Spacial SFM compartmentalised

Catalogue

Fixed Motor Control Centres switchboards

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Introduction
Fixed compartmentalised swithchboards for Motor Control Centres

The Spacial SFM compartmentalised functional fixed system can be used for motor control centres in industrial environments (IP54).
It has been tested taking into account device characteristics.
This ensures a high degree of reliability in system operation and optimum safety.
Devices can be mounted on universal mounting plates on a workcut-out to simplify installation in the switchboard.

Fixed functional system for Motor Control

The fixed functional system for Motor Control Centres is designed for installation of motor starters up to 250 kW.

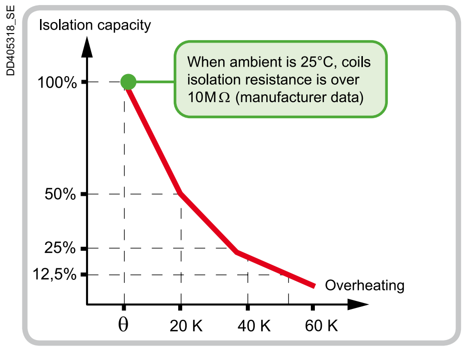
PB502998-75

Motor control centres
Motor protection

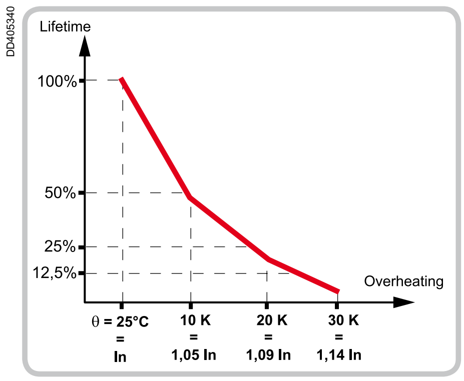
In addition to the motor power and the starter type (direct, reversing, star-delta…), 4 main criteria have to be taken into account when choosing a motor starter:
- the operational voltage,
- the type of thermal protection, electro-mechanical or electronical,
- the type of magnetic protection, according to the switchboard's Isc,
- the type of installation, according to the required availability level.

Operational voltage
Network's operational voltage is a decisive parameter in the choice of motor protection. Indeed, the operational voltage will have an impact on the device's performances and the installation constraints.
For instance, the voltage will influence:
- the breaking performances,
- the safety areas.

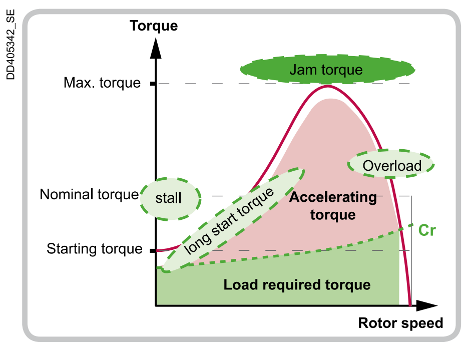
Motor protection



Protecting the motors to extend their lifetime
- Overheating in electrical motors is caused by copper and ferro-magnetic losses:
- □ the current I is proportional to the motor's load. Copper losses are proportional to I^2 (stator and rotor),
- □ hysteresis cycles in ferro-magnetic materials and the induced Foucault currents cause overheating, which is in particular proportional to frequency.
- The consequence of abnormal overheatings is a reduced isolation capacity of the materials, thus leading to a significant shortening of the motor lifetime, as shown in the opposite diagram.
- In continuous or semi-continuous processes, availability is a major issue. It is therefore decisive to observe accurately the operating conditions of the motors.
- Motor protection relays are the components dedicated to this task. They provide various levels of accuracy and functionalities, in order to meet the expectations of the process manager.



Supervising finely the motors to improve process availability
- An electrical motor transforms electrical energy in mechanical energy.
When the voltage, current and frequency change, the speed and torque of the motor change too. And conversely, any changes in charge have a direct impact on the electrical parameters.
- **Electromechanical thermal relays** protect the motor against overloads.
- **Electronical relays** protect the motor against overloads, on the basis of very sophisticated and highly accurate thermal patterns.
- □ These relays are able to make out several cases of motor overload, and to transmit the information, thus allowing the operator to have a better understanding of the true nature of the problem,
- □ These relays report for many complementary parameters, providing useful informations to the operator, therefore giving him the opportunity to avoid motor stops, or to re-start quickly if a stop has occurred.
- □ Examples:
  - motor under-load can be the signal of a pump cavitation,
  - phase inversion can be the indication of a maintenance error, that should be hard to diagnose without that sign.
- □ In addition to the observation of currents, the electronical relays can monitor the voltage, and consequently the power and the power factor. They can also watch the leakage currents and measure the actual coil temperature whenever it has a built-in sensor.
All these informations give an additional level of anticipation and shrewdness to help coping with problems.
- □ Finally, electronical relays can take on information-processing functions, like state and faults statistics. They are also able to suggest logical solutions, and to react in a process-specific way.



Motor control centres

Motor protection

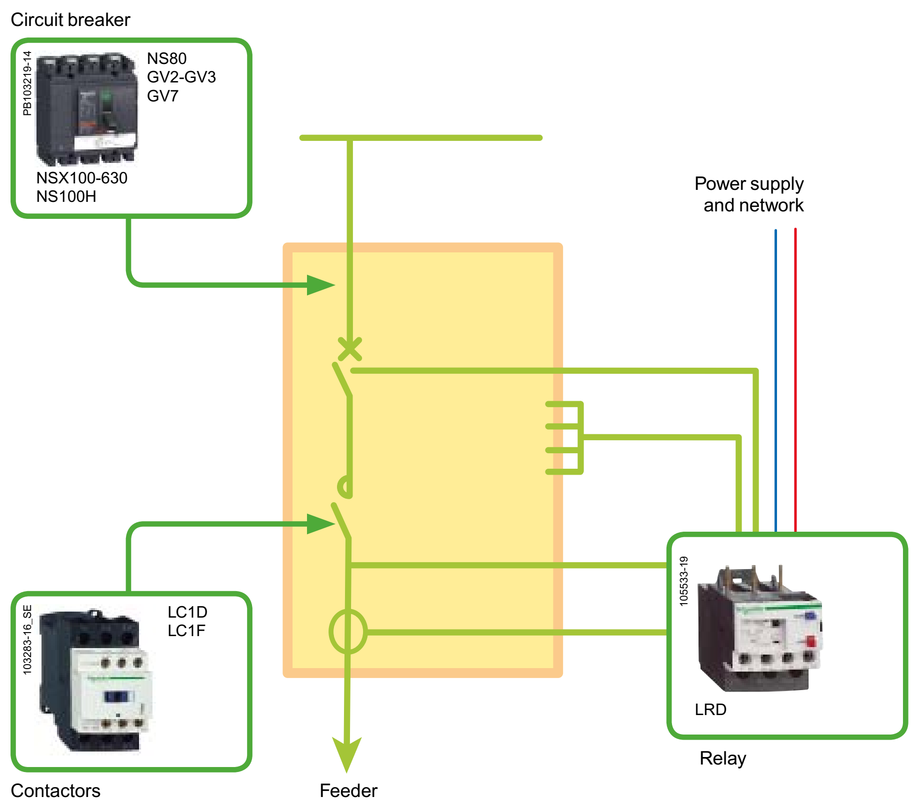
Magnetic protection: circuit-breakers and fuses

Schneider Electric have chosen to put forward circuit-breakers each time it is possible, as they have advantages in terms of maintenance and capacity of quick re-operating.

The advantages of magnetic circuit breakers over fuses are listed below:

- universal solution that can be exported to all countries, unlike the fuses, which standards are not coordinated,
- reduced dimensions,
- limited temperature rise,
- faster maintenance,
- no risk of over-rating the fuse cartridge (causing the motor destruction) or underrating (untimely tripping).

Spacial SFM: a combination for control motor starter



Motor control centres
Coordination

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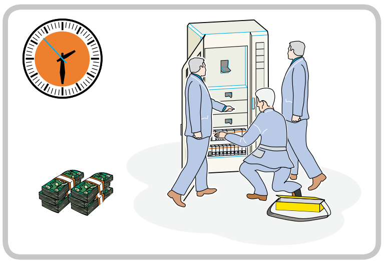
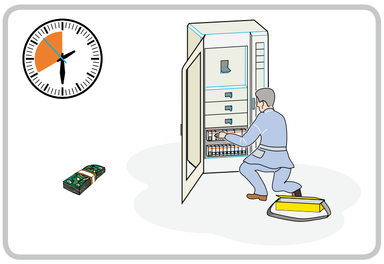
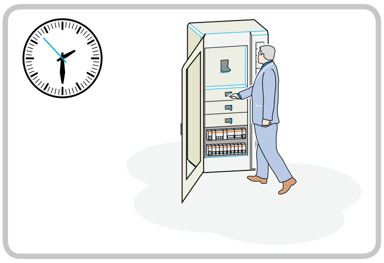

Type 1 coordination

DD383429

Type 2 coordination

DD383430

Total coordination

Coordination, what is it about?
A "motor starter" can be made up of 1, 2, or 3 different devices. They have to be coordinated in a way they ensure an optimal operation of the installation.

Aims of coordination
In case of a fault, the coordination's purposes are:
- to protect of the people and the equipment,
- to permit continuity of service,
- to reduce maintenance costs (manpower and replacement equipment).

Types of coordination as per IEC 60947-4-1
- Type 1 coordination: basic solution
  - no continuity of service,
  - important maintenance costs in case of a fault (manpower and equipment).
- Type 2 coordination: solution ensuring continuity of service
  - reduced machine shutdown time,
  - reduced cost of replacement equipment.
- Total coordination: withdrawable solutions as per IEC 60947-6-2:
  - no damage nor resetting of devices following a fault,
  - installation immediate return to operation.

Schneider Electric's choice as regards coordination
For applications in Spacial SFM high availability switchboard, Schneider Electric has **accepted**:

> **type 2 coordination** on grounds of:
- a low cost for repairing the equipment,
- a reduced machine shutdown time,

and **dismissed**:

> **type 1 coordination and non-coordoned feeders** because of:
- an expensive return to operation,
- a long machine shutdown time.

Motor control centres
Motor starter solutions

PD405140-30

2-component motor starter
Thermomagnetic circuit-breaker + contactor

■ **Advantages**

□ Very economic solutions.

□ Suitable for all types of diagrams.

□ Manual reset following a thermal fault.

□ Type 2 coordination.

■ **Applications**

□ Manufacturing and continuous and semi-continuous processes.

PD405141-30

3-component motor starter
■ **Advantages**

□ Wide choice of solutions.

□ Suitable for all types of diagrams.

□ Manual or automatic reset following a thermal fault.

□ 2 starting classes (10 and 20).

□ Type 2 coordination.

□ Segregation of thermal and magnetic faults.

■ Magnetic circuit-breaker + contactor + thermal protection

□ For manufacturing and continuous and semi-continuous processes.

■ Switch-disconnector fuse + contactor + thermal protection

□ For all types of machines.

□ For manufacturing and continuous and semi-continuous processes.

Enclosures

PB502987-70

Presentation

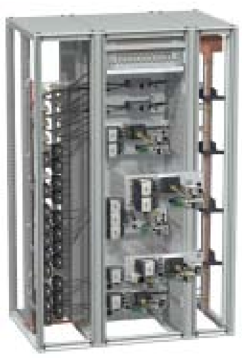
The Spacial SFM compartmentalised enclosures system used for MCC are based on the Spacial SF range.
They offer the same functions:
- Different possible configurations, combined side-by-side or back-to-back.
- The built-in partial doors and panels design allow to meet the required degree of protection.

And the same advantages:
- Save time through all assembly phases.
- Enclosure robustness.

Modularity and Versatility

They offer 36 vertical modules, each 50 mm high, of useful space.
They have 4 different enclosure dimensions and 2 additional chambers for distribution busbars or cabling management.
They can also be coupled with Spacial SFP for power distribution switchboards.

PB502985-32



The functional system

A metal structure

The switchboard is made up of one or more frameworks combined side-by-side or back-to-back, on which a complete selection of cover panels and partial doors can be mounted.
They are used to build IP54 configurations and see ClimaSys offer options for ventilation.
Electrical continuity is achieved using earthing braids.
Plain partial doors are reversible for quick left or right-hand mounting by a single person, 120º opening.
The robustness of the locking system allows naturally the good alingment of the assembly. From 1 to 4 locking points system with 5 mm double-bar insert as standard supply with possibility to replace it by other shape insert.

A distribution system

Vertical busbars positioned in a lateral compartment and horizontal busbars are used to distribute electricity throughout the switchboard.

Complete functional units

The functional unit need to be composed by:
- motor control and protection devices,
- a dedicated plain mounting plate for device installation,
- up to form 4b thanks to the gland boxes for the terminal isolation on the back of the switchboard or on the side of the cabling chamber,
- devices for on-site connections.

The functional units are modular and designed for installation one on top of another.
The system includes everything required for functional unit mounting, supply and onsite connection.
The components of the Spacial SFM compartmentalised system and those of the functional units in particular have been designed and tested taking into account device characteristics. This design approach ensures a high degree of reliability in system operation and optimum safety for personnel.
Electrical switchboards built using Schneider Electric recommendations fully comply with international standard IEC 61439-2 and IEC 62208.

Enclosures

Withstand to the most demanding environements

■ IP54 degree of protection for the dusty and/or damp industrial environments.
■ Seismic withstand.
■ Optional forced ventilation for environments with ambient temperatures hotter than 45°C or for devices sith considerable heat loss (see ClimaSys offer options).

Type tested

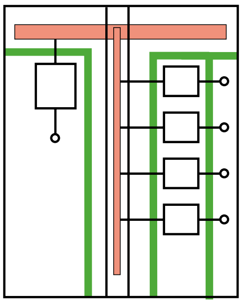
Spacial SFM compartmentalised is totally type-tested in accordance with IEC 61439-2.
■ Certified by independant lab.
■ As well as by a permanent control in Schneider Electric test laboratories.
■ Type-tests are carried out:
□ temperature-rise limit,
□ dielectric properties,
□ short-circuit withstand,
□ effectiveness of the protective circuit,
□ conformity of the clearance and creepage distances,
□ mechanical operation,
□ degree of protection.

PB502988-62

Partitioning

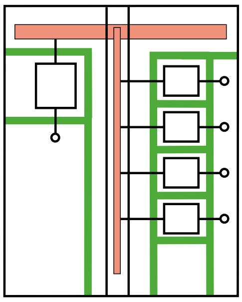
Partitioning is essential to ensure the utmost protection of the installation and personnel carrying out work in the switchboard.
Used in conjunction with the standard protection (terminal shields, factory-built connections), partitioning prevents any direct contact with live parts.

Form 2b



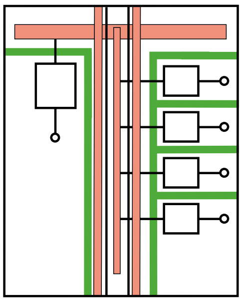
■ Terminals for external conductors separated from busbars.
■ The functional units and the terminals are separated from the busbars.

Form 3b



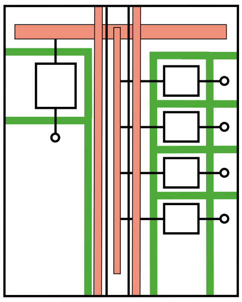
Separation of busbars from the functional units and separation of all functional units from one another. Separation of the terminals for external conductors from the functional units, but not from each other.
■ Protection against contact with live parts.
■ Reduction in the risk of faults between the functional units (propagation of electrical arcs, etc.).

Form 4a



Terminals for external conductors in the same compartment as the associated functional unit.

Form 4b



Terminals for external conductors not in the same compartment as the associated functional unit, but in individual, separate, enclosed protected spaces or compartments.

New SFM Compartmentalised for MCC fix

PB502999-71

General data

Applications	MCC
Standards	IEC 61439-2
Internal arc	No
Seismic	3G
Installation	Indoor

Mechanical data

Cable inlet	Top / Bottom
Access	Front / Rear Side
IP	54
IK	10
Form	4b type 7
Withdrability	FFF
Dimensions	H 2000 / W 600 & 800 / D 600 & 800
Color	RAL 7035

Electrical data

Insulation voltage (Ui)	1000 V
Voltage rating(Ue)	415 V
Coordination	Type 2
Frequency	50/60 Hz
Auxiliary circuit voltage	230 V
Degree of pollution	3
Rated current (IP>31)	2500 A (with Copper & Linergy)
Short circuit (Icw - 1s)	85 kA

Compartmentalised enclosure for Motor Control Centres
Mounting plates for fixed MCC switchboards

Mounting plates for fixed MCC switchboards

PB502989-60

PB502990-58

PB502991-66

Motor control functional units

The plain mounting plates can be used to install all the devices making up an MCC motor starter on a single support.

Easy installation

Motor feeders can be prepared on a bench making the cut-outs needed.
The quick-fixing system allows to hold the mounting plate during device installation and wiring. The mounting plate can be fixed on the side partitions in adjustable depth with a pitch of 50 mm.

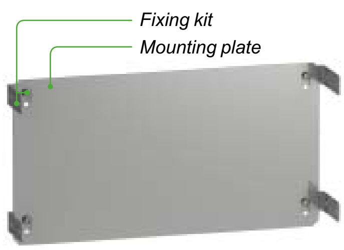
Switchboard upgradeability

- Functional units with form partitioning 3b and 4b.
- Sides and Rear accessibility.
- Separation panels with pre-cuts for cable-glands ref. 01215.

Functional unit reliability

- The unit of height for the mounting plates is the 50 mm module.
- 3 to 24 module (150 to 1200 mm) mounting plates are installed in 600 and 800 mm wide cubicles.
- Capacity of Spacial SFM cubicles: 36 modules (50 mm each).
- Cables are run in dedicated 300 or 400 mm wide lateral compartments.

Plain mounting plates



Dimension of the compartment			References	
Number of modules	Rate (mm)	Width (mm)	Mounting plate	Fixing kit
3M	150	600	NSYMP3M6	NSYMPFIX
		800	NSYMP3M8	
4M	200	600	NSYMP4M6	
		800	NSYMP4M8	
5M	250	600	NSYMP5M6	
		800	NSYMP5M8	
6M	300	600	NSYMP6M6	
		800	NSYMP6M8	
8M	400	600	NSYMP8M6	
		800	NSYMP8M8	
9M	450	600	NSYMP9M6	
		800	NSYMP9M8	
12M	600	600	NSYMP12M6	
		800	NSYMP12M8	
16M	800	600	NSYMP16M6	
		800	NSYMP16M8	
18M	900	600	NSYMP18M6	
		800	NSYMP18M8	
20M	1000	600	NSYMP20M6	
		800	NSYMP20M8	
24M	1200	600	NSYMP24M6	
		800	NSYMP24M8	

2-component motor starter
Direct on line and reversing
GV2, GV3 and GV7

Selection of recommended combinations

Iq (kA)		Motor characteristics		Motor starter solution		Mounting plate Number of modules (1M = 50 mm)	
Without limiter	With GV1L3	P max (kW)	I max (A)	Circuit breaker	Contactor (1)	DOL	Reversing
GV2							
85	-	0.18	0.6	GV2-P04	LC1D09	3M	3M
85	-	0.25	0.9	GV2-P05	LC1D09	3M	3M
85	-	0.37	1.1	GV2-P06	LC1D09	3M	3M
85	-	0.55	1.5	GV2-P06	LC1D09	3M	3M
85	-	0.75	1.8	GV2-P07	LC1D09	3M	3M
85	-	1.1	2.6	GV2-P08	LC1D09	3M	3M
85	-	1.5	3.4	GV2-P08	LC1D09	3M	3M
85	-	2.2	4.8	GV2-P10	LC1D09	3M	3M
85	-	3	6.5	GV2-P14	LC1D09	3M	3M
85	-	4	8.2	GV2-P14	LC1D18	3M	3M
50	85	5.5	11	GV2-P16	LC1D25	3M	3M
50	85	7.5	14	GV2-P20	LC1D25	3M	3M
50	85	10	19	GV2-P21	LC1D32	3M	3M
50	85	11	21	GV2-P22	LC1D32	3M	3M
50	85	15	28	GV2-P32	LC1D32	3M	3M
50	-	18.5	34	GV3-P40	LC1D50A	3M	4M
50	-	22	40	GV3-P50	LC1D50A	3M	4M
50	-	30	55	GV3-P65	LC1D65	3M	4M
70	-	15	28	GV7-RS40	LC1D40	3M	6M
70	-	18.5	34	GV7-RS40	LC1D50	3M	6M
70	-	22	40	GV7-RS50	LC1D80	3M	6M
70	-	30	55	GV7-RS80	LC1D80	3M	6M
70	-	37	66	GV7-RS80	LC1D80	3M	6M
70	-	45	80	GV7-RS100	LC1D115	4M	9M
70	-	55	100	GV7-RS150	LC1D150	6M	9M
70	-	75	135	GV7-RS150	LC1F185	9M	12M
70	-	90	160	GV7-RS220	LC1F225	9M	12M
70	-	110	200	GV7-RS220	LC1F265	9M	12M

(1) 2xLC1-D for reversing

Selection of the mounting plate

Dimension of the compartment			References	
Number of modules	Rate (mm)	Width (mm)	Mounting plate	Fixing kit
3M	150	600	**NSYMP3M6**	**NSYMPFIX**
		800	**NSYMP3M8**	
4M	200	600	**NSYMP4M6**	
		800	**NSYMP4M8**	
6M	300	600	**NSYMP6M6**	
		800	**NSYMP6M8**	
9M	450	600	**NSYMP9M6**	
		800	**NSYMP9M8**	
12M	600	600	**NSYMP12M6**	
		800	**NSYMP12M8**	

Ue	IP	Ambiant temperature
415 V	≤ IP54	35°C

3-component motor starter
Direct on line and reversing
GV2 and GV3

Selection of recommended combinations

Iq (kA)		Motor characteristics		Motor starter solution			Mounting plate Number of modules (1M = 50 mm)	
Without limiter	With LA9LB920	P max (kW)	I max (A)	Circuit breaker	Contactor (1)	Thermal relay	DOL	Reversing
85	-	0.18	0.6	GV2-L04	LC1D09	LRD04	3M	3M
85	-	0.25	0.9	GV2-L05	LC1D09	LRD05	3M	3M
85	-	0.37	1.1	GV2-L06	LC1D09	LRD06	3M	3M
85	-	0.55	1.5	GV2-L06	LC1D09	LRD06	3M	3M
85	-	0.75	1.8	GV2-L07	LC1D09	LRD07	3M	3M
85	-	1.1	2.6	GV2-L08	LC1D09	LRD08	3M	3M
85	-	1.5	3.4	GV2-L08	LC1D09	LRD08	3M	3M
85	-	2.2	4.8	GV2-L10	LC1D09	LRD10	3M	3M
85	-	3	6.5	GV2-L14	LC1D09	LRD12	3M	3M
85	-	4	8.2	GV2-L14	LC1D18	LRD14	3M	3M
50	85	5.5	11	GV2-L16	LC1D25	LRD16	3M	3M
50	85	7.5	14	GV2-L20	LC1D25	LRD21	3M	3M
50	85	10	19	GV2-L21	LC1D32	LRD22	3M	3M
50	85	11	21	GV2-L22	LC1D32	LRD22	3M	3M
50	85	13	24	GV2-L32	LC1D32	LRD32	3M	3M
50	-	18.5	34	GV3-L40	LC1D50A	LRD340	3M	4M
50	-	22	40	GV3-L50	LC1D50A	LRD350	3M	4M
50	-	26	49	GV3-L65	LC1D65A	LRD365	3M	4M

(1) 2xLC1-D for reversing.

Selection of the mounting plate

Dimension of the compartment			References	
Number of modules	Rate (mm)	Width (mm)	Mounting plate	Fixing kit
3M	150	600	**NSYMP3M6**	**NSYMPFIX**
		800	**NSYMP3M8**	
4M	200	600	**NSYMP4M6**	
		800	**NSYMP4M8**	

Ue	IP	Ambiant temperature
415 V	≤ IP54	35°C

3-component motor starter
Direct on line and reversing
NS80H and NSX

Selection of recommended combinations

Iq (kA)	Motor characteristics		Motor starter solution			Mounting plate Number of modules (1M = 50 mm)	
	P max (kW)	I max (A)	Circuit breaker	Contactor (1)	Thermal relay	DOL	Reversing
70	18.5	34	NS80H-MA	LC1D50	LRD3355	3M	6M
70	22	40	NS80H-MA	LC1D50	LRD3357	3M	6M
70	30	55	NS80H-MA	LC1D65	LRD3359	3M	6M
70	37	66	NS80H-MA	LC1D80	LRD3363	3M	6M
(2)	18.5	34	NSX100• MA	LC1D80	LRD3355	3M	6M
(2)	22	40	NSX100• MA	LC1D80	LRD3357	3M	6M
(2)	30	55	NSX100• MA	LC1D80	LRD3359	3M	6M
(2)	37	64	NSX100• MA	LC1D80	LRD3363	3M	6M
(2)	45	80	NSX100• MA	LC1D115	LR9D5367	6M	9M
(2)	55	100	NSX160• MA	LC1D150	LR9D5369	6M	9M
(2)	75	135	NSX160• MA	LC1F185	LR9F5369	9M	12M
(2)	90	160	NSX250• MA	LC1F225	LR9F5371	9M	12M
(2)	100	187	NSX250• MA	LC1F265	LR9F5371	9M	12M
(2)	132	230	NSX400• 1.3-M	LC1F330	LR9F7375	12M	16M
(2)	160	270	NSX400• 1.3-M	LC1F330	LR9F7375	12M	16M
(2)	200	361	NSX630• 1.3-M	LC1F500	LR9F7379	16M	16M
(2)	220	380	NSX630• 1.3-M	LC1F500	LR9F7379	16M	16M
(2)	250	430	NSX630• 1.3-M	LC1F500	LR9F7379	16M	16M

(1) 2xLC1-D for reversing
(2) NSX...F = 36 kA
NSX...N = 50 kA
NSX...H = 70 kA
NSX...S = 85 kA
NSX400L = 150 kA
NSX630L = 150 kA

Selection of the mounting plate

Dimension of the compartment			References	
Number of modules	Rate (mm)	Width (mm)	Mounting plate	Fixing kit
3M	150	600	**NSYMP3M6**	**NSYMPFIX**
		800	**NSYMP3M8**	
6M	300	600	**NSYMP6M6**	
		800	**NSYMP6M8**	
9M	450	600	**NSYMP9M6**	
		800	**NSYMP9M8**	
12M	600	600	**NSYMP12M6**	
		800	**NSYMP12M8**	
16M	800	600	**NSYMP16M6**	
		800	**NSYMP16M8**	

Ue	IP	Ambiant temperature
415 V	≤ IP54	35°C

2-component motor starter
Star-delta
GV2, GV3 and GV7

Selection of recommended combinations

Iq (kA)		Motor characteristics		Motor starter solution		Mounting plate Number of modules (1M = 50 mm)
Without limiter	With GV1L3	P max (kW)	I max (A)	Circuit breaker	Contactor	Star-delta
85	-	0.37	1.1	GV2-P06	3xLC1D09	4M
85	-	0.55	1.5	GV2-P06	3xLC1D09	4M
85	-	0.75	1.8	GV2-P07	3xLC1D09	4M
85	-	1.1	2.6	GV2-P08	3xLC1D09	4M
85	-	1.5	3.4	GV2-P08	3xLC1D09	3M
85	-	2.2	4.8	GV2-P10	3xLC1D18	4M
85	-	3	6.5	GV2-P14	3xLC1D18	3M
85	-	4	8.2	GV2-P14	3xLC1D18	4M
50	85	5.5	11	GV2-P16	3xLC1D25	4M
50	85	7.5	14	GV2-P20	3xLC1D25	4M
50	85	10	19	GV2-P21	3xLC1D32	5M
50	85	11	21	GV2-P22	3xLC1D32	4M
35	85	15	28	GV2-P32	3xLC1D32	4M
50	-	18.5	34	GV3-P40	3xLC1D50A	5M
50	-	22	40	GV3-P50	3xLC1D50A	5M
50	-	30	55	GV3-P65	3xLC1D65A	5M
70	-	15	28	GV7-RS40	3xLC1D80	9M
70	-	18.5	34	GV7-RS40	3xLC1D50	9M
70	-	22	40	GV7-RS50	3xLC1D80	9M
70	-	30	55	GV7-RS80	3xLC1D80	9M
70	-	45	80	GV7-RS100	3xLC1D115	12M
70	-	55	100	GV7-RS150	3xLC1D150	12M
70	-	75	135	GV7-RS150	3xLC1F185	16M
70	-	90	160	GV7-RS220	3xLC1F225	16M
70	-	110	200	GV7-RS220	3xLC1F265	16M

Selection of the mounting plate

Dimension of the compartment			References	
Number of modules	Rate (mm)	Width (mm)	Mounting plate	Fixing kit
3M	150	600	**NSYMP3M6**	**NSYMPFIX**
		800	**NSYMP3M8**	
4M	200	600	**NSYMP4M6**	
		800	**NSYMP4M8**	
5M	250	600	**NSYMP5M6**	
		800	**NSYMP5M8**	
9M	450	600	**NSYMP9M6**	
		800	**NSYMP9M8**	
12M	600	600	**NSYMP12M6**	
		800	**NSYMP12M8**	
16M	800	600	**NSYMP16M6**	
		800	**NSYMP16M8**	

Motor control command functional units

Ue	IP	Ambiant temperature
415 V	≤ IP54	35°C

3-component motor starter

Star-delta

GV2 and GV3

Selection of recommended combinations

Iq (kA)		Motor characteristics		Motor starter solution			Mounting plate Number of modules (1M = 50 mm)
Without limiter	With LA9LB920	P max (kW)	I max (A)	Circuit breaker	Contactor	Thermal relay	Star-delta
85	-	0.37	1.1	GV2-L06	3xLC1D09	LRD06	4M
85	-	0.55	1.5	GV2-L06	3xLC1D09	LRD06	4M
85	-	0.75	1.8	GV2-L07	3xLC1D09	LRD07	4M
85	-	1.1	2.6	GV2-L08	3xLC1D09	LRD08	4M
85	-	1.5	3.4	GV2-L08	3xLC1D09	LRD08	4M
85	-	2.2	4.8	GV2-L10	3xLC1D18	LRD10	4M
85	-	3	6.5	GV2-L14	3xLC1D18	LRD12	4M
85	-	4	8.2	GV2-L14	3xLC1D18	LRD14	4M
50	85	5.5	11	GV2-L16	3xLC1D25	LRD16	4M
50	85	7.5	14	GV2-L20	3xLC1D25	LRD21	4M
50	85	10	19	GV2-L21	3xLC1D32	LRD22	4M
50	85	11	21	GV2-L22	3xLC1D32	LRD22	4M
35	85	15	24	GV2-L32	3xLC1D32	LRD32	4M
50	-	18.5	34	GV3-L40	3xLC1D50A	LRD340	5M
50	-	22	40	GV3-L50	3xLC1D50A	LRD350	5M
50	-	30	49	GV3-L65	3xLC1D65A	LRD365	5M

Selection of the mounting plate

Dimension of the compartment			References	
Number of modules	Rate (mm)	Width (mm)	Mounting plate	Fixing kit
4M	200	600	**NSYMP4M6**	**NSYMPFIX**
		800	**NSYMP4M8**	
5M	250	600	**NSYMP5M6**	
		800	**NSYMP5M8**	

Motor control command functional units

Ue	IP	Ambiant temperature
415 V	≤ IP54	35°C

3-component motor starter
Star-delta
NS80H and NSX

Selection of recommended combinations

Iq (kA)	Motor characteristics		Motor starter solution			Mounting plate Number of modules (1M = 50 mm)
	P max (kW)	I max (A)	Circuit breaker	Contactor	Thermal relay	Star-delta
70	18.5	34	NS80H-MA	3xLC1D50	LRD3355	9M
70	22	40	NS80H-MA	3xLC1D50	LRD3357	9M
70	30	55	NS80H-MA	3xLC1D65	LRD3359	9M
70	37	66	NS80H-MA	3xLC1D80	LRD3363	9M
(1)	18.5	34	NSX100• MA	3xLC1D80	LRD3355	9M
(1)	22	40	NSX100• MA	3xLC1D80	LRD3357	9M
(1)	30	55	NSX100• MA	3xLC1D80	LRD3359	9M
(1)	37	64	NSX100• MA	3xLC1D80	LRD3363	9M
(1)	45	80	NSX100• MA	3xLC1D115	LR9D5367	12M
(1)	55	100	NSX160• MA	3xLC1D150	LR9D5369	12M
(1)	75	135	NSX160• MA	3xLC1F185	LR9F5369	16M
(1)	90	160	NSX250• MA	3xLC1F225	LR9F5371	16M
(1)	110	187	NSX250• MA	3xLC1F265	LR9F5371	16M
(1)	132	230	NSX400• 1.3-M	3xLC1F330	LR9F7375	20M
(1)	160	270	NSX400• 1.3-M	3xLC1F330	LR9F7375	20M
(1)	200	361	NSX630• 1.3-M	3xLC1F500	LR9F7379	24M
(1)	220	380	NSX630• 1.3-M	3xLC1F500	LR9F7379	24M
(1)	250	430	NSX630• 1.3-M	3xLC1F500	LR9F7379	24M

(1) NSX...F = 36 kA
NSX...N = 50 kA
NSX...H = 70 kA
NSX...S = 85 kA
NSX400L = 150 kA
NSX630L = 150 kA

Selection of the mounting plate

Dimension of the compartment			References	
Number of modules	Rate (mm)	Width (mm)	Mounting plate	Fixing kit
9M	450	600	**NSYMP9M6**	**NSYMPFIX**
		800	**NSYMP9M8**	
12M	600	600	**NSYMP12M6**	
		800	**NSYMP12M8**	
16M	800	600	**NSYMP16M6**	
		800	**NSYMP16M8**	
20M	1000	600	**NSYMP20M6**	
		800	**NSYMP20M8**	
24M	1200	600	**NSYMP24M6**	
		800	**NSYMP24M8**	

Linergy LGYE-LGY

a breakthrough in busbar systems

Safe, reliable, flexible, and flexible with the highest level of performance

The Linergy LGYE-LGY busbar system now includes horizontal busbars, for greater electrical switchboard enclosure performance, reliability, and costeffectiveness.

Manufactured using a revolutionary process, patented Linergy busbars are unique on the market, taking your electrical switchboard installations a giant leap into the future.

PB502992-103

Discover how Linergy LGYE-LGY can place the next generation of low-voltage switchboards in your hands.

Innovative technology

from an energy expert you can trust

Patented Linergy LGYE-LGY is backed by Schneider Electric's decades of expertise in electrical distribution systems and is certified IEC 61439-2 compliant by ASEFA.

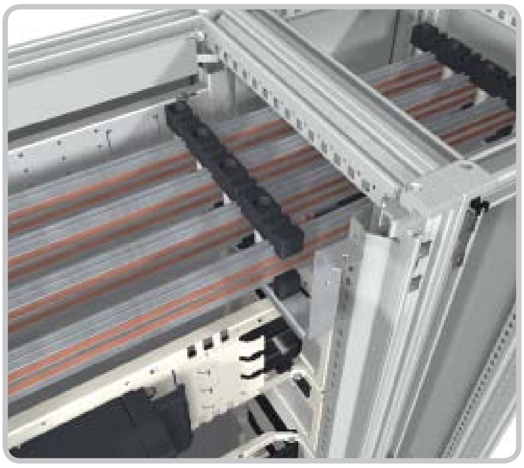
Linergy unique profile was designed with the ratings you need, a commitment to performance backed by regular testing up to 4000 A.

Heat is dissipated by conduction and radiation for performance only a market leader can bring you.

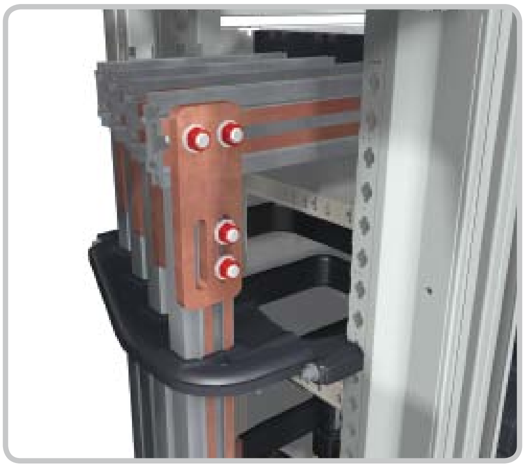
Linergy LGYE-LGY busbars performances are identical or better than traditional all Linergy BS busbars.

Unlike tin-plated aluminum busbars, rugged Linergy LGYE-LGY busbars are resistant to scratching during assembly to ensure optimal connection quality and reliability.

PB502993-68



PB502994-72



High Velocity Oxy-Fuel, unique on the busbar market

Patented Linergy LGYE-LGY uses a supersonic high-temperature coating process for a robust copper contact surface.

A revolutionary design

for greater efficiency

The Linergy line now includes horizontal busbars, helping you achieve better electrical switchboard performance while optimizing busbar layout and facilitating assembly.

Schneider Electric™ has drawn upon 30 years of expertise in electrical distribution systems and a decade of hands-on experience with the proven and reliable Linergy line of products. It brings you a revolutionary design featuring a high-quality copper contact surface that delivers even better results than traditional Linergy BS-to-Linergy BS connections.

Linergy LGYE-LGY busbars offer a number of benefits to help you enhance performance and boost your competitiveness.

Lightweight

Linergy is half the weight of equivalent-rated Linergy BS bars for more fuel-efficient transport, easier handling, and smoother installation.

Higher-capacity

A single Linergy LGYE bar can withstand ratings up to 2500 A. It would take two or three Linergy BS bars per pole to achieve similar ratings.

Robust and flexible

Linergy LGYE bars are extruded for a unique profile that includes both closed and ribbed sections, improving rigidity, thermal dissipation, and resistance to short circuits, with a shortcircuit withstand capacity (Icw) of 85 kA/1s for SFM and 100 kA / 1s for Spacial SFP.

Linergy LGYE is 50% lighter than Linergy BS

Reduce costs and assembly times over Linergy BS busbars

Attractive

The revolutionary copper contact strips, anodized aluminum surface, and unique shapes give a modern appearance and a soft touch.

IEC standards-compliant

The latest standards were factored in from the early design stages to ensure that temperatures are kept below the IEC61439-2 standard requirements, for optimal performance regardless of the switchboard configuration.

Environmentally-friendly

Instead of increasingly-scarce copper, Linergy LGYE is made from 70% recycled raw materials offering the same performance as primary raw materials.

Cost-effective

Linergy LGYE-LGY helps you achieve cost savings now and provides protection against fluctuating copper prices in the future, plus all the advantages of a raw material that is easy to purchase and store.

Linergy accessories are also evolving!

Linergy LGYE is a full-featured busbar system that includes all the connections, screws, bolts, isolating supports, and other accessories you need for drill-free assembly.

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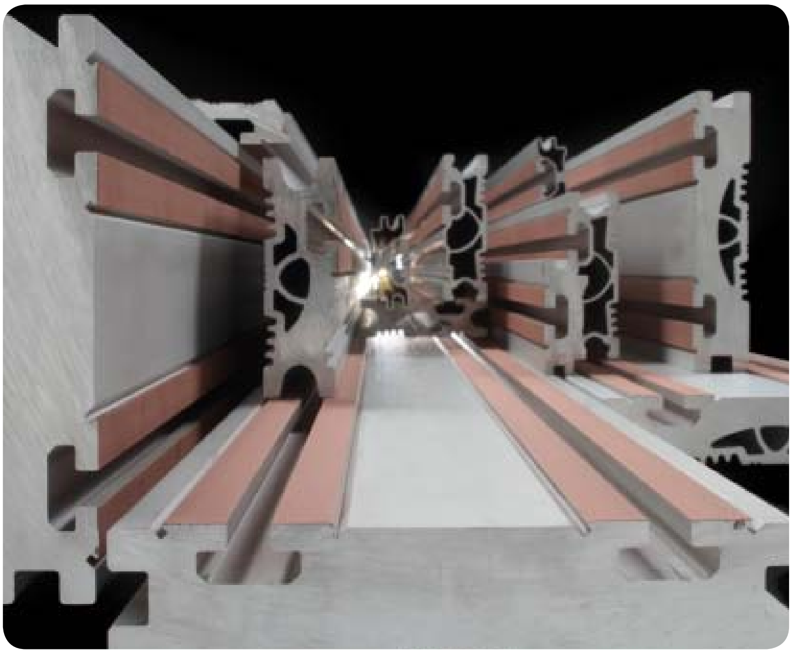

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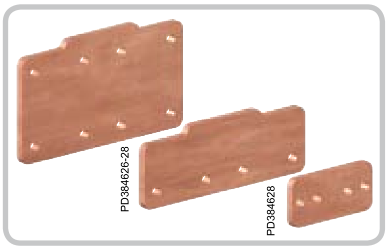

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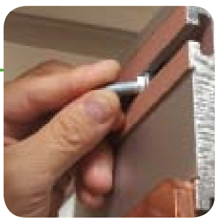


Panel builders, we've thought of everything to make your life easier!

- Linergy LGYE-LGY busbars are lightweight, making them easy to transport and handle in the workshop.
- With Linergy LGYE-LGY, you can continue to use the familiar Spacial SFP busbar supports you already know for Linergy BS bars. There's no new system to learn.
- Linergy LGYE-LGY offers single bars for each rating, making handling during installation faster and more convenient.
- Linergy LGYE-LGY bars are fast and easy to position without drilling, thanks to a sliding bolt and track system.
- Linergy screws let you add extra outgoing connections without drilling new holes or dismounting previous connections or busbar supports, saving you time and giving you greater flexibility in the event of last-minute changes.
- Linergy LGYE-LGY busbars offer a unique shape with no sharp edges for safer, smoother handling and installation the bars simply slide right in to the busbar supports.
- Existing Linergy LGY vertical busbars are easy to connect to Linergy LGYE with ready-toinstall accessories like vertical connectors.
- Linergy materials are easy to recycle via well-established aluminum recycling services already in use for materials like aluminum cans, coffee capsules, door and window frames, and engine blocks.

Linergy also offers the most **advanced busbar solutions** while remaining **simple**.

PB502995-140

Linergy LGYE / LGY /BS

Power busbars

> Solutions available up to 2500 A for Spacial SFM up to 4 000 A for Spacial SFP.
> Connection everywhere without drilling (with LGY and LGYE profile).

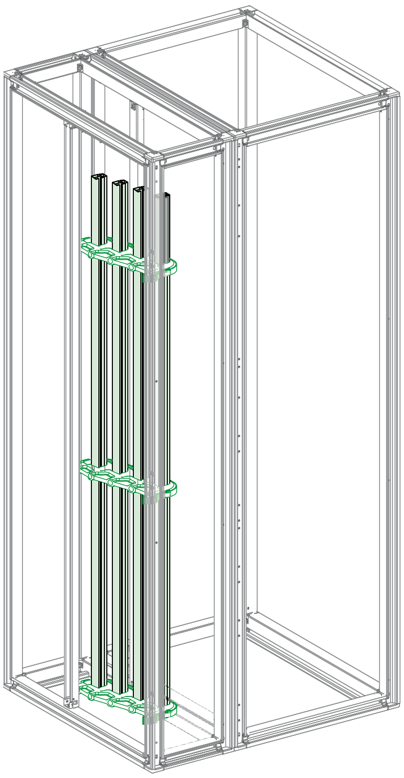
Linergy distribution systems
Lateral Linergy busbars
up to 1600 A

Busbar calculation
The following table indicates:
■ the catalogue numbers of the bars to be used, depending on the permissible current level in the busbars,
■ the number of supports required, depending on the rated short-time withstand current (Icw in kA rms / 1 second).

Linergy busbars	Cat. no.	Permissible current at 35 °C for switchboard		No. of supports Icw (kA effrms / 1 s)							
		IP ≤ 31	IP > 31	≤ 25	≤ 30	≤ 40	≤ 50	≤ 60	≤ 65	≤ 75	≤ 85
Linergy 630	**04502**	680	590	3							
Linergy 800	**04503**	840	760	3	3						
Linergy 1000	**04504**	1040	950	3	3	3					
Linergy 1250	**04505**	1290	1170	3	3	3	4	5			
Linergy 1600	**04506**	1650	1480	3	3	3	4	5	5	7	8

Note: the permissible current values for the busbars are given for an ambient temperature of 35°C around the switchboard.
The bottom support also maintains the bars in position.
Each catalogue number represents one bar.

DB300923

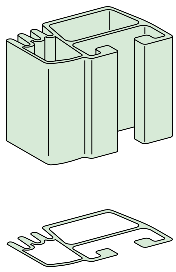


Busbars up to 1600 A.
The bottom support is used in wedging busbars in position.

Busbar selection

Linergy busbars, L = 1670 mm
Cat. no. selection
See the table below.
Each bar is supplied with a stop for the bottom support.

DD384147b



Bar 630 A.
Cat. no. 04502

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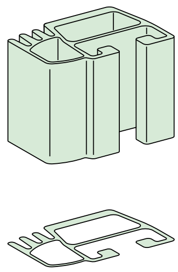

Bar 800 A.
Cat. no. 04503

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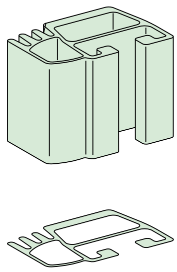
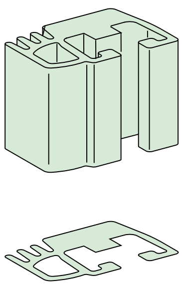


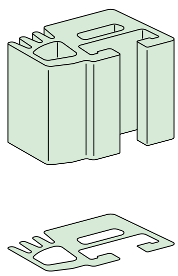
Bar 1000 A.
Cat. no. 04504

DD384150b



Bar 1250 A.
Cat. no. 04505

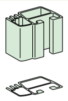
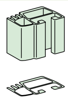
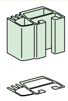
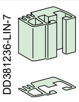
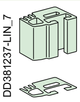
DD384151b



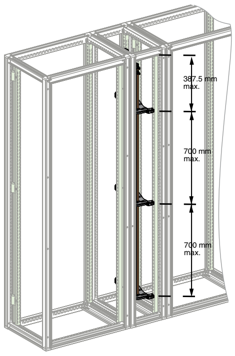
Bar 1600 A.
Cat. no. 04506

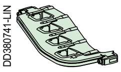
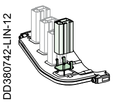
Linergy distribution systems
Linergy LGY
Lateral profiles up to 1600 A

Linergy LGY profiles

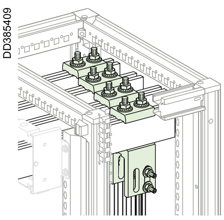
		Up to 1600 A (single busbar)				
In Spacial SF busbar chamber		**W300**				
Linergy profile, 1670 mm length						
		630 A	**800 A**	**1000 A**	**1250 A**	**1600 A**
Permissible current for an ambient temp. of 35°C around the switchboard	IP ≤ 31	680 A	840 A	1040 A	1290 A	1650 A
	IP > 31	590 A	760 A	950 A	1170 A	1480 A
Number of profiles per phase		1				
Cat. no.		**04502**	**04503**	**04504**	**04505**	**04506**

Busbar supports



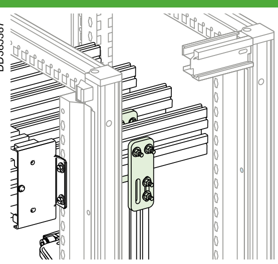
Description		The bottom wedge support is used to place the busbar and ensure it is in the correct position. It is count as a busbar support (included in the number of supports).  Fixed support **04651**				
Characteristics				An end stop must be fitted on the bottom support: **01109** (sold in lots of 12)		
Number of supports depending on Icw (kA rms/1 s)	≤ 25	3				
	≤ 30	-	3			
	≤ 40	-		3		
	≤ 50	-			4	
	≤ 60	-			5	
	≤ 65	-				5
	≤ 75	-				7
	≤ 85	-				8
Cat. no.		**04651** (set of 2 upright adapters **NSYSFPA** and set of 2 40 mm universal cross-rail **NSYSUCR40200** for installation in Spacial SF busbar chamber)				

Connections to the Linergy BS horizontal busbar



Characteristics			Supplied with mounting hardware. Reference include 1 connection only. Order 1 connection per phase.	
Cat. no according to horizontal busbar size	5 mm thick		**04634**	**04635**
	10 mm thick	Width ≤ 80 mm	**04636**	

Connections to the Linergy LGYE horizontal busbar

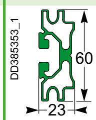
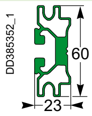
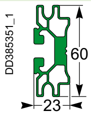
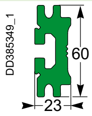
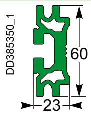
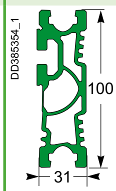
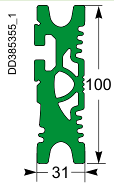


≤ 1600 A

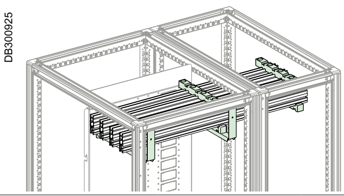
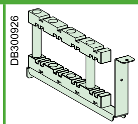
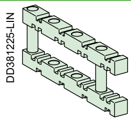
Characteristics	Supplied with mounting hardware. Reference include 1 connection only. Order 1 connection per phase.
Cat. no.	**04602** (vertical connection) **04603** (vertical shifted connection)

Linergy distribution systems
Linergy LGYE
Horizontal profiles up to 2500 A

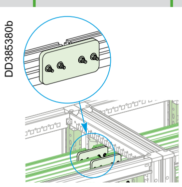
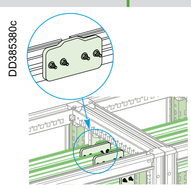
Linergy LGYE profiles

Installation in Spacial SFM compartmentalised	Up to 1600 A					Up to 2500 A	
Linergy profile, 2000 mm length							
	630 A	**800 A**	**1000 A**	**1250 A**	**1600 A**	**2000 A**	**2500 A**
Permissible current for an ambient temp. of 35°C around the switchboard	530 A	680 A	850 A	1050 A	1480 A	1650 A	2100 A
Number of profiles per phase	1						
Total number of vertical modules (50 mm)	3					3	
Cat. no.	**04560**	**04561**	**04562**	**04563**	**04564**	**04565**	**04566**

Busbar supports

			 Fixed support		 Free support				
Characteristics			2 fixed supports for Spacial SF wide cublicle are compulsory according compartment depth (400 or 500 mm). 1 fixed support for Spacial SF 300/400 wide chamber are compulsory. Fixed directly on framework. If more supports are needed, add free supports.						
In cubicle SFM: W600/800 Busbar supports 75 mm distance between bars	Number of supports depending on Icw (kA rms/1 s)	≤ 15	2						
		≤ 25	2						
		≤ 30	2						
		≤ 40	-		2				
		≤ 50	-			2			
		≤ 60	-			2+1		2	
		≤ 65	-				2+1		
		≤ 75	-				2+1		
		≤ 85	-				2+1		
Cat. no.	Fixed support	D400	**NSYMBHS4**						
		D500	**NSYMBHS5**						
	Free support		**NSYBSA**						
In busbar chamber SF: W300/400 Busbar supports 75 mm distance between bars	Number of supports depending on Icw (kA rms/1 s)	≤ 15	1						
		≤ 25	1						
		≤ 30	1						
		≤ 40	-		1				
		≤ 50	-			1			
		≤ 60	-			1			
		≤ 65	-				1 + 1		
		≤ 75	-				1 + 1		
		≤ 85	-				1 + 1		
Cat. no.	Fixed support	D600	**NSYBHS600**					**NSYBHS600**	
		D800	**NSYBHS800**					**NSYBHS800**	
	Free support		**NSYBSA**					**NSYBSA**	

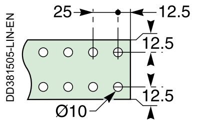
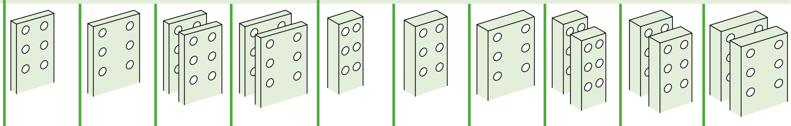
Joints

	Up to 1600 A					Up to 2500 A	
	630 A	**800 A**	**1000 A**	**1250 A**	**1600 A**	**2000 A**	**2500 A**
	 **04620**					 **04621**	
Cat. no.	3 x **04620** (3P) 4 x **04620** (4P)					3 x **04621** (3P) 4 x **04621** (4P)	

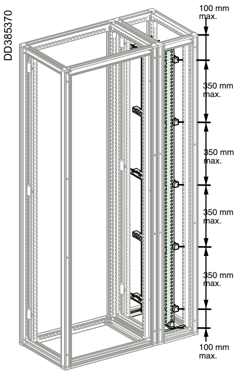
Note: *for accessories, see page 31.*

Linergy distribution systems
Linergy BS
Lateral flat busbars up to 2500 A

Flat busbars

		Up to 1600 A				Up to 2500 A					
In Spacial SF busbar chamber		**W300 D500/600/800**				**W300 D500/600/800**					
Pre-slotted copper, 1675 mm length											
Permissible current for an ambient temp. of 35°C around the switchboard	IP > 31	750 A	900 A	1250 A	1600 A	1080 A	1250 A	1600 A	1850 A	2000 A	2500 A
Busbar cross-section (mm)		60 x 5	80 x 5	60 x 5	80 x 5	50 x 10	60 x 10	80 x 10	50 x 10	60 x 10	80 x 10
Number of busbars per phase		1		2		1			2		
Cat. no.		**04516**	**04518**	**04516**	**04518**	**04525**	**04526**	**04528**	**04525**	**04526**	**04528**

Busbar supports

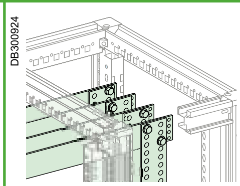


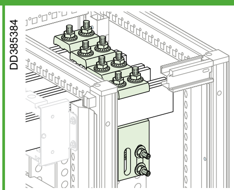
Description: 3 fixed supports are compulsory to hold the busbar in position.
If more than 3 supports are needed, use free supports (in addition).
The bottom wedge support is used to place the busbar and ensure it is in the correct position.
It does not count as a busbar support.

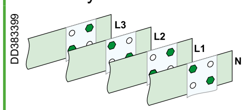
Number of supports depending on Icw (kA rms/1 s)	750 A	900 A	1250 A	1600 A	1080 A	1250 A	1600 A	1850 A	2000 A	2500 A
⩽ 15	3				3					
⩽ 25	3+2			3	3					
⩽ 30	3+2				3+2					3
⩽ 40	3+4		3+2		3+2					
⩽ 50		3+4			3+2					
⩽ 60					3+4					3+2
⩽ 65					3+4					3+2
⩽ 75						3+6		3+4		
⩽ 85									3+4	

Cat. no. of supports depending on distance between bars and busbar chamber depth	Spacial SF busbar chamber 75 mm distance between bars	W300, D600	**NSYBVS600** (fixed) + **NSYBSA** (free) + **NSYAS600** (end stop support)
		W300, D800	**NSYBVS800** (fixed) + **NSYBSA** (free) + **NSYAS800** (end stop support)

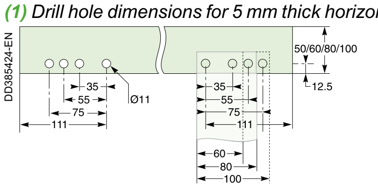
Connections to the Linergy BS horizontal busbar



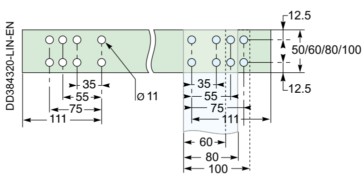


		Up to 1600 A				Up to 2500 A					
Characteristics		For a busbar with 75 mm distance between bars, the bars must be completely covered. Staggered assembly points between one bar and the next, to maintain the necessary clearance distances.(1) 				References **04636**, **04637** are supplied individually: 1 connection per phase. Reference **04642** consists of 2 M8 x 140 screws which can replace the original M8 x 120 screws.					
		1 vertical bar per phase		2 vertical bars per phase		1 vertical bar per phase			2 vertical bars per phase		
		60 x 5	80 x 5	60 x 5	80 x 5	50 x 10	60 x 10	80 x 10	50 x 10	60 x 10	80 x 10
Cat. no. of the connection piece depending on horizontal busbar size	⩽ 80 mm	**04645**				**04636**		**04637**	**04637**		

(1) Drill hole dimensions for 5 mm thick horizontal busbars.

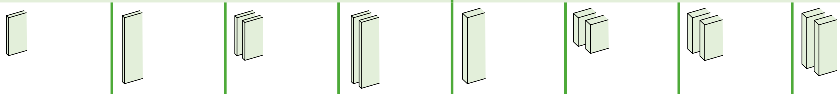


Drill hole dimensions for 10 mm thick horizontal busbars.



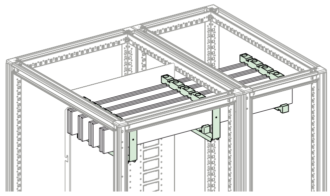
Linergy distribution systems
Linergy BS
Horizontal flat busbars up to 2500 A

Flat busbars

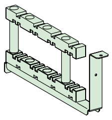
Installation in Spacial SFM compartmentalised	Hasta 1600 A				Hasta 2500 A			
Copper bar, 2000 mm length DB301128								
Permissible current for an ambient temp. of 35°C around the switchboard	750 A	900 A	1250 A	1600 A	1600 A	1850 A	2000 A	2500 A
Busbar cross-section (mm)	60 x 5	80 x 5	60 x 5	80 x 5	80 x 10	50 x 10	60 x 10	80 x 10
Number of busbars per phase	1	1	2	2	1	2	2	2
Total number of vertical modules (50 mm)	3							
Nº cat.	**04536**	**04538**	**04536**	**04538**	**04548**	**04545**	**04546**	**04548**

Busbar supports

DB300927

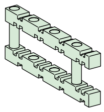


DB300926



Fixed support

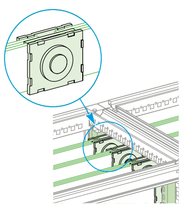
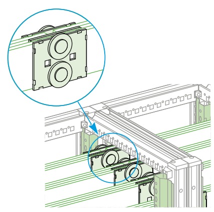
DD381225-LIN-15



Free support

In cubicle SFM: W600/800 with 75 mm distance between bars	Characteristics		2 fixed supports for Spacial SF wide cublicle are compulsory according compartment depth (400 or 500 mm). 1 fixed support for Spacial SF 300/400 wide chamber are compulsory. Fixed directly on framework. If more supports are needed, add free supports.							
	Number of supports depending on Icw (kA rms/1 s)	≤ 15	2							
		≤ 25	2+1	2						
		≤ 30	2+1		2					
		≤ 40	2+1				2			
		≤ 50	-	2+1					2	
		≤ 60	-				2+1			
		≤ 65	-				2+1			
		≤ 75	-				2+2	2+1		
		≤ 85	-				-		2+1	
	Cat. no.	Fixed support	**NSYMBHS4** (D400) or **NSYMBHS5** (D500)							
		Free support	**NSYBSA**							
In busbar chamber SF: W300/400 with 75 mm distance between bars	Number depending on Icw (kA rms/1 s)	≤ 30	1							
		≤ 50	1+1				1			
		≤ 85	-				2			
	Cat. no. depending on depth	Fixed support	**NSYBHS600** (D600) or **NSYBHS800** (D800)				**NSYBHS600** (D600) or **NSYBHS800** (D800)			
		Free support	**NSYBSA**				**NSYBSA**			

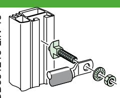
Joints

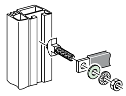
Installation in Spacial SFP	Up to 1600 A				Up to 2500 A			
	1 vertical bar per phase		2 vertical bars per phase		1 vert. bar per phase	2 vertical bars per phase		
Busbar cross-section (mm)	60 x 5	80 x 5	60 x 5	80 x 5	80 x 10	50 x 10	60 x 10	80 x 10
Sliding joints with self-breaking lock nut	**04640**			**04641**				
	DD385385b 			DD385386b 				
Cat. no.	**04640**	**04641**	**04640**	**04641**	**04641**	**04640**	**04640**	**04641**

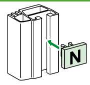
Note: *When installed at the bottom of a cubicle, the busbar must be partitioned.*

Linergy distribution systems
Accessories

Accessories

DD381218-LIN-15

Linergy screw

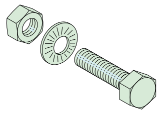
DD381219-LIN-15

Plain washer

DD381222-LIN-10


Identification

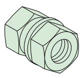
Linergy screw	Characteristics		Sold in lots of 20: 20 screws + 20 nuts + 20 contact washers, class 8.8. The screws slide into the profile and are then locked in the desired position.
	Cat. no.	25 mm length	see the table "Connections on Linergy LGYE & LGY" below
		39 mm length	
Steel plain washers	Characteristics		M8 sold in lots of 20.
	Cat. no.	ext. Ø20 mm	**04772**
		ext. Ø24 mm	**04773**
		ext. Ø28 mm	**04774**
Brass plain washers	Characteristics		M8 sold in lots of 20 for connection of ≤ 25 mm² lugs to Linergy.
	Cat. no.	ext. Ø20 mm	**04775**
Identification	Characteristics		12 clip-on supports + N, L1, L2, L3, PE, PEN labels.
	Cat. no.		**04794**
	Characteristics		Linergy LGYE busbar screw plate kit after sales service.
	Cat. no.		**01130**

M8 bolts

DD380737b


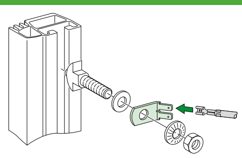
Linergy BS, 20 bolts 8.8 class	Characteristics		Set of 20 bolts + 20 nuts + 40 contact washers.
	Cat. no.	M8 x 20	**04782**
		M8 x 25	**04783**
		M8 x 30	**04784**
		M8 x 35	**04785**
		M8 x 40	**04786**
		M8 x 45	**04787**
		M8 x 50	**04788**

Torque nuts

DD380735b


20 M8 torque nuts	Characteristics	Can be used to obtain the correct tightening torque (28 Nm) recommended by then manufacturer, without using a torque wrench. Torque nuts may be used for all electrical connections.
	Cat. no.	**04759**

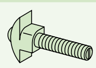
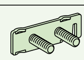
Voltage tap-offs

DD380736b


20 M10 voltage tap-offs for two 6.35 mm tab connectors	Characteristics	For small lugs (on low-current cables or measurement tap-offs), insert a conducting washer (cat. no. 04775) between the busbar and the lug.
	Cat. no.	**04229**

Connections on Linergy LGYE & LGY

InA (A)		**Connection on Linergy**	**Utilisation**	**Cat no.**
0 to 630	Cable Insulated flexible bar	Use the 25 mm Linergy screw	Recommended	**04766**
		Use the 39 mm Linergy screw	Possible	**04767** (1)
800 to 1250	5 mm thick bar	Use the 25 mm Linergy screw	Recommended	**04766**
		Use the 39 mm Linergy screw	Possible	**04767** (1)
		Use the flat plate screw with 2 studs	Possible	**04768**
1600 to 2500	5 or 10 mm thick bar	Use the flat plate screw with 2 studs	Recommended	**04768**
		Use the 39 mm Linergy screw	Possible	**04767** (1)

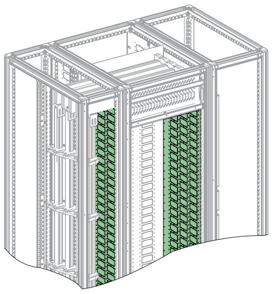
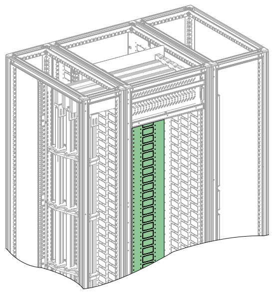
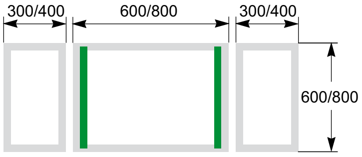
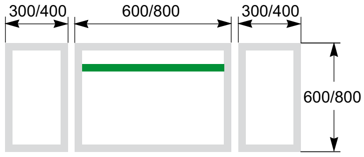
*(1) **04767** is only compatible with Linergy LGY.*

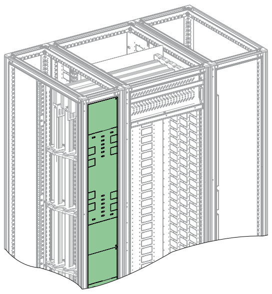
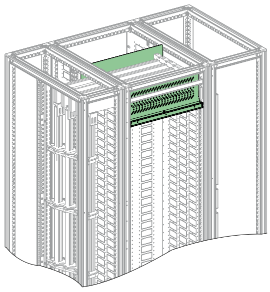
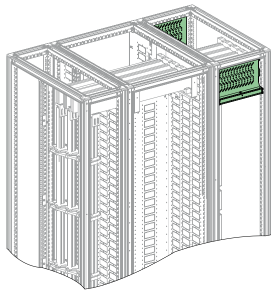
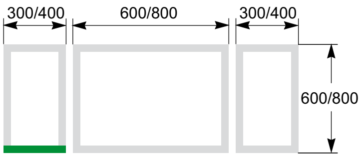
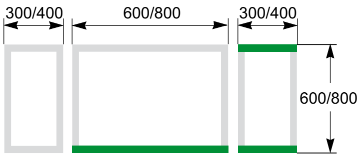
Partitioning

Partitioning Form 2

Separation of busbars from the functional units:
- protection against contact with live parts upstream of the outgoing circuits,
- protection against penetration of foreign solid bodies.

Form 2 partitioning

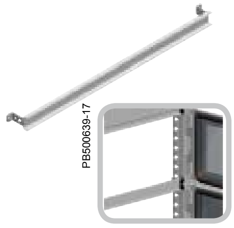
	Lateral partitioning	Rear partitioning
	DB300928 	DB300929 
Diagramas		
	DB300962 	DB300963 
Características	■ Set of 2 vertical metallic separation which guarantees good insulation of the sides of the compartment (IP2x). ■ Top and bottom ends have knock-outs for installation of horizontal busbars and pre-cuts of 40 x 70 mm for cable-glands using grommets ref **01215** when Form 4b is required. ■ Partition extension required for D800 mm. ■ Direct fixing on structure of enclosure.	■ Vertical metallic separation which guarantee good insulation of the back of the compartment (IP2x). ■ Pre-cuts of 40 x 70 mm for cable-glands using grommets ref **01215** when Form 4b is required on back installation. ■ Direct fixing on structure of enclosure.
Nº cat.	D600: **NSYMSC206** D800: **NSYMSC206** + **NSYMSC202** + **NSYSUCR40200**	W600: **NSYMBC206** W800: **NSYMBC208**

	Front and Rear busbar barrier	Horizontal busbar barriers			
	DB300930 	DB300961 		DB300960 	
Diagramas					
	DB300964 	DB300965 			
		W600	W800	W300	W400
Características	■ Front protection is realized by the association of the door W300 and this barrier. Metallic barrier, composed of 2 parts H850, pre-cut at both ends ■ Rear protection is realized by the association of the back panel of the enclosure.	■ Horizontal protection by the association of slotted front barrier and horizontal partition for efficient natural convection in the switchboard.		■ Set of 2 slotted barriers (front & rear), plus horizontal panel to be used when busbars cross the cable chamber.	
		■ The set can be used to partition horizontal busbar at the top or bottom of the cubicle. ■ The space required for the busbars is not increased.			
Nº cat.	W300: **06540** W400: **NSYVPF2B4**	D600 (1): **NSYHPF2B3M64** D800 (1): **NSYHPF2B3M65**	D600 (1): **NSYHPF2B3M84** D800 (1): **NSYHPF2B3M85**	D600: **06561** D800: **06563**	D600: **NSYHPF2B3M4** D800: **NSYHPF2B3M4**

Note: *when the busbars are at the bottom of the cubicle, gland plates are mandatory.*
(1) *For an enclosure with depth of 600 mm the compartment depth is 400 mm.*
For an enclosure with depth of 800 mm the compartment depth is 500 mm.

Partitioning

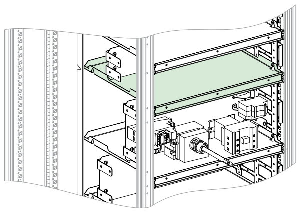
Accessorie for partitioning Form 2

External claddings	
	Intermediate Crossbar
	 PB500638-30 PB500639-17
Characteristics	■ It is mounted between partial doors, guaranteeing good sealing. ■ To be used in the absence of the partition tray. ■ Direct fixing to the structure. ■ Available in 2 widths (mm).
Supply	2 crossbars with fixing elements
N° cat.	W600: **NSYMIC6** W800: **NSYMIC8**

Partitioning Form 3

Separation of busbars from the functional units and separation of all functional units from one another.
Separation of the terminals for external conductors from the functional units, but not from each other.

- protection against contact with live parts
- reduction in the risk of faults between the functional units (propagation of electrical arcs, etc.).

Form 3 partitioning		
Horizontal partitioning		
	 DB300931	
	W600	**W800**
Characteristics	■ A horizontal metal partition to separate functional units from one another and guarantees insulation of the compartments (IP2x). ■ It is fixed to the front uprights of the enclosure and the side partitions. ■ Quick fixing system with intermediate crossbar to ensure the degree of protection of the partial doors. ■ Order by multiples of 2 (2, 4, 6…).	
Cat. no.	D600 (1): **NSYMTR64** D800 (1): **NSYMTR65**	D600 (1): **NSYMTR84** D800 (1): **NSYMTR85**

(1) For an enclosure with depth of 600 mm the compartment depth is 400 mm.
For an enclosure with depth of 800 mm the compartment depth is 500 mm.

Partitioning

Partitioning Form 4

Separation of busbars from the functional units and separation of all functional units from one another, including the terminals for external conductors which are an integral part of the functional unit:

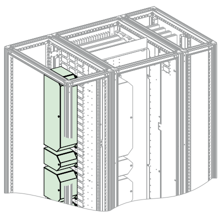
■ Protection against contacts with live parts and reduction in the risk of faults between the functional units (propagation of electrical arcs, etc.).

■ Form 4a: terminal for external conductors in the same compartment as the associated.

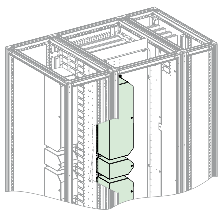
■ Form 4b: Terminals for external conductors not in the same compartment as the associated functional unit, but in individual, separate, enclosed protected spaces or compartments.

Form 4b boxes

DB300932



DB300933



Characteristics	■ Metallic plain box composed by 2 parts that can be easily installed for side or rear connection to separate the terminals for external conductors of the functional unit. ■ Quick fixing system on the side or on the back partition. ■ Available in 6 heights:					
Cat. no.	3M: **NSYBF4B3M**	4M: **NSYBF4B4M**	5M: **NSYBF4B5M**	6M: **NSYBF4B6M**	8M: **NSYBF4B8M**	9M: **NSYBF4B9M**

Other universal common accessories

Rail support bracket

PB502723-20

Characteristics	■ Bracket for fixing rails at an angle of 45°. ■ Reference by unit. Order by multiples of 10 (10, 20, 30…).
Cat. no.	**NSYFB45**

Mounting & Cable management acc.

PB500864-20

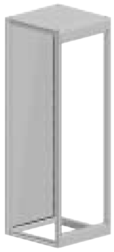
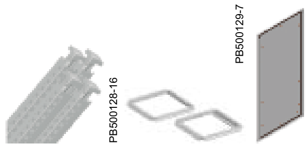
PB500864-36

Cat. no.	**See on Universal Enclosure catalogue**

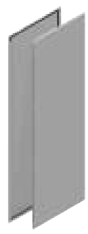
Selection of Spacial enclosures
For Motor Control Centres

Common characteristics
■ Spacial SFM framework with compartmentalised system that can be combined side-by-side with busbar and cable chambers.
■ Receive the cover panels and partial doors IP54.
■ **Material:** steel.
■ **Finish:** painted with epoxy-polyester resin.
■ **Colour:** RAL 7035 grey.
■ Possibility to order it assembled or kit supply.

Compartmentalised enclosure

		Assembled supply		Kit supply	
		PB500207-16 		PB500127-13 PB500128-16 PB500129-7 	
		W600	**W800**	**W600**	**W800**
Characteristics		■ Structure: Top and bottom frame and vertical uprights H2000 mm. ■ Useful height for doors H1800 mm /36M, when are installed the top and bottom fix panels for modularity (mandatory for installation of partial doors). ■ Equipped with removable roof, external fixing rear panel and top & bottom fixed panels (H100 mm) to allow modularity of partial doors. ■ 4 dimensions available.			
Cat. no.		D600: **NSYSF20660M** D800: **NSYSF20680M**	D600: **NSYSF20860M** D800: **NSYSF20880M**	-	-
	Vertical uprights H2000 mm	-	-	**NSYSFV20**	**NSYSFV20**
	Top & Bottom frame with roof	-	-	D600: **NSYSFC66** D800: **NSYSFC68**	D600: **NSYSFC86** D800: **NSYSFC88**
	Rear panel	-	-	**NSYBP206**	**NSYBP208**
	Fixed panels for modularty H100 mm /2M (intermediate crossbars included)	-	-	See table below	See table below

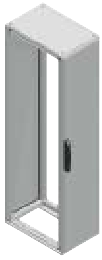
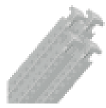
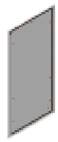
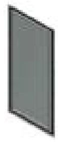
External claddings

	Front Fix panel for modularity		Frontal partial doors		Side panels	
	PB500637-27 		PB500640-50 		PB500114-17 	
	W600	**W800**	**W600**	**W800**	**D600**	**D800**
Characteristics	■ Top & bottom fix panel to obtain modularity required to install partial doors. ■ If there is no horizontal partitioning on top or bottom, the intermediate crossbar has to be ordered separately, ref. **NSYMIC6** (W600 mm) or **NSYMIC8** (W800 mm). ■ 2M fixed panels are delivered as standard for the compartmentalized enclosure. Possibility to order it separately for Spacial SFM framework in kit supply. ■ Available in 2 heights(M) (1).		■ Plain partial door with lock 5 mm double-bar insert. ■ They are fixed to the uprights of the framework by means of hinges. ■ Drilling template for uprights ref. **NSYMDT** (Only 1 drilling template by order is needed). ■ Opening to right or left. ■ 1, 2 or 4 locking points according different heights. ■ Possibility to replace locking insert (see page 37). ■ Available in following heights(M) (1).		■ Set of 2 side panels fixed to the outside of the enclosure. ■ Captive screws pre-mounted on the panels. ■ Available in 2 depths (mm).	
Cat. no.	2M: **NSYMFP2M6** 5M: **NSYMFP5M6**	2M: **NSYMFP2M8** 5M: **NSYMFP5M8**	3M: **NSYMPD3M6** 4M: **NSYMPD4M6** 5M: **NSYMPD5M6** 6M: **NSYMPD6M6** 8M: **NSYMPD8M6** 9M: **NSYMPD9M6** 12M: **NSYMPD12M6** 16M: **NSYMPD16M6** 18M: **NSYMPD18M6** 20M: **NSYMPD20M6** 24M: **NSYMPD24M6**	3M: **NSYMPD3M8** 4M: **NSYMPD4M8** 5M: **NSYMPD5M8** 6M: **NSYMPD6M8** 8M: **NSYMPD8M8** 9M: **NSYMPD9M8** 12M: **NSYMPD12M8** 16M: **NSYMPD16M8** 18M: **NSYMPD18M8** 20M: **NSYMPD20M8** 24M: **NSYMPD24M8**	**NSY2SP206**	**NSY2SP208**

(1) Heights according modularity (1M = 50 mm).

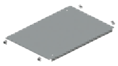
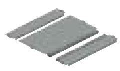
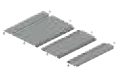
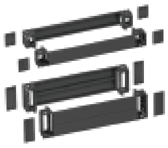
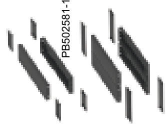
Selection of Spacial enclosures

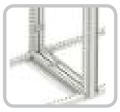
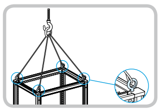
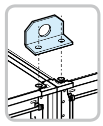
Busbar & cabling chambers

		Assembled supply		Kit supply	
		 PB500739-14		 PB500127-13  PB500128-16	 PB500129-7  PB500130-7
		W300	**W400**	**W300**	**W400**
Characteristics		■ Structure: Top and bottom frame and vertical uprights H2000 mm. ■ Equipped with removable roof, external fixing rear panel and front plain door with 4 point locking system with handle and DB 5 mm insert. ■ 4 dimensions available.			
Cat. no.		D600: **NSYSF20360** D800: **NSYSF20380**	D600: **NSYSF20460** D800: **NSYSF20480**	-	-
	Vertical uprights H2000 mm	-	-	**NSYSFV20**	**NSYSFV20**
	Top & Bottom frame with roof	-	-	D600: **NSYSFC36** D800: **NSYSFC38**	D600: **NSYSFC46** D800: **NSYSFC48**
	Rear panel	-	-	**NSYBP203**	**NSYBP204**
	Front plain door	-	-	**NSYSFD203**	**NSYSFD204**

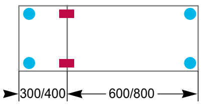
Spacial accessories

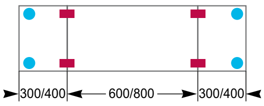
Other composition accessories

			Cable-gland plates			Plinth (100 mm height)		Plinth (200 mm height)	
									
H (mm)	**W (mm)**	**D (mm)**	**Plain**	**1 entry**	**2 entries**	**Front kit**	**Side kit**	**Front kit**	**Side kit**
2000	600	600	**NSYEC66**	**NSYEC661**	**NSYEC662**	**NSYSPF6100**	**NSYSPS6100**	**NSYSPF6200**	**NSYSPS6200**
2000	600	800	**NSYEC68**	**NSYEC681**	**NSYEC682**	**NSYSPF6100**	**NSYSPS8100**	**NSYSPF6200**	**NSYSPS8200**
2000	800	600	**NSYEC86**	**NSYEC861**	**NSYEC862**	**NSYSPF8100**	**NSYSPS6100**	**NSYSPF8200**	**NSYSPS6200**
2000	800	800	**NSYEC88**	**NSYEC881**	**NSYEC882**	**NSYSPF8100**	**NSYSPS8100**	**NSYSPF8200**	**NSYSPS8200**
2000	300	600	**NSYEC36**	**NSYEC361**	-	**NSYSPF3100**	**NSYSPS6100**	**NSYSPF3200**	**NSYSPS6200**
2000	300	800	-	**NSYEC381**	-	**NSYSPF3100**	**NSYSPS8100**	**NSYSPF3200**	**NSYSPS8200**
2000	400	600	**NSYEC64**	**NSYEC461**	-	**NSYSPF4100**	**NSYSPS6100**	**NSYSPF4200**	**NSYSPS6200**
2000	400	800	**NSYEC84**	**NSYEC481**	-	**NSYSPF4100**	**NSYSPS8100**	**NSYSPF4200**	**NSYSPS8200**

	Coupling kit	4 lifting eyebolts	4 lifting brackets	Earth braids	Earthing cables
					
Characteristics	■ Side-by-side combination. ■ Back-to-back combination (2).	■ Use a set of lifting eyebolts rings for each framework (3).	■ When two cubicles with devices have been combined, use a lifting brackets.	■ **NSYEB1516D8:** □ Length 155 mm, □ Section 16 mm², □ Terminal 8.5 mm. ■ **NSYEB2025D8:** □ Length 200 mm, □ Section 25 mm², □ Terminal 8.5 mm. ■ **NSYEB2050D8:** □ Length 200 mm, □ Section 50 mm², □ Terminal 8.5 mm.	■ **NSYEL166D8:** □ Length 160 mm, □ Section 6 mm², □ Terminal 8.3 mm. ■ **NSYEL2225D8:** □ Length 220 mm, □ Section 25 mm², □ Terminal 8.3 mm. ■ **NSYEL3525D8:** □ Length 350 mm, □ Section 25 mm², □ Terminal 8.3 mm.
Cat. no.	**NSYSFBK19**	**NSYSFEB**	**NSYSFELB**	**NSYEB1516D8** **NSYEB2025D8** **NSYEB2050D8**	**NSYEL166D8** **NSYEL2225D8** **NSYEL3525D8**

(2) Back to back association must be shipped individually and combined during on-site installation.
(3) For 2 columns: *For 3 columns:*





Lifting eyebolts
Lifting brackets

For more than 3 colomuns, lenghts > 1600 mm, see Lifting bars options on Universal Enclosures catalogue.

Locks for partial doors

		Possibility to replace standard insert by one from the table below (CRN range) and by keeping the standard latch.	
Type of lock		**Insert references**	**Key references**
◎	3 mm double bar	**NSYTDBCRN***	**NSYLDB5**
□	6 mm	**NSYTC6CRN**	**NSYLC7**
□	7 mm	**NSYTC7CRN**	**NSYLC7**
□	8 mm	**NSYTC8CRN**	**NSYLC8**
△	6.5 mm	**NSYTT6CRN**	**NSYLT8**
△	7 mm	**NSYTT7CRN**	**NSYLT8**
△	8 mm	**NSYTT8CRN**	**NSYLT8**

** Delivered with 1 metal key.*

Standard IEC 61439

Both the point of arrival of energy and a device for distribution to the site applications, the LV switchboard is the intelligence of the system, central to the electrical installation.

It plays an essential role in the availability of electric power, while meeting the needs of personal and property safety.
Its definition, design and installation are based on precise rules; there is no place for improvisation. The IEC 61439 standard aims to better define "low-voltage switchgear and controlgear assemblies", ensuring that the specified performances are reached. It specifies in particular:

- the responsibilities of each player, distinguishing those of the original equipment manufacturer; the organization that performed the original design and associated verification of an assembly in accordance with the standard, and of the assembly manufacturer - the organization taking responsibility for the finished assembly
- the design and verification rules, constituting a benchmark for product certification

All the component parts of the electrical switchboard are concerned by the IEC 61439 standard. Equipment produced in accordance with the requirements of this switchboard standard ensures the safety and reliability of the installation.

The main 10 functions of standard IEC 61439

For each of the following 10 functions, the standard IEC 61439 requires design verifications from the system manufacturer - mainly through type-tests - and routine verifications on each panel from the Panel Builder to achieve 3 basic goals: safety, continuity of service and compliance with end-user requirements.

Safety

■ **Voltage stresses withstand capability**
To withstand long term voltages, and transient and temporary overvoltages according to the insulation coordination principles and requirements.
■ **Current-carrying capability**
To protect against burns and to withstand temperature rise:
□ when any circuit is continuously loaded, alone, to the specified current
□ when the assembly is loaded to the specified current according to the specified load pattern (between circuits and/or as a function of the time).
■ **Short-circuit withstand capability**
To withstand the stresses resulting from the prospective short-circuit current and from the associated data (High forces between conductors, temp. rise in a very short time, air ionization, overpressure).
■ **Protection against electric shock**
□ Hazardous-live-parts not to be accessible (basic protection).
□ Accessible conductive parts not to become hazardous-live (fault protection).
■ **Protection against risk of fire or explosion**
□ Resistance to internal glowing elements.
Note: Protection of persons, and optional protection of the assembly, against arcing due to internal fault can be specified through a "special test" according to IEC 61641.

Continuity of service

■ **Maintenance and modification capability**
Capability to preserve continuity of supply without impairing safety during assembly maintenance or modification.
□ Electrical condition of the assembly or various circuits.
□ Speed of exchange of the functional units.
□ Test facilities…
■ **Electro-Magnetic compatibility**
To properly function (immunity) and not to generate EM disturbances (emission) in specified environmental conditions:
□ Industrial networks or locations (Environment A).
□ Domestic, commercial, and light industrial locations (Environment B).

Compliance with end-user requirements

■ **Capability to operate the electrical installation**
To properly function, according to:
□ the electrical diagram of the overall system and related information (voltages, coordination…),
□ the specified operating facilities (e.g. free or restricted access to Man Machine Interfaces, isolation of the outgoing circuits…).
■ **Capability to be installed on site**
□ To withstand handling, transport, storage… and installation constraints.
□ Capability to be erected and connected (type of enclosure, type, material and cross sectional areas of external conductors).
■ **Protection of the assembly against mechanical and atmospheric environmental conditions**
□ Presence of water or solid foreign bodies (IP according to IEC 60529).
□ External mechanical impacts (optional IK according to IEC 62262).
□ Indoor or outdoor installation (humidity, UV).

Enclosure standard
IEC 62208

Standard IEC 62208
Empty enclosures for low-voltage switchgear and controlgear assemblies

General rules for empty enclosures
Standard IEC 62208 lay down definitions, classifications, characteristics and test requirements for the enclosures used for assemblies.
It apply to empty enclosures before installation of the devices by the panel builder, as supplied by the manufacturer.
It apply to one-piece enclosures and to enclosures supplied in kit form.

Type tests

1 - Static load
2 - Hoisting
3 - Axial loads of metal inserts
4 - IK code
5 - IP code
6 - Thermal stability
7 - Resistance to heat
8 - Resistance to abnormal heat and to fire
9 - Dielectric strength
10 - Protective-circuit continuity
11 - Weather resistance
12 - Corrosion resistance
13 - Marking

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