check that the device continues to function normally:
  - □ it conducts the rated current without abnormal temperature rise
  - □ protection functions perform within the limits specified by the standard
  - □ suitability for isolation is not impaired.

Longer service life of electrical installations

Current-limiting circuit breakers greatly reduce the negative effects of short-circuits on installations.

Thermal effects
Less temperature rise in conductors, therefore longer service life for cables.

Mechanical effects
Reduced electrodynamic forces, therefore less risk of electrical contacts or bus bars being deformed or broken.

Electromagnetic effects
Less disturbances for measuring devices located near electrical circuits.

Economy by means of cascading

Cascading is a technique directly derived from current limiting. Circuit breakers with breaking capacities less than the prospective short-circuit current may be installed downstream of a limiting circuit breaker. The breaking capacity is reinforced by the limiting capacity of the upstream device.
It follows that substantial savings can be made on downstream equipment and enclosures.

Current-limiting curves

The current-limiting capacity of a circuit breaker is expressed by two curves which are a function of the prospective short-circuit current (the current which would flow if no protection devices were installed):

- ■ the actual peak current (limited current),
- ■ thermal stress (A^2s), i.e. the energy dissipated by the short-circuit in a conductor with a resistance of 1 Ω.

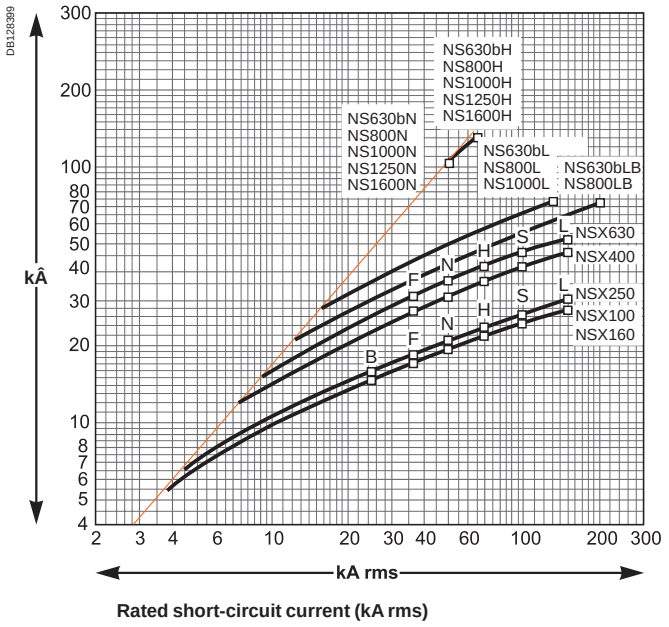
Example
What is the real value of a 200 kA rms prospective short-circuit (i.e. 440 kA peak) limited by an NS630bLB upstream ?
Answer: 70 kA peak (see next page).

Current-limiting curves

Current-limiting curves

Voltage 400/440 V AC (1)

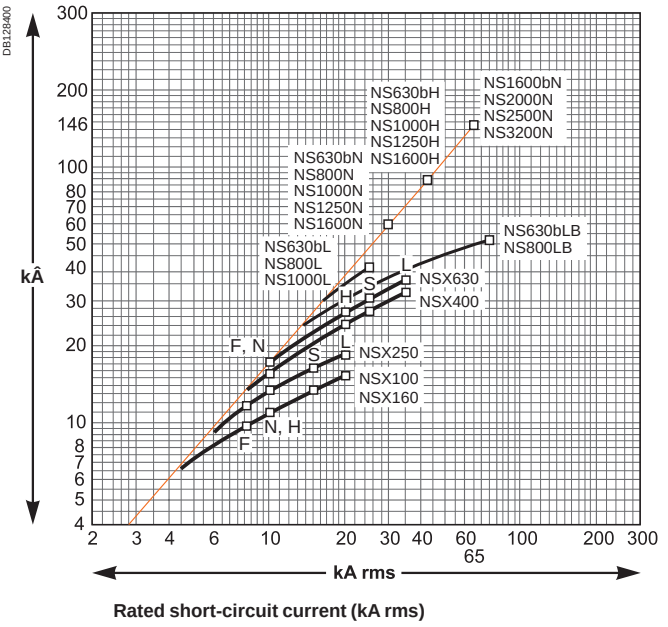
Limited short-circuit current (kÂ peak)



Rated short-circuit current (kA rms)

Voltage 660/690 V AC

Limited short-circuit current (kÂ peak)

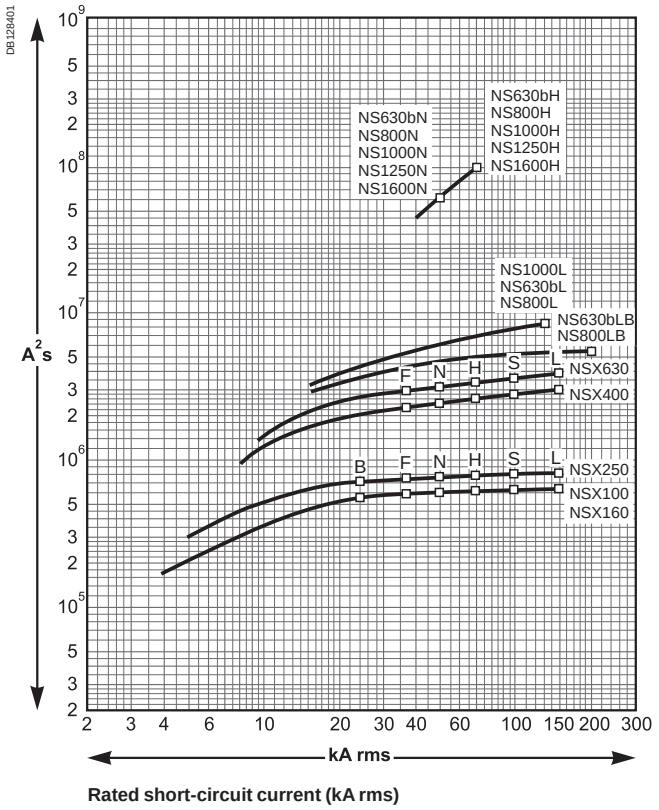


Rated short-circuit current (kA rms)

Thermal-stress curves

Voltage 400/440 V AC (1)

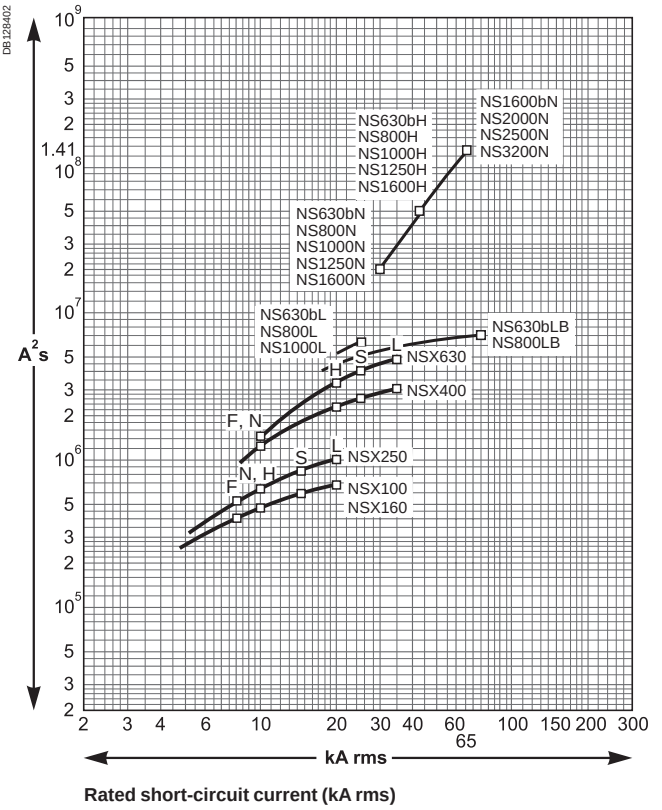
Limited energy



Rated short-circuit current (kA rms)

Voltage 660/690 V AC

Limited energy



Rated short-circuit current (kA rms)

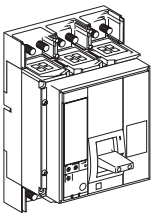
(1) Valid for 480 V Nema.

Catalogue numbers and order forms
Contents

NS630b to NS1600 fixed manually operated
Complete device

Front-connected circuit breaker with Micrologic 2.0 control unit

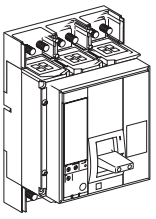
DB128405



Compact NS type N		
Icu = 50 kA at 220/415 V	3P	4P
NS630b	33460	33463
NS800	33466	33469
NS1000	33472	33475
NS1250	33478	33480
NS1600	33482	33484
Compact NS type H		
Icu = 70 kA at 220/415 V	3P	4P
NS630b	33461	33464
NS800	33467	33470
NS1000	33473	33476
NS1250	33479	33481
NS1600	33483	33485
Compact NS type L		
Icu = 150 kA at 220/415 V	3P	4P
NS630b	33462	33465
NS800	33468	33471
NS1000	33474	33477

Front-connected circuit breaker with Micrologic 5.0 control unit

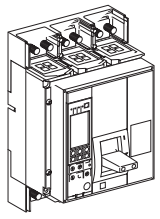
DB128405



Compact NS type N		
Icu = 50 kA at 220/415 V	3P	4P
NS630b	33546	33549
NS800	33552	33555
NS1000	33558	33561
NS1250	33564	33566
NS1600	33568	33570
Compact NS type H		
Icu = 70 kA at 220/415 V	3P	4P
NS630b	33547	33550
NS800	33553	33556
NS1000	33559	33562
NS1250	33565	33567
NS1600	33569	33571
Compact NS type L		
Icu = 150 kA at 220/415 V	3P	4P
NS630b	33548	33551
NS800	33554	33557
NS1000	33560	33563

Front-connected circuit breaker with Micrologic 2.0 A control unit

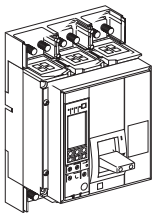
DB128403



Compact NS type N		
Icu = 50 kA at 220/415 V	3P	4P
NS630b	33223	33227
NS800	33233	33237
NS1000	33243	33247
NS1250	33253	33257
NS1600	33263	33267
Compact NS type H		
Icu = 70 kA at 220/415 V	3P	4P
NS630b	33228	33229
NS800	33238	33239
NS1000	33248	33249
NS1250	33258	33259
NS1600	33268	33269
Compact NS type L		
Icu = 150 kA at 220/415 V	3P	4P
NS630b	33497	33500
NS800	33498	33501
NS1000	33499	33502

Front-connected circuit breaker with Micrologic 5.0 A control unit

DB128403



Compact NS type N		
Icu = 50 kA at 220/415 V	3P	4P
NS630b	33323	33327
NS800	33333	33337
NS1000	33343	33347
NS1250	33353	33357
NS1600	33363	33367
Compact NS type H		
Icu = 70 kA at 220/415 V	3P	4P
NS630b	33328	33329
NS800	33338	33339
NS1000	33348	33349
NS1250	33358	33359
NS1600	33368	33369
Compact NS type L		
Icu = 150 kA at 220/415 V	3P	4P
NS630b	33516	33519
NS800	33517	33520
NS1000	33518	33521

Fixed front connected Micrologic 2.0 E

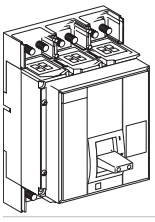
Compact NS type N		
	3P	4P
NS630b	34400	34402
NS800	34404	34406
NS1000	34408	34410
NS1250	34412	34414
NS1600	34416	34418
Compact NS type H		
	3P	4P
NS630b	34401	34403
NS800	34405	34407
NS1000	34409	34411
NS1250	34413	34415
NS1600	34417	34419

Fixed front connected Micrologic 5.0 E

Compact NS type N		
	3P	4P
NS630b	34420	34422
NS800	34424	34426
NS1000	34428	34430
NS1250	34432	34434
NS1600	34436	34438
Compact NS type H		
	3P	4P
NS630b	34421	34423
NS800	34425	34427
NS1000	34429	34431
NS1250	34433	34435
NS1600	34437	34439

Front-connected switch-disconnector

DB128404



	3P	4P
NS630b	33486	33491
NS800	33487	33492
NS1000	33488	33493
NS1250	33489	33494
NS1600	33490	33495

Note: *select in addition the connection accessories, device accessories and auxiliaries, control-unit accessories and communications option, as required.*

NS630b to NS1600 fixed circuit breaker
Connection

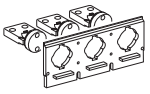
Connections for circuit breakers and switch-disconnectors

DB401441

Front connection / Replacement kit (3 or 4 parts)

		3P	4P
630/1000 A - N	Top	33598	33608
	Bottom	33599	33609
1250 A - N	Top	33600	33610
630-1000 A - L 630/800 A - LB	Bottom	33601	33611
1600 A - N	Top	33602	33612
	Bottom	33603	33613

DB401442



Rear connection / Replacement kit (3 or 4 parts)

	3P	4P
Vertical and horizontal (top or bottom)	33584	33585
Installation manual	33148	

Connection accessories

Bare-cable connectors + 1 connector shield for 4 cables (240 mm²)

DB128420

3P	33640
4P	33641
Installation manual	33148

1 long connection shield / 1 part

DB128421

3P	33628
4P	33629

Vertical-connection adapters / Replacement kit (3 or 4 parts)

DB128422

3P	33642
4P	33643
Installation manual	33148

Cable lug adapters / Replacement kit (3 or 4 parts)

DB128423

3P	33644
4P	33645
Installation manual	33148

Interphase barriers / Replacement kit (3 parts)

DB128425

	Front connection	Rear connection
3P/4P top	33646	33648
3P/4P bottom	33646	33648
Installation manual	33148	

Arc chute screen / 1 part

DB128426

3P	64907
4P	33597
Installation manual	33148

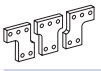
Brackets for mounting on a horizontal surface (2 parts)

DB401443

3P/4P	64908

Spreaders / Replacement kit (3 or 4 parts)

DB128427



3P	33622
4P	33623
Installation manual	33148

Cable lug kits / Replacement kit (6 or 8 parts)

DB128424

240 mm²	3P (6 lug kit)	33013
	4P (8 lug kit)	33014
300 mm²	3P (6 lug kit)	33015
	4P (8 lug kit)	33016
Installation manual		33148

Electrical auxiliaries

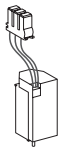
Indication contact / 1 part

DB128428

	6 A - 240 V	Low level
OF, ON/OFF indication contacts	**29450**	**29452**
SD trip indication contact for manually operated devices	**29450**	**29452**
SDE fault indication contact operated devices	**29450**	**29452**
Up to 3 OF, 1 SD and 1 SDE can be connected (the SDE contact is standard for electrically operated devices).		
Installation manual		**33148**

Remote tripping / 1 part

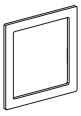
DB128429



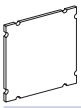
	MX	**MN**			
			Delay unit	**R** (non-adjustable)	**Rr** (adjustable)
12 V DC	**33658**				
24/30 V DC, 24 V AC	**33659**	**33668**			
48/60 V DC, 48 V AC	**33660**	**33669**	48/60 V AC/DC		**33680**
100/130 V AC/DC	**33661**	**33670**	100/130 V AC/DC	**33684**	**33681**
200/250 V AC/DC	**33662**	**33671**	200/250 V AC/DC	**33685**	**33682**
277 V AC	**33663**				
380/480 V AC	**33664**	**33673**	380/480 V AC/DC		**33683**
Installation manual	**33149**				

NS630b to NS1600 fixed circuit breaker
Installation accessories

Installation accessories / 1 part

DB128143 	Escutcheon (small cut-out) for manually operated device with toggle	**33717**
DB128431 	Escutcheon for: - device with toggle (large cutout) - device with rotary handle - electrically operated device	**33718**

Blanking plate / 1 part

DB128432 	Blanking plate	**33858**
	Installation manual	**33148**

Toggle extension / 1 part

DB128447 	Toggle extension	**46996**
	Additional toggle extension	**33195**

Replacement parts for Micrologic control units

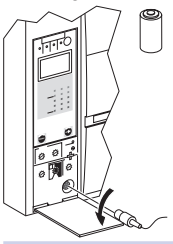
Long-time rating plug (limits setting range for higher accuracy) / 1 part

DB128458

Standard	0.4 at 1 x Ir	**33542**
Low-setting option	0.4 at 0.8 x Ir	**33543**
High-setting option	0.8 at 1 x Ir	**33544**
Without long-time protection	off	**33545**

Battery + cover

DB128353

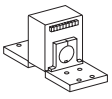


Battery (1 part)		**33593**
Cover (1 part)	For Micrologic A, E	**33592**
	For Micrologic P	**47067**

External sensors

External sensor for neutral + earth-fault protection (TCE) / 1 part

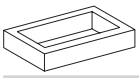
DB128459



CT rating: 400/1600 A	**33576**

Rectangular sensor for earth-leakage protection + 1 Vigi cable / 1 part

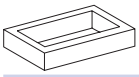
DB128460



280 mm x 115 mm	**33573**

Source ground return (SGR) earth-fault protection / 1 part

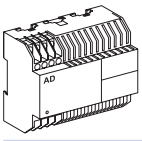
DB128460



External sensor (SGR)	**33579**
MDGF summing module	**48891**

External power supply module (AD) / 1 part)

DB128461



24-30 V DC	**54440**
48-60 V DC	**54441**
100-125 V DC	**54442**
110-130 V AC	**54443**
200-240 V AC	**54444**
380-415 V AC	**54445**

Test equipments / 1 part

DB128464

Hand held test kit (HHTK)	**33594**
Full function test kit (FFTK)	**33595**
Test report edition come from FFTK	**34559**
FFTK test cable 2 pin for STR trip unit	**34560**
FFTK test cable 7 pin for Micrologic trip unit	**33590**

NS630b to NS1600 fixed circuit breaker
Locking and accessories

Locking for manually operated devices

Removable toggle locking system / 1 part

DB128448

Locking by 3 padlocks		44936
Installation manual		33148

Fixed toggle locking system / 1 part

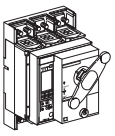
DB128449

Locking by 3 padlocks		32631
Installation manual		33148

Rotary handle for manually operated devices

Devices with direct rotary handles / 1 part

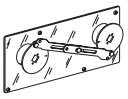
DB128352



Conversion accessory	CNOMO	33866	
Locking by keylocks		Ronis	Profalux
	OFF position	33870	33869
	OFF and ON positions	33872	33871
Keylock kit (without keylocks)		33868	33868
Installation manual		33150	

Mechanical interlocking

DB128451

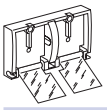


For 2 devices with extended rotary handles	33890

Locking and accessories for electrically operated devices

Pushbutton locking / 1 part

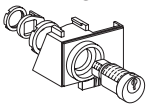
DB128454



By transparent cover + padlocks		33897
Installation manual		47103

Locking in OFF position / 1 part

DB128455



By Profalux keylocks

Profalux	1 lock with 1 key + adaptation kit	33902
	2 locks 1 key + adaptation kit	33904
1 keylock Profalux (without adaptation kit):		
	identical key not identified combination	33173
	identical key identified 215470 combination	33174
	identical key identified 215471 combination	33175

By Ronis keylocks

Ronis	1 lock with 1 key + adaptation kit	33903
	2 locks 1 key + adaptation kit	33905
1 keylock Ronis (without adaptation kit):		
	identical key not identified combination	33189
	identical key identified EL24135 combination	33190
	identical key identified EL24153 combination	33191
	identical key identified EL24315 combination	33192
Adaptation kit (without keylock):		
	adaptation kit Profalux	33898
	adaptation kit Ronis	33899
	adaptation kit Kirk	47517
	adaptation kit Castell	47518
Installation manual		47103

Operation counter CDM / 1 part

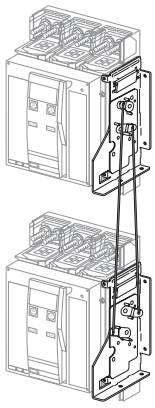
DB128456

Operation counter CDM	33895
Installation manual	47103

Mechanical interlocking for source changeover

Interlocking using connecting rods for Compact electrically operated devices

DB128465

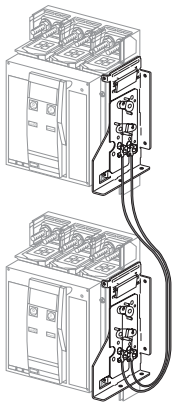


Complete assembly with 2 adaptation fixtures + rods

2 Compact fixed devices ***Note:*** *the installation manual is enclosed.*	**33910**

Interlocking using cables for Compact electrically operated devices

DB128466

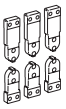


Complete assembly with 2 adaptation fixtures + cables

2 Compact fixed devices	**33911**
1 Compact fixed + 1 Compact withdrawable device ***Note:*** *the installation manual is enclosed.*	**33915**

NS630b to NS1600 withdrawable circuit breaker
Connection

Connection


DB128416

	3P	4P
Front connection / Replacement kit (6 or 8 parts)		
Top and bottom	**33588**	**33589**
Rear connection / Replacement kit (4 or 6 parts)		
Vertical and horizontal	**33586**	**33587**
Installation manual		**33149**


DB128417

Vert. mounting.


DB401444

Horiz. mounting.

Connection accessories

Vertical connection adapters for front-connected chassis / Replacement kit (3 or 4 parts)		
3P		**33642**
4P		**33643**
Installation manual		**33149**
Cable lug adapters for front-connected chassis / Replacement kit (3 or 4 parts)		
3P		**33644**
4P		**33645**
Installation manual		**33149**
Interphase barriers for rear-connected chassis / Replacement kit (3 parts)		
3P/4P		**33768**
Installation manual		**33149**
Spreaders for front-connected and rear-connected chassis / Replacement kit (3 or 4 parts)		
3P		**33622**
4P		**33623**
Installation manual		**33149**
Cable lug kits / Replacement kit (6 or 8 parts)		
240 mm²	3P (6 lug kit)	**33013**
	4P (8 lug kit)	**33014**
300 mm²	3P (6 lug kit)	**33015**
	4P (8 lug kit)	**33016**
Installation manual		**33149**

DB128422


DB128423

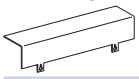

DB401447

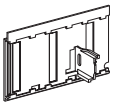

DB128427


DB128424

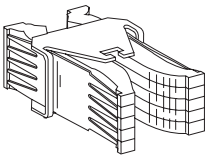
Chassis accessories

Auxiliary terminal shield (CB) / 1 part		
3P		**33763**
4P		**33764**
Installation manual		**33149**
Safety shutters (VO) / 1 part		
3P		**33765**
4P		**33766**
Installation manual		**47104**


DB128434


DB401445

Clusters


DB401446

1 disconnecting contact cluster for chassis (see table below) (1 part)	**64906**

Table : number of clusters required for the different chassis models

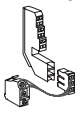
Chassis rating (A)	Compact NS - 3P		Compact NS - 4P	
	NA - N	L	NA - N	L
630	12	18	16	24
800	12	18	16	24
1000	12	18	16	24
1250	12		16	
1600	18		24	

***Note:** the minimum order is 6 parts.*

Electrical auxiliaries

SD trip indication contact for manually operated devices / 1 part

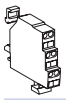
DB128436



	6 A - 240 V	Low level
OF, ON/OFF indication contacts	**29450**	**29452**
SD trip indication contact for manually operated devices	**29450**	**29452**
SDE fault indication contact operated devices	**29450**	**29452**
Up to 3 OF, 1 SD and 1 SDE can be connected (the SDE contact is standard for electrically operated devices).		
Installation manual		**47103**

CE, CD, CT carriage switches / 1 part

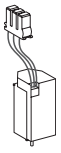
DB128437



6 A - 240 V	**33170**
Low level	**33171**
Up to 3 CE, 1 CT, 2 CD per device	
Installation manual	**47104**

Instantaneous voltage releases / 1 part

DB128429



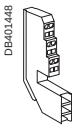
	MX	**MN**			
			Delay unit	**R** (non-adjustable)	**Rr** (adjustable)
12 V DC	**33658**				
24/30 V DC, 24 V AC	**33659**	**33668**			
48/60 V DC, 48 V AC	**33660**	**33669**	48/60 V AC/DC		**33680**
100/130 V AC/DC	**33661**	**33670**	100/130 V AC/DC	**33684**	**33681**
200/250 V AC/DC	**33662**	**33671**	200/250 V AC/DC	**33685**	**33682**
277 V AC	**33663**				
380/480 V AC	**33664**	**33673**	380/480 V AC/DC		**33683**
Installation manual	**47103**				

Auxiliaries terminal for chassis

DB128354

3 wires.

DB401448



6 wires.

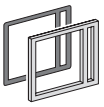
3 wire terminal block (1 part)	**33098**
6 wire terminal block (1 part)	**33099**
Jumpers (10 parts)	**47900**
Installation manual	**47103**

NS630b to NS1600 withdrawable circuit breaker
Installation accessories

Installation accessories

Escutcheon / 1 part

DB128430



33857

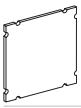
Transparent cover for escutcheon / 1 part

DB128445

33859

Blanking plate / 1 part

DB128432



33858

Replacement parts for Micrologic control units

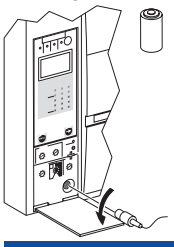
Long-time rating plug (limits setting range for higher accuracy) / 1 part

DB128458

Standard	0.4 at 1 x Ir	**33542**
Low-setting option	0.4 at 0.8 x Ir	**33543**
High-setting option	0.8 at 1 x Ir	**33544**
Without long-time protection	off	**33545**

Battery + cover

DB128353

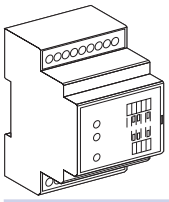


Battery (1 part)		**33593**
Cover (1 part)	For Micrologic A, E	**33592**
	For Micrologic P	**47067**

Communication option

Chassis

DB128406

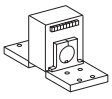


Modbus COM (1 part)	**64915**
Installation manual	**33088**

External sensors

External sensor for neutral + earth-fault protection (TCE) / 1 part

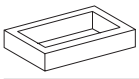
DB128459



CT rating: 400/1600 A	**33576**

Source ground return (SGR) earth-fault protection + Vigi cable / 1 part

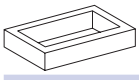
DB128460



External sensor (SGR)	**33579**
MDGF summing module	**48891**

Rectangular sensor for earth-leakage protection / 1 part

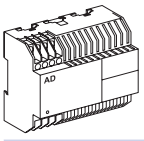
DB128460



280 mm x 115 mm	**33573**

External power supply module (AD) / 1 part

DB128461



24-30 V DC	**54440**
48-60 V DC	**54441**
100-125 V DC	**54442**
110-130 V AC	**54443**
200-240 V AC	**54444**
380-415 V AC	**54445**

Test equipments / 1 part

DB128464

Hand held test kit (HHTK)	**33594**
Full function test kit (FFTK)	**33595**
Test report edition come from FFTK	**34559**
FFTK test cable 2 pin for STR trip unit	**34560**
FFTK test cable 7 pin for Micrologic trip unit	**33590**

NS630b to NS1600 withdrawable circuit breaker
Locking and accessories

Locking for manually operated devices

Removable toggle locking system / 1 part


DB128448

Locking by 3 padlocks		44936
Installation manual		33148

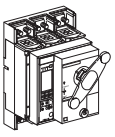
Fixed toggle locking system / 1 part


DB128449

Locking by 3 padlocks		32631
Installation manual		33148

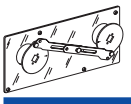
Rotary handle for manually operated devices

Devices with direct rotary handles / 1 part


DB128352

Conversion accessory	CNOMO	33866	
Locking by keylocks		Ronis	Profalux
	OFF position	33870	33869
	OFF and ON positions	33872	33871
Keylock kit (without keylocks)		33868	33868
Installation manual			33150

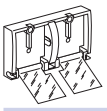
Mechanical interlocking


DB128461

For 2 devices with extended rotary handles	33890

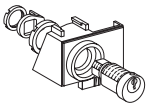
Locking and accessories for electrically operated devices

Pushbutton locking / 1 part


DB128454

By transparent cover + padlocks	33897
Installation manual	47103

Locking in OFF position / 1 part


DB128455

By Profalux keylocks

Profalux	1 lock with 1 key + adaptation kit	33902
	2 locks 1 key + adaptation kit	33904
1 keylock Profalux (without adaptation kit):		
	identical key not identified combination	33173
	identical key identified 215470 combination	33174
	identical key identified 215471 combination	33175

By Ronis keylocks

Ronis	1 lock with 1 key + adaptation kit	33903
	2 locks 1 key + adaptation kit	33905
1 keylock Ronis (without adaptation kit):		
	identical key not identified combination	33189
	identical key identified EL24135 combination	33190
	identical key identified EL24153 combination	33191
	identical key identified EL24315 combination	33192
Adaptation kit (without keylock):		
	adaptation kit Profalux	33898
	adaptation kit Ronis	33899
	adaptation kit Kirk	47517
	adaptation kit Castell	47518
Installation manual		47103

Operation counter CDM / 1 part

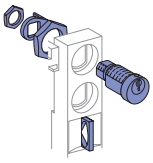
DB128456

Operation counter CDM / 1 part	33895
Installation manual	47103

Chassis locking

Keylocking in disconnected position / 1 part

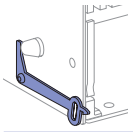
DB128440



By Profalux keylocks		
Profalux	1 lock with 1 key + adaptation kit	**64909**
	2 locks 1 key + adaptation kit	**64910**
	2 locks 2 different keys + adaptation kit	**64911**
1 keylock Profalux (without adaptation kit):	identical key not identified combination	**33173**
	identical key identified 215470 combination	**33174**
	identical key identified 215471 combination	**33175**
By Ronis keylocks		
Ronis	1 lock with 1 key + adaptation kit	**64912**
	2 locks 1 key + adaptation kit	**64913**
	2 locks 2 different keys + adaptation kit	**64914**
1 keylock Ronis (without adaptation kit):	identical key not identified combination	**33189**
	identical key identified EL24135 combination	**33190**
	identical key identified EL24153 combination	**33191**
	identical key identified EL24315 combination	**33192**
Adaptation kit (without keylock):	adaptation kit Profalux	**33769**
	adaptation kit Ronis	**33770**
	adaptation kit Castell	**33771**
	adaptation kit Kirk	**33772**

Door interlock / 1 part

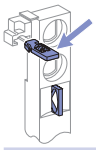
DB128441



Right and left side of chassis (VPECD or VPECG)	**33172**
Installation manual	**47104**

Racking interlock (VPOC) / 1 part

DB128442



	33788
Installation manual	**47104**

Mismatch protection (VDC) / 1 part

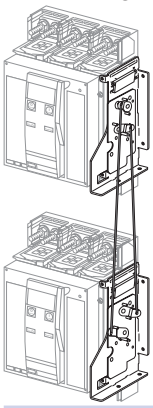
DB128443

	33767
Installation manual	**47104**

Mechanical interlocking for source changeover

Interlocking using connecting rods for Compact electrically operated devices

DB128465

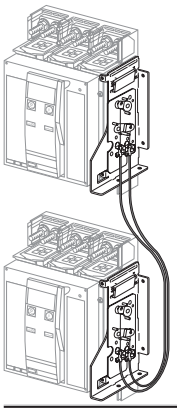


Complete assembly with 2 adaptation fixtures + rods	
2 Compact withdrawable devices	**33913**

Note: *the installation manual is enclosed.*

Interlocking using cables for Compact electrically operated devices

DB128466



Complete assembly with 2 adaptation fixtures + cables	
2 Compact fixed devices	**33914**
1 Compact fixed + 1 Compact withdrawable device	**33915**

Note: *the installation manual is enclosed.*

NS630b to NS1600 fixed or withdrawable circuit breaker
Instructions

Instructions			
Chassis accessories			**47104**
Circuit breaker accessories		Manual	**33148**
		Electrical	**33149**
Fixed and drawout circuit breaker		Manual	**33148**
		Electrical	**33149**
NS630b user manual	French		**33159**
	English		**33160**
Micrologic user manual	20/50 (French)		**33076**
	20/50 (English)		**33077**
	2A/7A (French)		**33079**
	2A/7A (English)		**33080**
	2E/6E (French)		**33079**
	2E/6E (English)		**33080**
	5P/7P (French)		**33082**
	5P/7P (English)		**33083**
Modbus communication notice for manual			**33088**

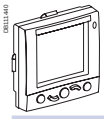
Portable data acquisition Communication bus accessories and Modbus

Portable data acquisition

Masterpact GetnSet

	Masterpact GetnSet product with battery and accessories	**48789**
	Spare battery for Masterpact GetnSet product	**48790**
	Spare cable for Masterpact GetnSet product	**48791**

ULP display module (1)



	Switchboard front display module FDM121	**TRV00121**
	FDM mounting accessory (diameter 22 mm)	**TRV00128**

	Breaker ULP cord L = 0.35 m	**LV434195**
	Breaker ULP cord L = 1.3 m	**LV434196**
	Breaker ULP cord L = 3 m	**LV434197**

	10 Modbus line terminators	**VW3A8306DRC** (2)

	5 RJ45 connectors female/female	**TRV00870**

	10 ULP line terminators	**TRV00880**

	10 RJ45/RJ45 male cord L = 0.3 m	**TRV00803**
	10 RJ45/RJ45 male cord L = 0.6 m	**TRV00806**
	5 RJ45/RJ45 male cord L = 1 m	**TRV00810**
	5 RJ45/RJ45 male cord L = 2 m	**TRV00820**
	5 RJ45/RJ45 male cord L = 3 m	**TRV00830**
	1 RJ45/RJ45 male cord L = 5 m	**TRV00850**

Converter

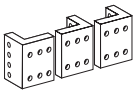
	RS485/Ethernet	**EGX100/300** (2)

(1) *For measurement display with Micrologic A, E, P.*
(2) *www.schneider-electric.com*

Compact NS1600b to 3200
Connection, locking and installation accessories

Optional vertical connection adaptor / Replacement kit (3 or 4 parts)

DB123323



1600/2500/3200 A	3P	**33975**
	4P	**33976**
Installation manual		**33969**

Electrical auxiliaries

Indication contacts (1 part)

DB128428

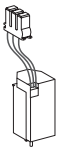
OF, SD, SDE	6 A - 240 V	**29450**
	Low level	**29452**

Note: *up to 3 OF, 1 SD and 1 SDE can be connected.*

Installation manual	**33969**

Instantaneous voltage releases (1 part)

DB128429



	MX	**MN**	**Delay unit**	**R** (non-adjustable)	**Rr** (adjustable)
12 V DC	**33658**				
24/30 V DC, 24 V AC	**33659**	**33668**			
48/60 V DC, 48 V AC	**33660**	**33669**	48/60 V AC/DC		**33680**
100/130 V AC/DC	**33661**	**33670**	100/130 V AC/DC	**33684**	**33681**
200/250 V AC/DC	**33662**	**33671**	200/250 V AC/DC	**33685**	**33682**
277 V AC	**33663**				
380/480 V AC	**33664**	**33673**	380/480 V AC/DC		**33683**
Installation manual	**33969**				

Locking

Removable toggle locking system / 1 part

DB128448

Locking by 3 padlocks	**33996**
Installation manual	**33969**

Fixed toggle locking system / 1 part

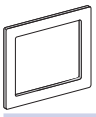
DB128449

Locking by 3 padlocks	**32631**
Installation manual	**33969**

Installation accessories

Escutcheon / 1 part

DB128444



	33929

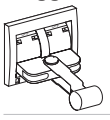
Interphase barriers / 3 parts

DB128446

	33998
Installation manual	**33969**

Toggle extension / 1 part

DB128338



NS3200 toggle extension for replacement	**33997**
Installation manual	**33969**

Accessories for Micrologic control units

Long-time rating plug (enhanced accuracy by limiting the setting range) / 1 part

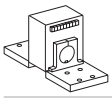
DB128458

Standard	0.4 to 1 x Ir	**33542**
Low setting	0.4 to 0.8 x Ir	**33543**
High setting	0.8 to 1 x Ir	**33544**
Without long-time protection	OFF	**33545**

External sensors

External sensor for neutral + earth-fault protection (TCE) / 1 part

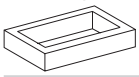
DB128459



CT rating: 1000/4000 A	**34036**

Source ground return (SGR) earth-fault protection + Vigi cable / 1 part

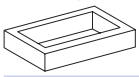
DB128460



External sensor (SGR)	**33579**
MDGF summing module	**48891**

Rectangular sensor for earth-leakage protection / 1 part

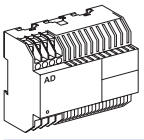
DB128460



470 mm x 160 mm	**33574**

External power supply module (AD) / 1 part

DB128461



24-30 V DC	**54440**
48-60 V DC	**54441**
100-125 V DC	**54442**
110-130 V AC	**54443**
200-240 V AC	**54444**
380-415 V AC	**54445**

Test equipments / 1 part

DB128464

Hand held test kit (HHTK)	**33594**
Full function test kit (FFTK)	**33595**
Test report edition come from FFTK	**34559**
FFTK test cable 2 pin for STR trip unit	**34560**
FFTK test cable 7 pin for Micrologic trip unit	**33590**

Compact NS630b to NS3200
Circuit breakers and switch-disconnectors

Name of customer: .....

Address for delivery: .....

Requested delivery date: .....

Customer order no.: .....

To indicate your choices, check the applicable square boxes ☐

and enter the appropriate information in the rectangles ☐

Circuit breaker or switch-disconnector

Compact type		**NS630b to NS1600**	☐
		NS1600b to NS3200	☐
Rating		**A**	☐
Circuit breaker		**N, H, L, LB**	☐
Switch-disconnector		**NA**	☐
Number of poles		**3 or 4**	☐
Device	NS630b/3200	Fixed	☐
	NS630b/1600	Withdr. with chassis	☐
		Withdr. without chassis (moving part only)	☐
Chassis alone without connections			☐

Micrologic control unit

Basic protection	**2.0**	☐	**5.0**	☐	**6.0**	☐	
A - ammeter	**2.0**	☐	**5.0**	☐	**6.0**	☐	**7.0** ☐
E - energy	**2.0**	☐	**5.0**	☐	**6.0**	☐	
P - power			**5.0**	☐	**6.0**	☐	**7.0** ☐

AD - external power-supply module		V	☐
ENVT - External Neutral Voltage Temp. (3P + N and Micrologic P)			☐
TCE - external sensor (CT) for neutral protection			☐
Rectangular sensor for earth-leakage protection	NS630b/1600	280 x 115 mm	☐
	NS1600b/3200	470 x 160 mm	☐
TCW - external sensor for SGR protection			☐
LR - long-time rating plug	Standard 0.4 to 1 Ir		☐
	Low setting 0.4 to 0.8 Ir		☐
	Hight setting 0.8 to 1 Ir		☐
	LT OFF		☐

Communication

COM module	Modbus	Device ☐	Chassis	☐	
Eco COM module	Modbus	Device ☐	Chassis	☐	
Front Display Module (FDM121)		☐	Mounting accessories	☐	
Breaker ULP cord	L= 0.35 m	☐			
	L= 1.3 m	☐			
	L= 3 m	☐			

NS630b/1600 connection

Horizontal rear connections	Top	☐	Bottom	☐	
Vertical rear connections	Top	☐	Bottom	☐	
Front connections	Top	☐	Bottom	☐	
4x240² bare cable connectors+shields		NS - FC fixed			☐
Long connection shields		NS - FC fixed			☐
Vertical-connection adapters		NS - FC fixed, withdr.			☐
Cable-lug adapters		NS - FC fixed, withdr.			☐
Arc chute screen		NS - FC fixed			☐
Interphase barriers		NS - FC fixed, withdrawable			☐
Spreaders		NS - FC fixed, withdrawable			☐

NS 1600b/3200 connection

Front connections	NS - FC fixed	☐
Vertical connection adaptor	optional for NS1600b/2500 (standard for NS3200)	☐

Micrologic control unit functions:
2.0: basic protection (long time + inst.)
5.0: selective protection (long time + short time + inst.)
6.0: selective + earth-fault protection (long time + short time + inst. + earth-fault)
7.0: selective + earth-leakage protection (long time + short time + inst. + earth-leakage)

Indication contacts

NS630b/3200	**SD** trip indication (maximum 1) (only for manually operated devices)						
	6 A-240 V AC	qty	☐	Low level	qty	☐	
	SDE fault-trip indication (maximum 1) (SDE integrated in electrically operated devices)						
	6 A-240 V AC	qty	☐	Low level	qty	☐	
	OF ON/OFF indication contacts (maximum 3)						
	6 A-240 V AC	qty	☐	Low level	qty	☐	
NS630b/1600	**Carriage switches** (possible combinations: 3 CE, 2 CD, 1 CT)						
CE - "connected" position	6 A-240 V AC	qty	☐	Low level	qty	☐	
CD - "disconnected" position	6 A-240 V AC	qty	☐	Low level	qty	☐	
CT - "test" position	6 A-240 V AC	qty	☐	Low level	qty	☐	
	Programmable contacts (630b - 1600) M6C kit for manually Compact						☐
Auxiliary terminals for chassis alone	3-wire terminal (30 parts)		☐	Jumpers (set of 10)			☐
				6-wire terminal (10 parts)			☐

Remote operation

Electrical operation	Standard		☐	Communicating			☐
(NS630b/1600)	Power supply	AC	☐	DC	☐	V	
Voltage releases	MX	AC	☐	DC	☐	V	
	MN	AC	☐	DC	☐	V	
	MN delay unit			Ajustable	☐	Non ajustable	☐

Rotary handles for NS630b/1600 fixed and withdrawable device

Direct	Black	☐	Red on yellow front
			CNOMO conversion access.
Extended	Black	☐	Red on yellow front
	Telescopic handle for withdrawable device		
Indication auxiliary	6 A-240 V AC		2 early-make switches
			2 early-break switches

Locking

Toggle (1 to 3 padlocks)	Removable system	☐	Fixed system			☐
Rotary handle	OFF position	☐	ON and OFF positions			☐
using a keylock	Ronis 1351B.500	☐	Profalux KS5 B24 D4Z			☐
(NS630b/1600)	Keylock kit (without keylock)					☐
For electrically	**VBP** - ON/OFF pushbutton locking					
operated devices	(by transparent cover +padlocks					
(NS630b/1600)	OFF position locking:					
	VCPO - by padlocks					☐
	VSPO - by keylocks:					
	Keylock kit (w/o keylock)		Profalux	☐	Ronis	☐
	1 keylock		Profalux	☐	Ronis	☐
	2 identical keylocks, 1 key		Profalux	☐	Ronis	☐
Chassis locking in "disconnected" position:						
VSPD - by keylocks	Keylock kit (w/o keylock)		Profalux	☐	Ronis	☐
			Kirk	☐	Castell	☐
	1 keylock		Profalux	☐	Ronis	☐
	2 identical keylocks, 1 key		Profalux	☐	Ronis	☐
	2 keylocks, different keys		Profalux	☐	Ronis	☐
	Optional connected/disconnected/test position locking					☐
VPEC - door interlock			On right-hand side of chassis			☐
			On left-hand side of chassis			☐
VPOC - racking interlock						☐
VDC - mismatch protection						☐

Accessories

VO - safety shutters on chassis		NS - withdrawable as standard		☐
CDM - mechanical operation counter				☐
CDP - escutcheon				☐
CP - transparent cover for escutcheon				☐
OP - blanking plate for escutcheon				☐
Mounting brackets for fixed NS		for mounting on horizontal plane		☐
Test kits	Mini test kit	☐	Portable test kit	☐

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