Medium Voltage Distribution

SM6-24

Modular units

Catalogue
2009

Schneider Electric

A new path for achieving your electrical installations

A comprehensive offer

The SM6 range is part of a comprehensive offer of products that are perfectly coordinated to meet all medium and low voltage electrical distribution requirements.
All of these products have been designed to work together: electrical, mechanical and communication compatibility.
The electrical installation is thus both optimised and has improved performance:

- better service continuity,
- increased personnel and equipment safety,
- guaranteed upgradeability,
- efficient monitoring and control.

You therefore have all the advantages at hand in terms of know-how and creativity for achieving optimised, safe, upgradeable and compliant installations.

Tools for facilitating the design and installation

With Schneider Electric, you have a complete range of tools to help you get to know and install the products whilst complying with current standards and good working practices.
These tools, technical sheets and guides, design software, training courses, etc are regularly updated.

Schneider Electric is associating itself with your know-how and your creativity to produce optimised, safe, upgradeable and compliant installations

For a real partnership with you

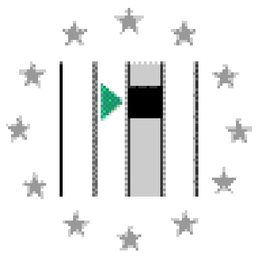
A universal solution doesn't exist because each electrical installation is specific.
The variety of combinations on offer allows you to truly customise the technical solutions.
You are able to express your creativity and put your know-how to best advantage when designing, manufacturing and exploiting an electrical installation.

General contents

Contents

The experience of a world leader

MT20140



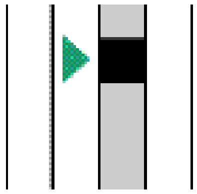
The Schneider Electric experience's extends over forty years in factory-built cubicles and over thirty years in SF6 breaking technology for Medium Voltage switchgear.

This experience means that today Schneider Electric can propose a complementary range: vacuum type circuit breaker cubicles up to 24 kV and internal arc cubicles to reinforced the safety of people according to the IEC standard.

This gives you the advantage of unique experience, that of a world leader, with over 2,000 000 SF6 Medium Voltage units installed throughout the world.

Putting this experience at your service and remaining attentive to your requirements is the spirit of active partnership that we want to develop in offering you the SM6-24.

MT20141



The modular SM6-24 is a range of harmonised cubicles equipped with SF6 or vacuum breaking technology switchgear with 30 years life span.

These cubicles allow you to produce all your Medium Voltage substation requirements up to 24 kV by superposing their various functions.

The result of in-depth analysis of your requirements, both now and in the future, SM6-24 cubicles mean that you can take advantage of all the features of both a modern and proven technology.

1975: innovation
Sulphur hexafluoride (SF6) is first used in an MV switch for an MV/LV transformer substation, with the VM6.

1989: experience
Over 300,000 VM6 cubicles equipped networks throughout the world.

1991: innovation and experience
Cumulated with the second generation of SM6 modular SF6 cubicles.

2008: a leading position
■ with over 900,000 SM6-24 cubicles installed around the world, Schneider Electric consolidates its position as uncontested leader in the Medium Voltage field.

■ development of the offer to enlarge the range of vacuum type circuit breaker cubicles up to 24 kV.

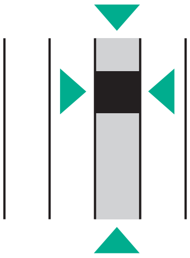
The range's advantages

MT20142


Upgradability

SM6-24, a comprehensive range

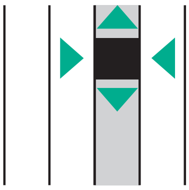
■ a comprehensive offer covering your present and future requirements
■ a design adapted to the extension of your installations
■ a catalogue of functions for all your applications
■ a product designed to be in compliance with standards constraints
■ options to anticipate the telecontrol of your installations.

MT20143


Compactness

SM6-24, an optimised range

■ compact units, with low increment cubicles
■ rationalised space requirement for switchboard installation
■ reduction of civil works costs
■ easy integration in factory-built outdoor substations for which the SM6-24 is particularly well designed.

MT20144


Maintenance

SM6-24, a range with reduced maintenance

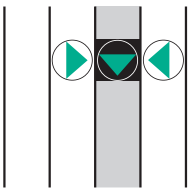
■ the active parts (breaking and earthing) are integrated in an SF6-filled, "sealed for life" unit
■ the control mechanisms, are intented to function with reduced maintenance under normal operating conditions
■ enhanced electrical endurance when breaking.

MT20145


Ease of installation

SM6-24, a simple range to incorporate

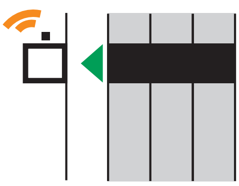
■ reduced dimensions and weights
■ only one civil works layout
■ a solution adapted to cable connection
■ simplified switchboard busbar design.

MT20146


Ease and safe to operate

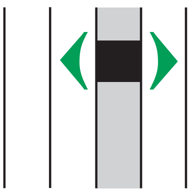
SM6-24, a proven range

■ a three position switch to block incorrect switching
■ the earthing disconnector has full closing capacity
■ positive breaking of position indicators
■ internal arc withstand in the cable and switchgear compartments
■ clear and animated display diagrams
■ switching lever with an "anti-reflex" function
■ compartmented cubicles.

MT20147


SM6-24: a range designed with telecontrol in mind

SM6-24 switchgear is perfectly adapted to telecontrol applications. Motorised, either when installed or at a later date on-site without any interruption in service, SM6-24 combines with the Easergy T200 remote control interface. You therefore benefit from a ready-to connect unit that is easy to incorporate providing guaranteed switchgear operation.

MT20148


SM6-24: a range with adapted protection devices

With the SM6-24, Schneider Electric proposes solutions for network management; the Sepam and VIP or relay ranges protect installations, providing continuity of electrical supply and reducing downtime.

Protecting the environment

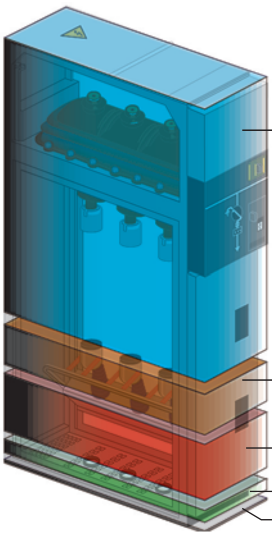
Schneider Electric's recycling service for SF6 products is part of a rigorous management process.

Schneider Electric's recycling service

61051N

Schneider Electric is committed to a long term environmental approach.
As part of this, the SM6-24 has been designed to be environmentally friendly, notably in terms of the product's recycleability.
The materials used, both conductors and insulators, are identified and easily separable.
At the end of its life, SM6-24 can be processed, recycled and its materials recovered in conformity with the draft European regulations on the end-of-life of electronic and electrical products, and in particular without any gas being released to the atmosphere nor any polluting fluids being discharged.

61016N



	Switch unit	Circuit breaker unit
Ferrous metal	**84%**	**65%**
Non-ferrous metal	**4%**	**10.6%**
Thermohardening	**9.5%**	**22%**
Thermoplastics	**2.35%**	**2.3%**
Fluid	**0.15%**	**0.1%**

MT55145

The environmental management system adopted by Schneider Electric production sites that produce the SM6-24 have been assessed and judged to be in conformity with requirements in the ISO 14001 standard.

A full range of services

61052N

Schneider Electric is capable of offering a full range of services either associated or not with the supply of the SM6-24 unit.

To improve the quality of your electrical power:
- network study, harmonics study, etc.
- reactive energy compensation
- consumption monitoring
- optimisation of your electrical power supply contracts.

To accompany the purchase and installation of your SM6-24 equipment:
- adaptation of our equipment to provide a better response to your requirements
- on site assembly, testing and commissioning of your equipment
- customised financing solutions
- warranty extension
- operator training.

To accompany your installation throughout its life and upgrading your equipment:
- upgrading your existing equipment: functional adaptation, control motorisation, renovation of protections units, etc.
- on site work
- supply of replacement parts
- maintenance contracts
- end of life recycling.

Fore more information on all the services proposed by Schneider Electric, please contact your Schneider Electric Sales Office.

PE57151

The references of a leader
SM6, a world-wide product

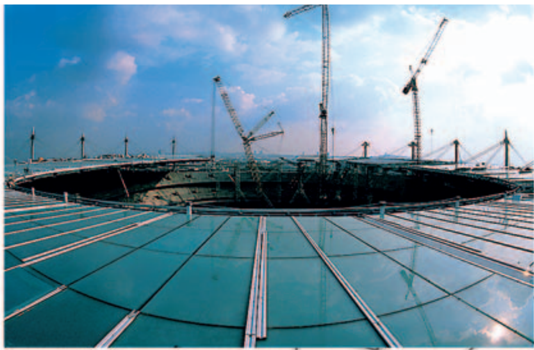
Asia/Middle East
- Canal Electrical Distribution Company, Egypt
- General Motors Holden, Australia
- Pasteur Institute, Cambodia
- Tian he City, China
- Sanya Airport, China
- Bank of China, Beijing, Jv Yanta, China
- Plaza Hotel, Jakarta, Indonesia
- Bali Airport, Indonesia
- Wakasa Control Center, Japan
- Otaru Shopping center, Japan
- New City of Muang, Thong Than, Kanjanapas, Thailand
- Danang and Quinhon Airport, Vanad, Vietnam
- British Embassy, Oman
- KBF Palace Riyadh, Saudi Arabia
- Raka Stadium, Saudi Arabia
- Bilkent University, Turkey
- TADCO, BABOIL development, United Arab Emirates
- Melbourne Tunnel City Link, Australia
- Campus KSU Qassim Riyad, Saudi Arabia

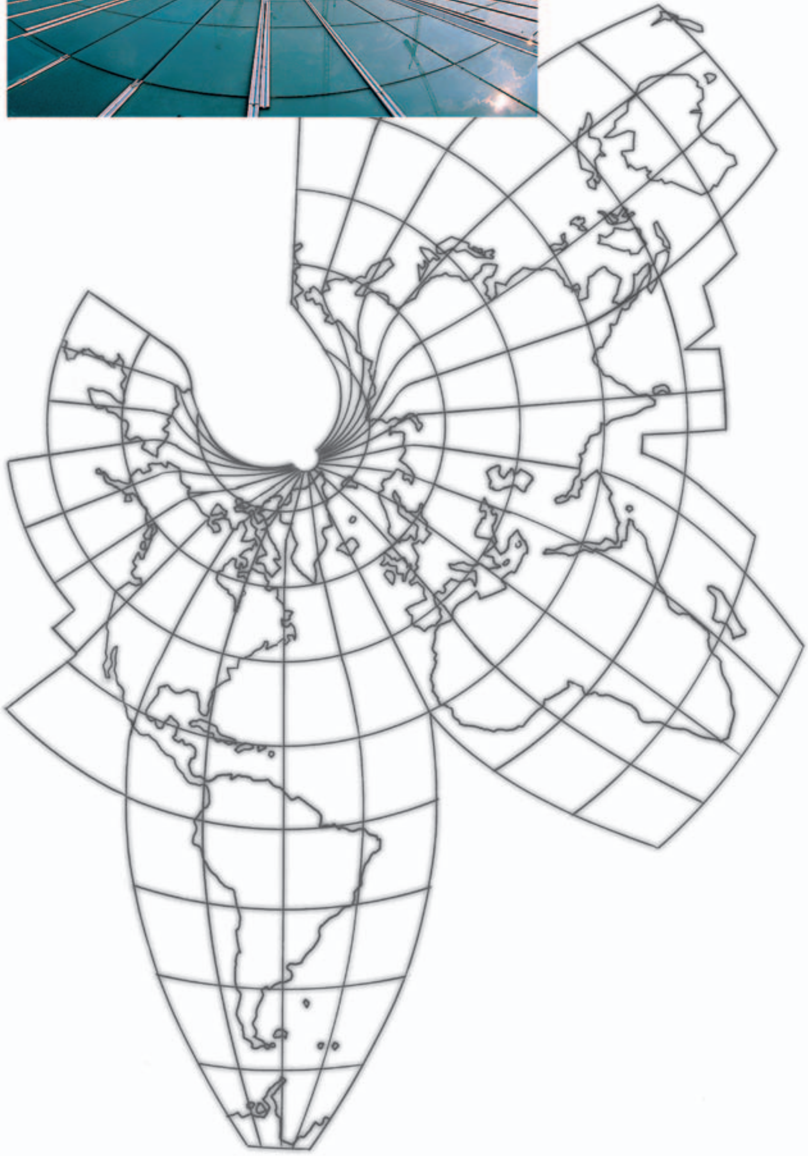
Africa
- ONAFEX, Hilton Hotel, Algeria
- Yaounde University, Cameroon
- Karoua Airport, Cameroon
- Libreville Airport, Gabon
- Ivarto Hospital, CORIF, Madagascar
- Central Bank of Abuja, ADEFEMI, Nigeria
- OCI Dakar, Oger international, CGE, Senegal
- Bamburi cement Ltd, Kenya
- Ivory Electricity Company, Ivory Coast
- Exxon, New Headquarters, Angola

South America/Pacific
- Lamentin Airport, CCIM, Martinique
- Space Centre, Kourou, Guyana
- Mexico City Underground System, Mexico
- Santiago Underground System, Chile
- Cohiba Hotel, Havana, Cuba
- Iberostar Hotel, Bavaro, Dominican Republic
- Aluminio Argentino Saic SA, Argentina
- Michelin Campo Grande, Rio de Janeiro, Brazil
- TIM Data Center, São Paulo, Brazil
- Light Rio de Janeiro, Brazil
- Hospital Oswaldo Cruz, São Paulo, Brazil

Europe
- EDF, France
- Eurotunnel, France
- Nestlé company headquarters, France
- Stade de France, Paris, France
- TLM Terminal , Folkestone, Great Britain
- Zaventem Airport, Belgium
- Krediebank Computer Centre, Belgium
- Bucarest Pumping station, Rumania
- Prague Airport, Czech Republic
- Philipp Morris St Petersburg, Russia
- Kremlin Moscow, Russia
- Madrid airport, Spain
- Dacia Renault, Rumania
- Lafarge cement Cirkovic, Czech Republic
- Caterpillar St Petersburg, Russia
- Ikea Kazan, Russia
- Barajas airport, Spain
- Coca-cola Zurich, Switzerland

61001N





Quality assurance
Quality certified to ISO 9001

A major advantage

Schneider Electric has integrated a functional organisation into each of its units. The main mission of this organisation is to check the quality and the compliance with standards.
This procedure is:

- uniform throughout all departments
- recognised by many customers and approved organisations.

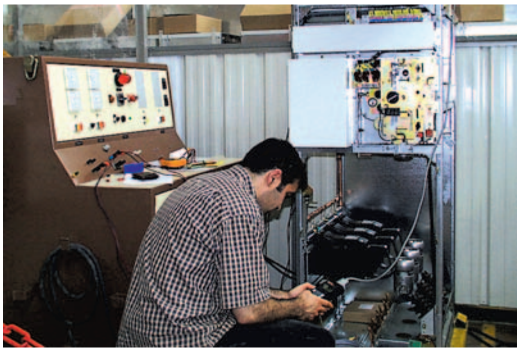
But it is above all its strict application that has enabled recognition to be obtained by an independent organisation:
The **F**rench **Q**uality **A**ssurance **A**ssociation (**FQAA**).

The quality system for the design and manufacture of SM6-24 units has been certified in conformity with the requirements of the ISO 9001: 2000 quality assurance model.

MT55054

MT55055

61002N



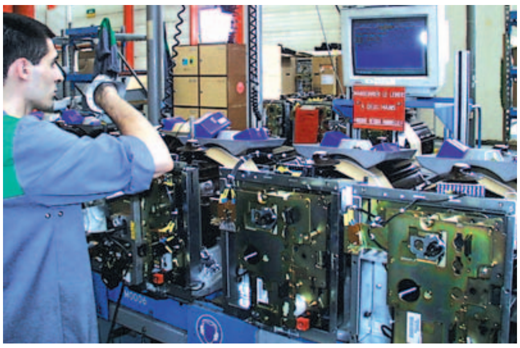
Meticulous and systematic controls

During manufacture, each SM6-24 is subject to systematic routine testing which aims to check the quality and conformity:

- sealing testing
- filling pressure testing
- opening and closing rate testing
- switching torque measurement
- dielectric testing
- conformity with drawings and plans.

The results obtained are written and reported on the test certificate for each device by the quality control department.

61003N



The environmental management system adopted by Schneider Electric production sites that produce the SM6-24 have been assessed and judged to be in conformity with requirements in the ISO 14001 standard.

MT55145

Contents

Field of application

The SM6-24 is made up of modular units containing fixed or withdrawable metal-enclosed SF6 switchgear, using sulphur hexafluoride (SF6) or vacuum:

- switch-disconnector
- SF1, SFset or Evolis circuit breaker
- Rollarc 400 or 400 D contactor
- disconnector.

SM6-24 units are used for the MV section in MV/LV transformer substations in public distribution systems and MV consumer or distribution substations up to 24 kV.

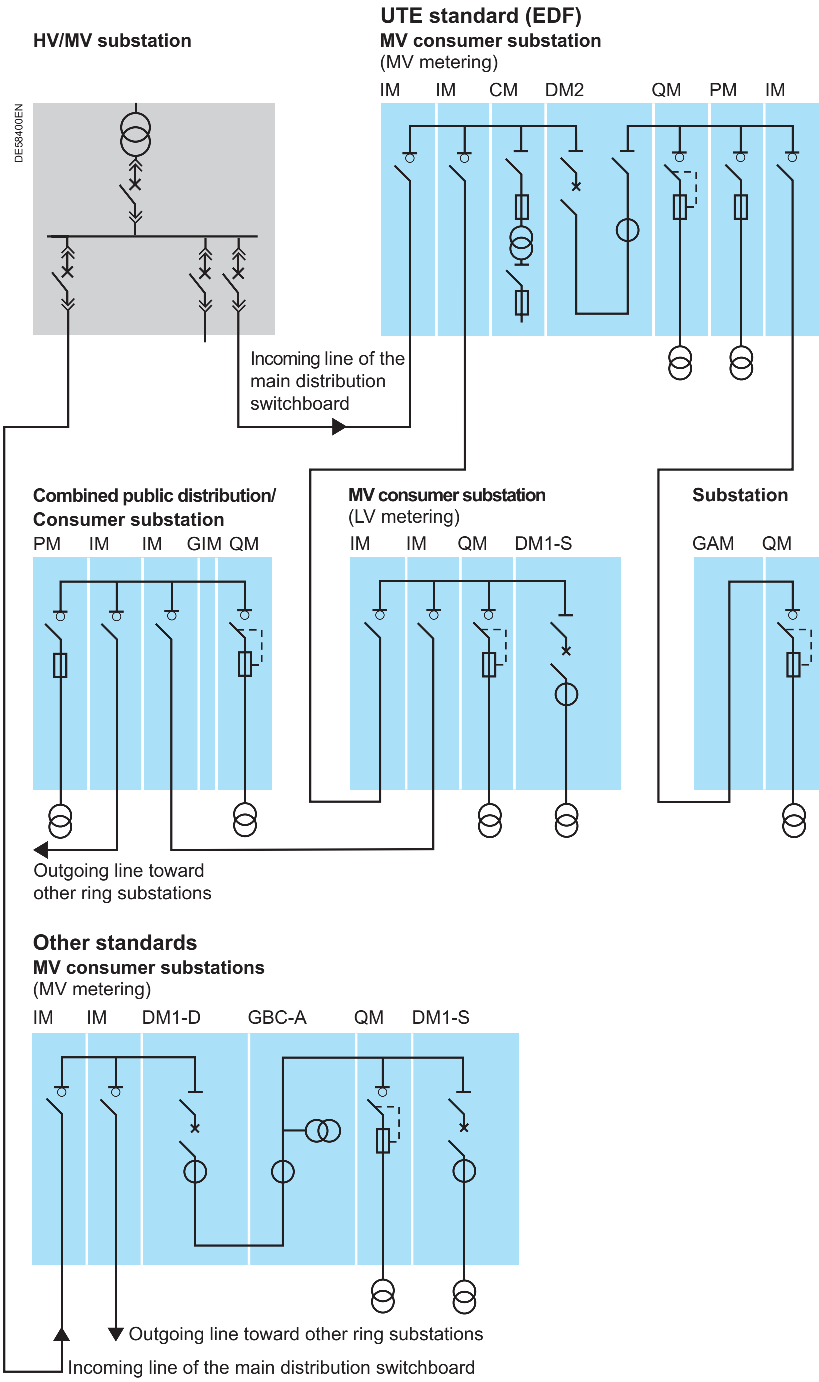
MV/LV transformer substations

MT55148

MT55147

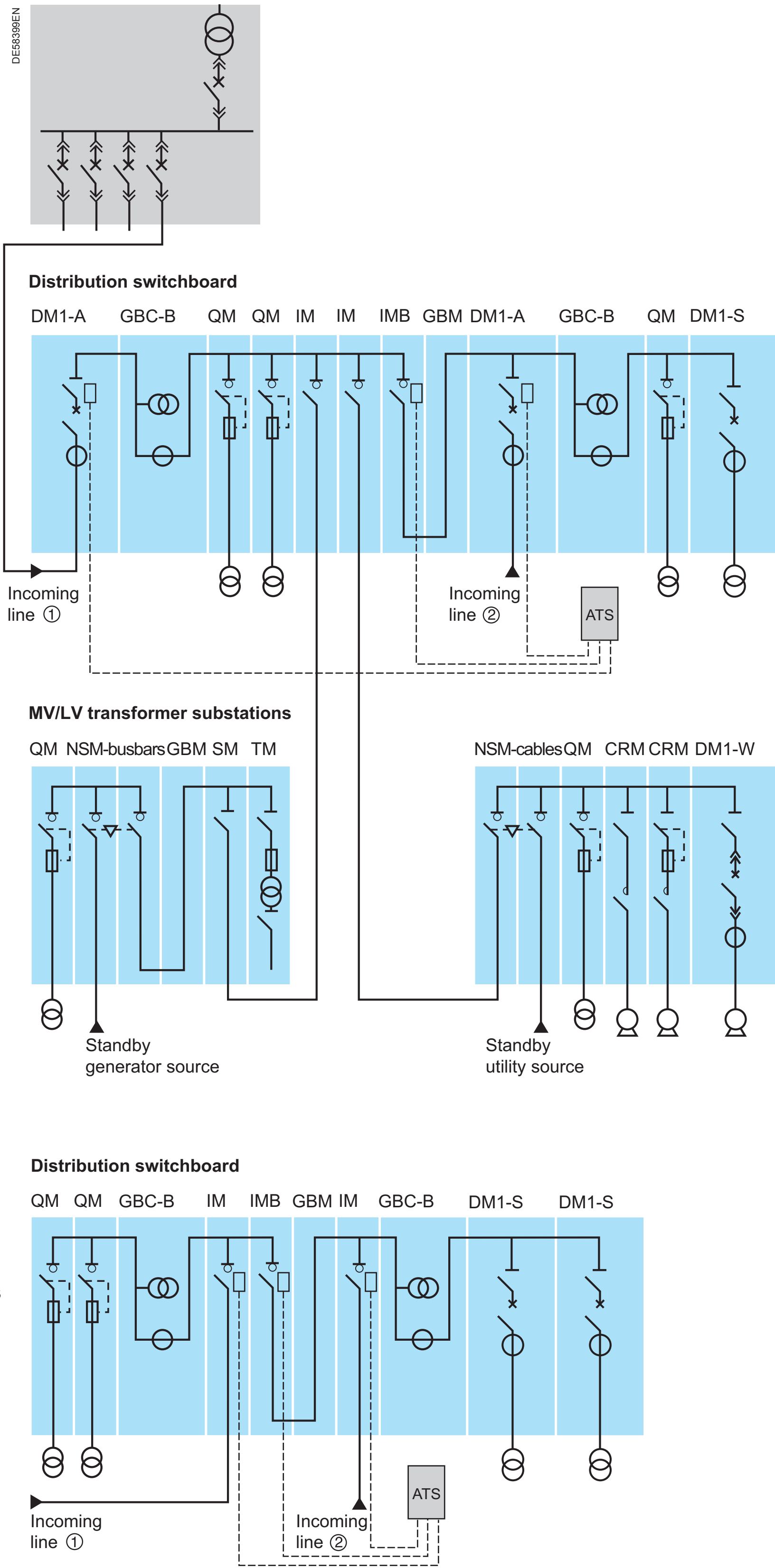
MT55146

DE58400EN



Field of application

Industrial distribution substations



ATS: Automatic Transfer System

Unit definitions

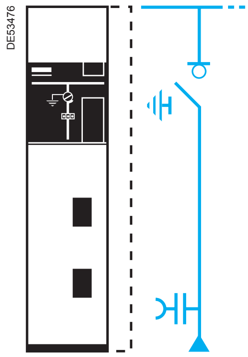
Below is the list of SM6-24 units used in MV/LV transformer substations and industrial distribution substations:

- **IM, IMC, IMB** switch
- **PM** fused switch
- **QM, QMC, QMB** fuse-switch combination
- **CRM** contactor and contactor with fuses
- **DM1-A, DM1-D, DM1-S** single-isolation disconnectable SF6 type circuit breaker
- **DMV-A, DMV-D, DMV-S** single-isolation vacuum type circuit breaker frontal
- **DMVL-A** single-isolation disconnectable vacuum type circuit breaker lateral
- **DM1-W, DM1-Z** withdrawable single-isolation SF6 type circuit breaker
- **DM2** double-isolation disconnectable SF6 type circuit breaker
- **CM, CM2** voltage transformers
- **GBC-A, GBC-B** current and/or voltage measurements
- **NSM-cables** for main incoming and standby
- **NSM-busbars** for main incoming and cables for standby
- **GIM** intermediate bus unit
- **GEM** extension unit
- **GBM** connection unit
- **GAM2, GAM** incoming cable connection unit
- **SM** disconnector
- **TM** MV/LV transformer unit for auxiliaries
- other units, consult us
- special function **EMB** busbar earthing.

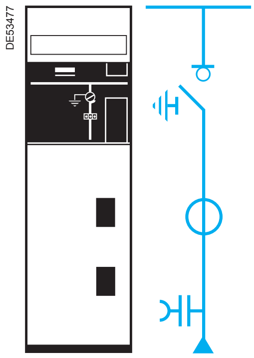
Units for all functions

page

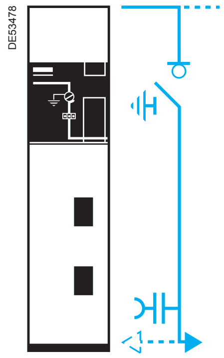
Connection to the networks



Switch unit
IM (375 or 500 mm)



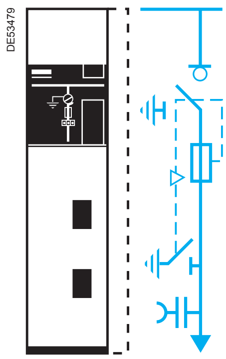
Switch unit
IMC (500 mm)



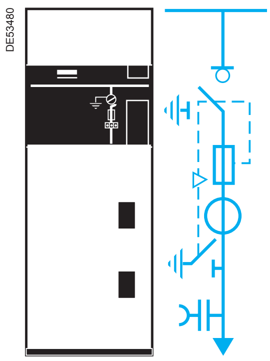
Switch unit
with or without
earthing disconnector
right or left outgoing line
IMB (375 mm)

40

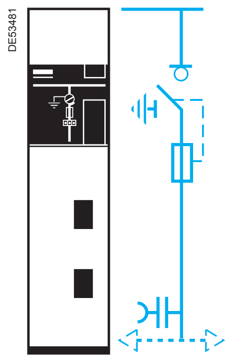
Fuse-switch protection



Fuse-switch
combination unit
QM (375 or 500 mm)

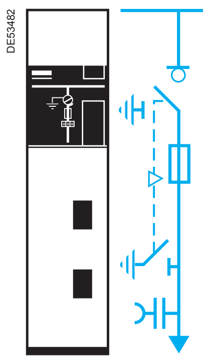


Fuse-switch
combination unit
QMC (625 mm)



Fuse-switch
combination unit
right or left outgoing line
QMB (375 mm)

41



Fuse-switch unit
PM (375 mm)

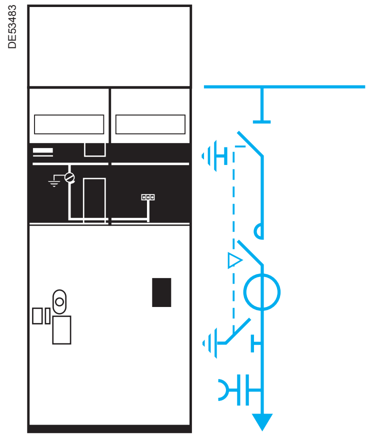
42

Units for all functions

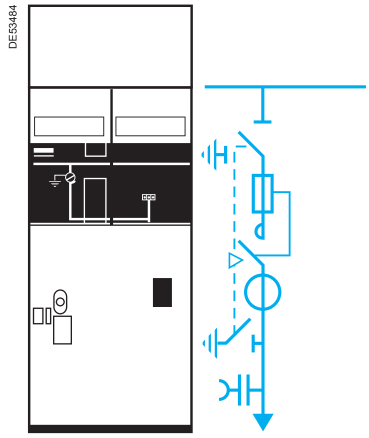
page

Contactor protection

43



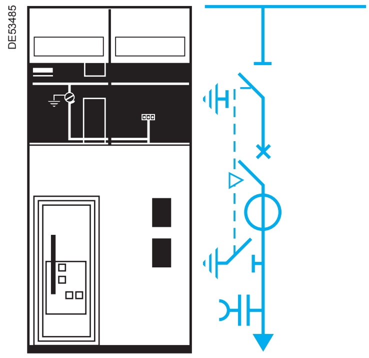
Contactor unit
CRM (750 mm)



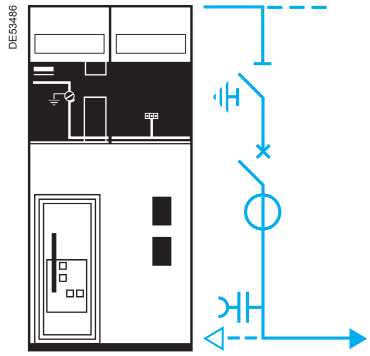
Fused-contactor unit
CRM (750 mm)

SF6 circuit-breaker protection

44

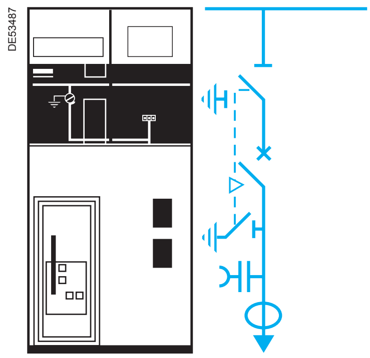


Single-isolation, disconnectable circuit breaker unit
DM1-A (750 mm)

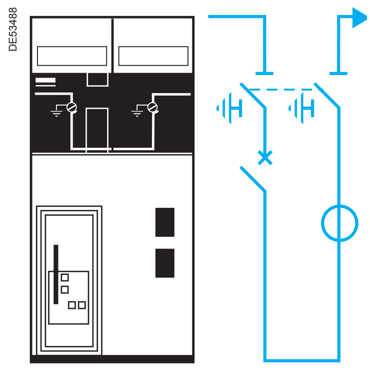


Single-isolation, disconnectable circuit breaker unit right or left outgoing line
DM1-D (750 mm)

45



Single-isolation, disconnectable circuit breaker unit with autonomous protection
DM1-S (750 mm)



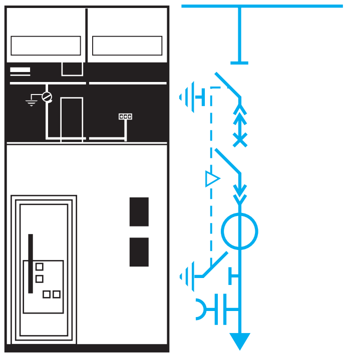
Double-isolation, disconnectable circuit breaker unit right or left outgoing line
DM2 (750 mm)

Units for all functions

page

SF6 circuit-breaker protection

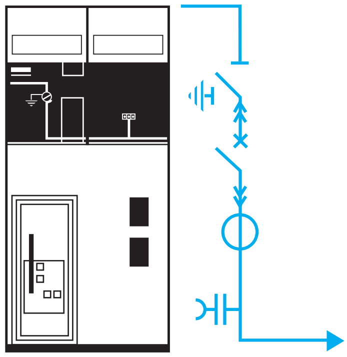
DE53489



46

Withdrawable single-isolation circuit breaker unit
DM1-W (750 mm)

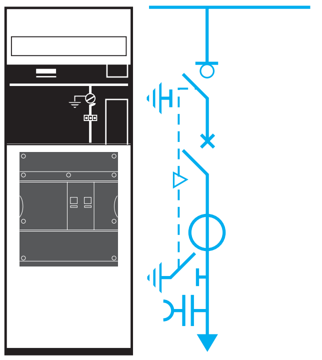
DE53490



Withdrawable single-isolation circuit breaker unit right outgoing line
DM1-Z (750 mm)

Vacuum circuit-breaker protection

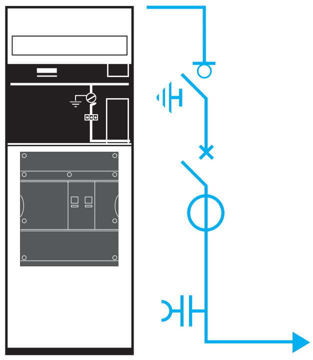
DE53491



47

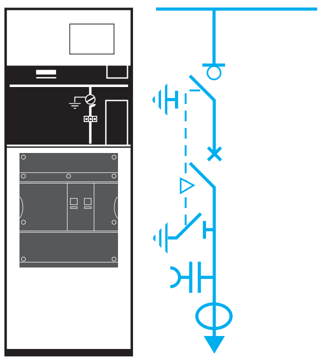
Single-isolation circuit breaker unit
DMV-A (625 mm)

DE53492



Single-isolation circuit breaker unit right outgoing line
DMV-D (625 mm)

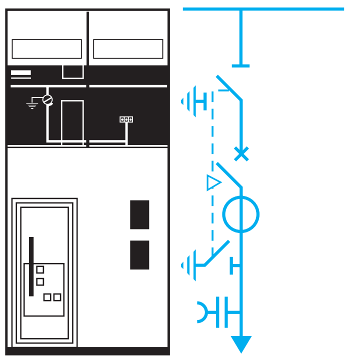
DE53493



47

Single-isolation circuit breaker unit with autonomous protection
DMV-S (625 mm)

DE53485



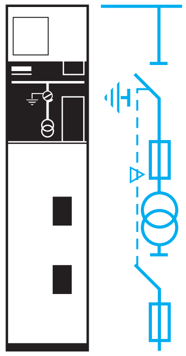
Single-isolation, disconnectable circuit breaker unit
DMVL-A (750 mm)

Units for all functions

page

MV metering

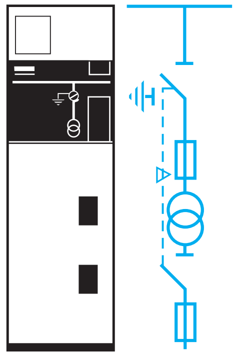
DE53494



48

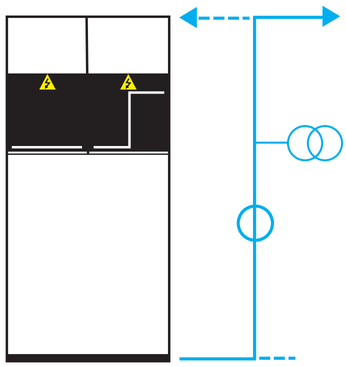
Voltage transformers for mains with earthed neutral system
CM (375 mm)

DE53495



Voltage transformers for mains with insulated neutral system
CM2 (500 mm)

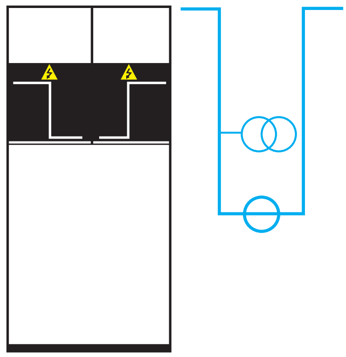
DE53496



49

Current and/or voltage measurement unit right or left outgoing line
GBC-A (750 mm)

DE53497



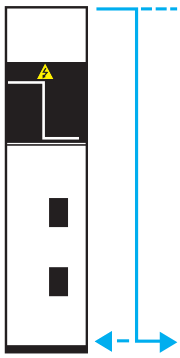
Current and/or voltage measurement unit
GBC-B (750 mm)

Units for all functions

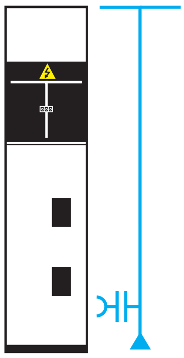
Casings

Intermediate bus unit
GIM (125 mm)

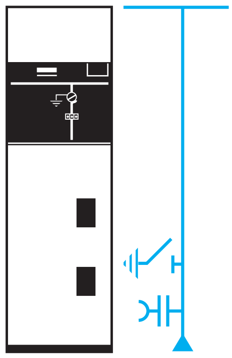
Extension unit
VM6/SM6
GEM (125 mm)



Connection unit
right or left outgoing line
GBM (375 mm)



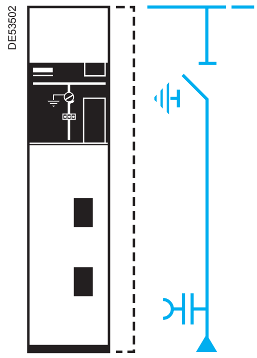
Incoming
cable-connection unit
GAM2 (375 mm)



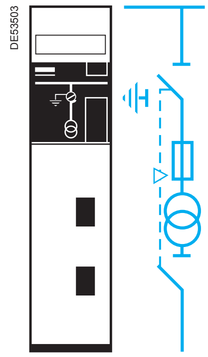
Incoming
cable-connection unit
GAM (500 mm)

Units for all functions

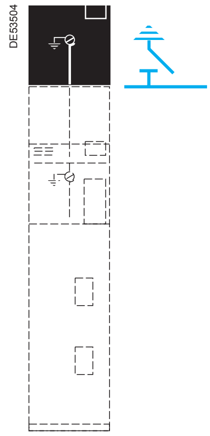
Other functions



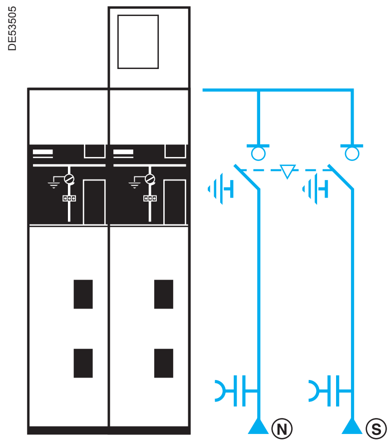
Disconnector unit
SM (375 or 500 mm)



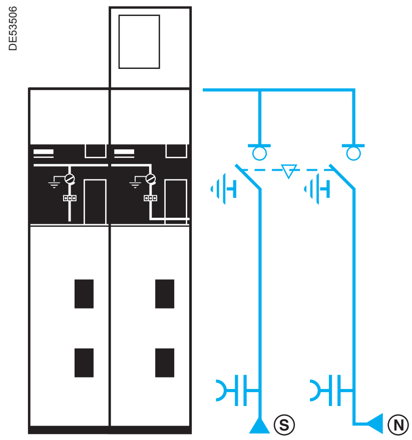
MV/LV transformer unit for auxiliaries
TM (375 mm)



Busbar earthing compartment
EMB (375 mm)



Cables power supply for main incoming line and standby line
NSM-cables (750 mm)



Busbars power supply for main incoming line on right or left and cables for standby line
NSM-busbars (750 mm)

Operating conditions

In addition to its technical characteristics, SM6-24 meets requirements concerning safety of life and property as well as ease of installation, operation and protecting the environment.

PE57152

SM6-24 units are designed for indoor installations.
Their compact dimensions are:
- 375 mm to 750 mm width
- 1600 mm height
- 840 mm depth…

… this makes for easy installation in small rooms or prefabricated substations.
Cables are connected via the front.
All control functions are centralised on a front plate, thus simplifying operation.
The units may be equipped with a number of accessories (relays, toroids, instrument transformers, surge arrester, control and monitoring, etc.).

Standards

SM6-24 units meet all the following recommendations, standards and specifications:

- **IEC recommendations**

60694: Common specifications for high-voltage switchgear and controlgear standards.
62271-200: A.C. metal-enclosed switchgear and controlgear for rated voltage above 1 kV and up to and including 52 kV.
60265-1: High voltage switches for rated voltages above 1 kV and less or equal to 52 kV.
62271-105: High voltage alternating current switch-fuse combinations.
60255: Electrical relays.
62271-100: High-voltage alternating current circuit breakers.
62271-102: High-voltage alternating current disconnectors and earthing switches.

- **UTE standards**

NFC 13.100: Consumer substation installed inside a building and fed by a second category voltage public distribution system.
NFC 13.200: High voltage electrical installations requirements.
NFC 64.130: High voltage switches for rated voltage above 1 kV and less than 52 kV.
NFC 64.160: Alternating current disconnectors and earthing switches.

- **EDF specifications**

HN 64-S-41: A.C. metal-enclosed swichgear and controlgear for rated voltages above 1 kV and up to and including 24 kV.
HN 64-S-43: Electrical independent-operating mechanism for switch 24 kV - 400 A.

Designation

SM6-24 units are identified by a code including:
- **an indication of the function, i.e. the electrical diagram code: IM, QM, DM1, CM, DM2, etc.**
- the rated current (Ir): 400 - 630 - 1250 A
- the rated voltage (Ur): 7.2 - 12 - 17.5 - 24 kV
- the maximum short-time withstand current values (Ik): 12.5 - 16 - 20 - 25 kA, time duration (tk) 1 s
- Internal arc classification IAC: **A-FLR**,16 kA 1 s

A: Authorized personal
F: Frontal
L: Lateral
R: Rear
Value of internal arc: 16 kA
Time duration : 1 s
- the colour is of RAL 9002 type (frosted satin white).

Example for a unit designated: **IM 400 - 24 - 12.5**
- IM indicates an “incoming” or “outgoing” unit
- 400 indicates the rated current is 400 A
- 24 indicates the rated voltage is 24 kV
- 12.5 indicates the short-time withstand current is 12.5 kA 1 s.

Main characteristics

The hereunder values are for working temperatures from -5°C up to +40°C and for a setting up at an altitude below 1000 m.

PE57150

Internal arc withstand:
- standard: 12.5 kA 1 s, IAC: A-FL
- enhanced: 16 kA 1 s, IAC: A-FLR & IAC: A-FL

in accordance with IEC 62271-200.

Protection index:
- classes: PI (insulating partition)
- loss of service continuity classes: LSC2A
- units: IP3X
- between compartments: IP2X
- Cubicle: IK08

Electro-magnetic compatibility:
- relays: 4 kV withstand capacity, as per recommendation IEC 60801.4
- compartments:
  - □ electrical field:
    - 40 dB attenuation at 100 MHz
    - 20 dB attenuation at 200 MHz
  - □ magnetic field: 20 dB attenuation below 30 MHz.

Temperatures:
The cubicles must be stored and installed in a dry area free from dust and with limited temperature variations.
- for stocking: from – 40°C to +70°C,
- for working: from – 5°C to +40°C,
- other temperatures, consult us.

General characteristics

Rated voltage	**Ur**	kV		7.2	12	17.5	24
Insulation level							
Insulation	**Ud**	50/60 Hz, 1 min (kV rms)		20	28	38	50
Isolation	**Ud**	50/60 Hz, 1 min (kV rms)		23	32	45	60
Insulation	**Up**	1.2/50 µs (kV peak)		60	75 (1)	95	125
Isolation	**Up**	1.2/50 µs (kV peak)		70	85	110	145
Breaking capacity							
Transformer off load		A		16			
Cables off load		A		31,5			
Rated current	**Ir**	A		400 - 630 -1250			
Short-time withstand current	**Ik/tk**	(kA/1 s)	25	630 - 1250			
			20	630 - 1250			
			16	630 - 1250			
			12.5	400 - 630 - 1250			
Making capacity	**Ima**	(kA)	62.5	630		NA	
			50	630			
			40	630			
			31.25	400 - 630			

(1) 60 kV peak for the CRM unit. NA: Non Available

Maximum breaking capacity (Isc)

Rated voltage	**Ur**	kV	7.2	12	17.5	24
Units						
IM, IMC, IMB, NSM-cables, NSM-busbars		A	630 - 800 (1)			
PM, QM, QMC, QMB		kA	25		20	
CRM		kA	10	8	NA	
CRM with fuses		kA	25		NA	
SF6 circuit breaker range						
DM1-A, DM1-D, DM1-W, DM1-Z, DM1-S, DM2		kA	25		20	
Vacuum circuit breaker range						
DMV-A, DMV-D, DMV-S		kA	25		20	NA
DMVL-A		kA	20			

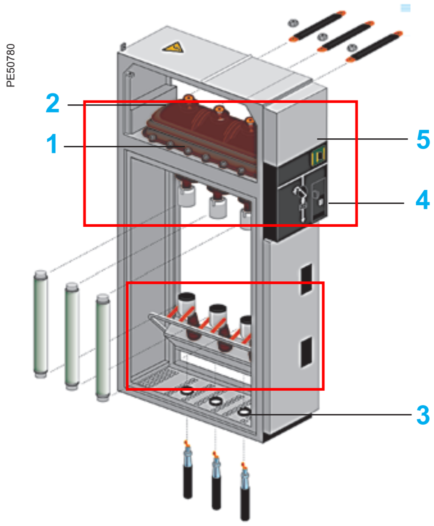
(1) In 800 A, consult us. NA: Non Available

Endurance

Units		**Mechanical endurance**	**Electrical endurance**
IM, IMC, IMB, PM, QM (1), QMC (1), QMB (1), NSM-cables, NSM-busbars		IEC 60265 1 000 operations class M1	IEC 60265 100 breaks at Ir, p.f. = 0.7, class E3
CRM	Disconnector	IEC 62271-102 1 000 operations	
	Rollarc 400	IEC 62470 300 000 operations	IEC 62470 100 000 breaks at 320 A 300 000 breaks at 250 A
	Rollarc 400D	100 000 operations	100 000 breaks at 200 A
SF6 circuit breaker range			
DM1-A, DM1-D, DM1-W, DM1-Z, DM1-S, DM2	Disconnector	IEC 62271-102 1 000 operations	
	SF circuit breaker	IEC 62271-100 10 000 operations class M2	IEC 62271-100 40 breaks at 12.5 kA 25 breaks at 25 kA 10 000 breaks at Ir, p.f. = 0.7, class E2
Vacuum circuit breaker range			
DMV-A DMV-D DMV-S	Switch	IEC 60265 1 000 operations class M1	IEC 60265 100 breaks at Ir, p.f. = 0.7, class E3
	Evolis circuit breaker	IEC 62271-100 10 000 operations class M2	IEC 62271-100 10 000 breaks at Ir, p.f. = 0.7, class E2
DMVL-A	Disconnector	IEC 62271-102	
	Evolis circuit breaker	IEC 62271-100 10 000 operations class M2	IEC 62271-100 10 000 breaks at Ir, p.f. = 0.7, class E2

(1) As per recommendation IEC 62271-105, three breakings at p.f. = 0.2
■ 1730 A under 12 kV ■ 1400 A under 24 kV ■ 2600 A under 5.5 kV.

Factory-built cubicles description



Switch and fuse protection cubicles

Cubicles are made up of five compartments separated by metal or insulating partitions.

1 **switchgear**: switch-disconnector and earthing switch in an enclosure filled with SF6 and satisfying “sealed pressure system” requirements.

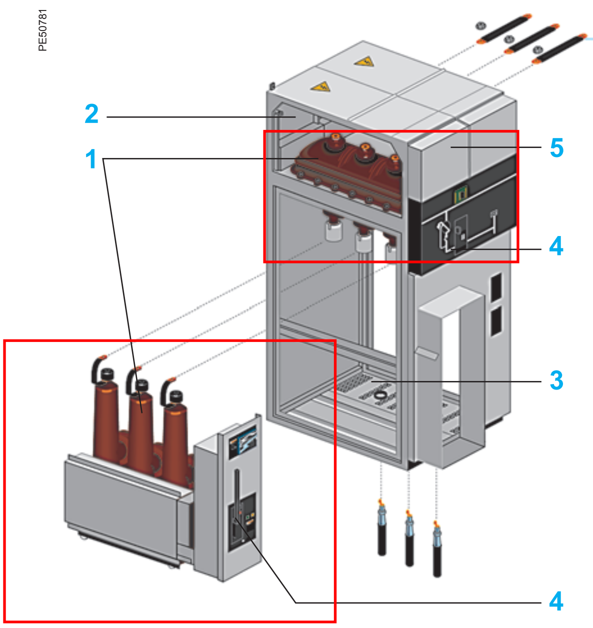
2 **busbars**: all in the same horizontal plane, thus enabling later switchboard extensions and connection to existing equipment.

3 **connection**: accessible through front, connection to the lower switch-disconnector and earthing switch terminals (IM cubicles) or the lower fuse-holders (PM and QM cubicles). This compartment is also equipped with an earthing switch downstream from the MV fuses for the protection units.

4 **operating mechanism**: contains the elements used to operate the switch-disconnector and earthing switch and actuate the corresponding indications (positive break).

5 **low voltage**: installation of a terminal block (if motor option installed), LV fuses and compact relay devices.
If more space is required, an additional enclosure may be added on top of the cubicle.

Options: please, refer to the chapter “Characteristics of the functional units”.



SF6 circuit breaker cubicles

1 **switchgear**: disconnector(s) and earthing switch(es), in enclosures filled with SF6 and satisfying “sealed pressure system” requirements.

2 **busbars**: all in the same horizontal plane, thus enabling later switchboard extensions and connection to existing equipment.

3 **connection and switchgear**: accessible through front, connection to the downstream terminals of the circuit breaker.
Two circuit breaker offers are possible:
■ SF1: combined with an electronic relay and standard sensors (with or without an auxiliary power supply
■ SFset: autonomous set equipped with an electronic protection system and special sensors (requiring no auxiliary power supply).

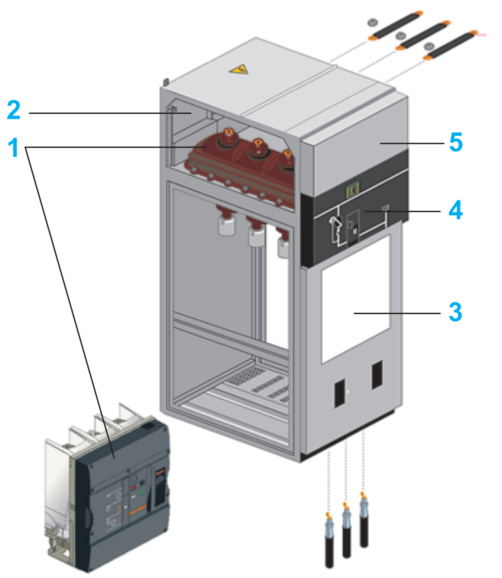
4 **operating mechanism**: contains the elements used to operate the disconnector(s), the circuit breaker and the earthing switch and actuate the corresponding indications.

5 **low voltage**: installation of compact relay devices (Statimax) and test terminal boxes. If more space is required, an additional enclosure may be added on top of the cubicle.

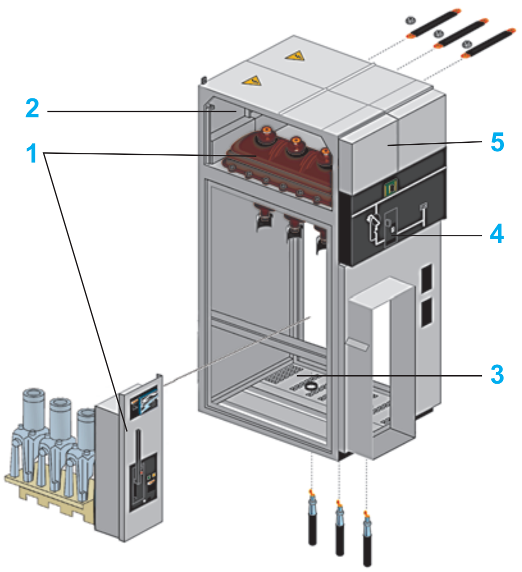
Options: please, refer to the chapter “Characteristics of the functional units”.

Factory-built cubicles description

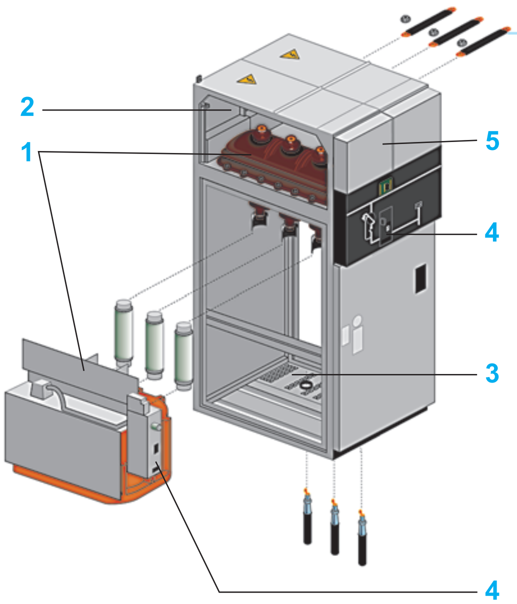
PE50782



PE50783



PE50784



Frontal vacuum type circuit breaker cubicles

1 switchgear: load break switch and earthing switch(es), in enclosure filled with SF6 and satisfying and one vacuum circuit breaker, "sealed pressure system" requirements.

2 busbars: all in the same horizontal plane, thus enabling later switchboard extensions and connection to existing equipment.

3 connection and switchgear: accessible through front, connection to the downstream terminals of the circuit breaker.
- Evolis: device associated with an electronic relay and standard sensors (with or without auxiliary source).

4 operating mechanism: contains the elements used to operate the disconnector(s), the circuit breaker and the earthing switch and actuate the corresponding indications.

5 low voltage: installation of compact relay devices (VIP) and test terminal boxes. If more space is required, an additional enclosure may be added on top of the cubicle.

Options: please, refer to the chapter "Characteristics of the functional units".

Lateral vacuum type circuit breaker cubicles

1 switchgear: disconnector(s) and earthing switch(es), in enclosure filled with SF6 and satisfying and one vacuum circuit breaker, "sealed pressure system" requirements.

2 busbars: all in the same horizontal plane, thus enabling later switchboard extensions and connection to existing equipment.

3 connection and switchgear: accessible through front, connection to the downstream terminals of the circuit breaker.
- Evolis: device associated with an electronic relay and standard sensors (with or without auxiliary source).

4 operating mechanism: contains the elements used to operate the disconnector(s), the circuit breaker and the earthing switch and actuate the corresponding indications.

5 low voltage: installation of compact relay devices (VIP) and test terminal boxes. If more space is required, an additional enclosure may be added on top of the cubicle.

Options: please, refer to the chapter "Characteristics of the functional units".

Contactor cubicles

1 switchgear: disconnector and earthing switch and contactor in enclosures filled with SF6 and satisfying "sealed pressure system" requirements.

2 busbars: all in the same horizontal plane, thus enabling later switchboard extensions and connection to existing equipment.

3 connection and switchgear: accessible through front.
This compartment is also equipped with an earthing switch downstream.
The Rollarc contactor may be equipped with fuses.
Two types may be used:
- R400 with magnetic holding
- R400D with mechanical latching.

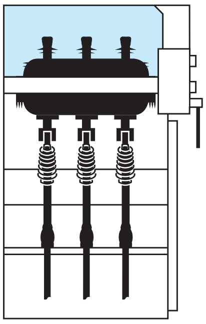
4 operating mechanism: contains the elements used to operate the disconnector(s), the contactor 400 or 400D and the earthing switch and actuate the corresponding indications.

5 low voltage: installation of compact relay devices and test terminal boxes. With basic equipment, an additional enclosure is added on top of the cubicle.

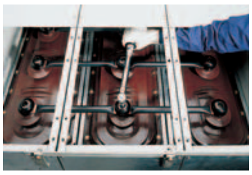
Options: please, refer to the chapter "Characteristics of the functional units".

Compartments description

DE53507



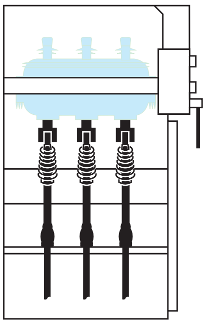
61007N



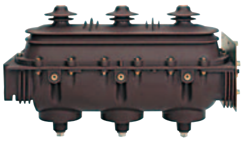
Busbar compartment

The three insulated busbars are parallel-mounted. Connection is made to the upper pads of the enclosure using a field distributor with integrated captive screws.
Ratings 400 - 630 - 1250 A.

DE53508



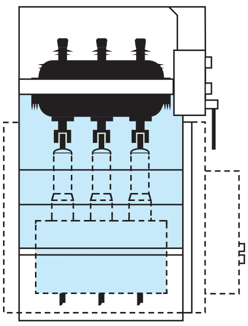
61006N



Switch compartment

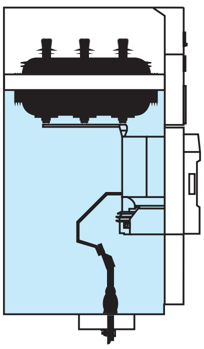
This compartment is separated from the busbar compartment and the connection compartment by the enclosure surrounding the switch, the disconnector and the earthing switch.

DE53509



SF6 and vacuum lateral type circuit breaker

DE53510



Frontal vacuum type circuit breaker

Connection and switch compartment

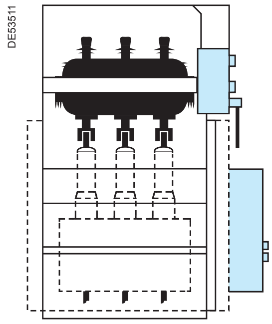
The network cables are connected:
- to the terminals of the switch
- to the lower fuse holders
- or to the connection pads of the circuit breaker.

Cables may have either:
- cold fitted cable end for dry-type

With basic equipment, the maximum allowable cross-section for cable is:
- 630 mm^2 or 2 x 400 mm^2 for 1250 A incoming or outgoing units
- 240 mm^2 or 2 x 240 mm^2 for incoming or outgoing units 400 - 630 A
- 95 mm^2 for transformer protection cubicles incorporating fuses.

See in fonctional units characteristics chapter for each unit allowable section.
The earthing switch must be closed before the cubicle may be accessed.
The reduced depth of the cubicle makes for easy connection of all phases.
A stud incorporated in the field distributor makes it possible to position and secure the cable-end lug with a single hand.

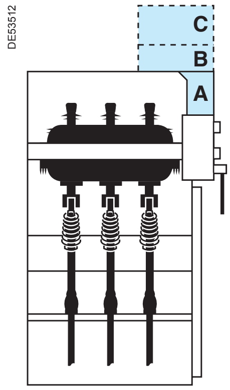
Compartments description



Operating-mechanism cover

These covers contain the various operating functions for the:
- switch and earthing switch
- disconnector(s)
- circuit breaker
- contactor

and the voltage presence indicator.
The operating-mechanism cover may be accessed with the cables and busbars energised and without isolating the substation.
It also enables easy installation of padlocks, locks and standard LV accessories (auxiliary contacts, trip units, motors, etc.).



Low-voltage monitoring control cabinet

It enables the cubicle to be equipped with low voltage switchgear providing protection, control, status indication and data transmission.
According to the volume, it is available in 3 versions: cover, wiring duct and cabinet.

A - LV cover: enables a very simple low voltage section to be installed such as indication buttons, push buttons or Statimax relays.
The total height of the cubicle is then 1600 mm.

B - LV wiring duct and cabinet: enables a large majority of low voltage configurations to be installed. It also takes the Sepam series 20 or series 40.
The total cubicle height is then 1690 mm.

C - LV control cabinet: this is only used for larger low voltage accessories or those with a depth greater than 100 mm or complex equipment, such as Sepam series 80, converters, changeover and telecontrol units, regulating transformers or dual secondary transformers.
The total height of the cubicle then becomes 2050 mm.

In all cases, these volumes are accessible, with cables and busbars energised, without de-energising the substation.

A - LV cover h = 1600 mm **B** - LV wiring duct h = 1690 mm **C** - LV control cabinet h = 2050 mm

Safety of people
By switchgear

61010N

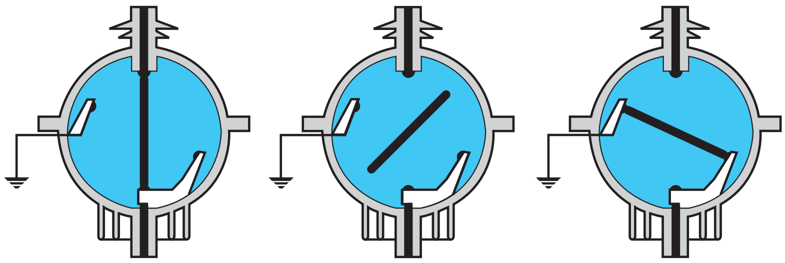
Switch-disconnector

Switch or disconnector and earthing switch

■ **Gas tightness**
The three rotating contacts are placed in an enclosure filled with gas to a relative pressure of 0.4 bar (400 hPa). It satisfies "sealed pressure system" requirements and seal tightness is always factory checked, and leakage rate is less than 0.1% for 30 years life span.

■ **Operating safety**
□ the switch may be in one of three positions: "closed", "open", or "earthed", representing a natural interlocking system that prevents incorrect operation. Moving-contact rotation is driven by a fast-acting mechanism that is independent of the action of the operator.
□ the device combines the breaking and disconnection functions.
□ the earthing switch placed in the SF6 has a short-circuit making capacity, in compliance with standards.
□ any accidental over-pressures are eliminated by the opening of the safety membrane, in which case the gas is directed toward the back of the unit, away from the operator.

MT20184



Closed position *Open position* *Earth position*

■ **Insensitivity to the environment**
□ parts are designed in order to obtain optimum electrical field distribution.
□ the metallic structure of cubicles is designed to withstand and aggressive environment and to make it impossible to access any energised part when in operation.

61011N

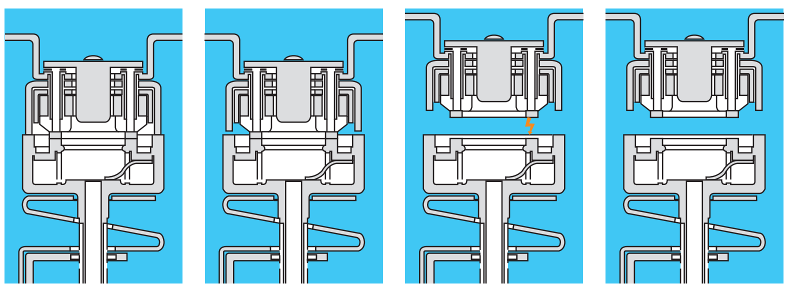
Rollarc contactor

Rollarc 400 and 400D contactor

■ **Gas tightness**
The three phases are placed in an enclosure filled with SF6 gas to a relative pressure of 2.5 bars (2500 hPa). It satisfies "sealed pressure system" requirements and seal tightness is always checked in the factory.

■ **Operating safety**
Accidental over-pressures are eliminated by the opening of the safety membrane.

DE53513



Contacts closed *Main contacts separated* *Arcing period* *Contacts open*

Safety of people

By switchgear

61012N

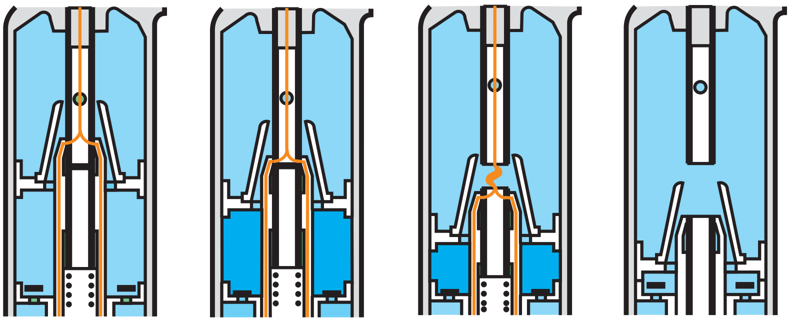
SF1 circuit breaker

SF6 circuit breaker: SF1 or SFset

■ **Gas tightness**
The SF1 or SFset circuit breaker is made up of three separate poles mounted on a structure supporting the operating mechanism. Each pole-unit houses all the active elements in an insulating enclosure filled with gas to a relative pressure of 0.5 bar (500 hPa). It satisfies “sealed pressure system” requirements and seal tightness is always checked in the factory.

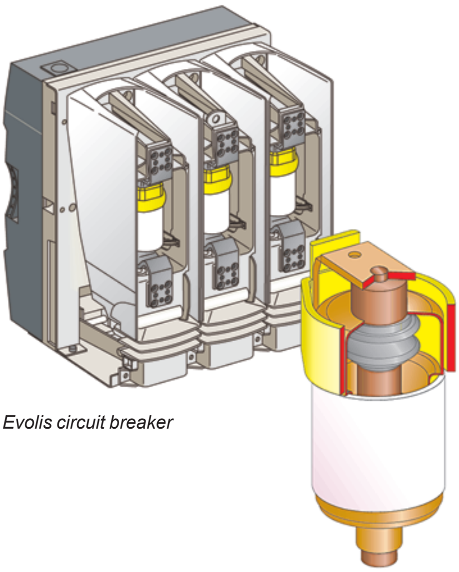
■ **Operating safety**
As for switch-units, accidental over-pressures are eliminated by the opening of the safety membrane.

DE53514



Contacts closed *Precompression* *Arcing period* *Contacts open*

61058N



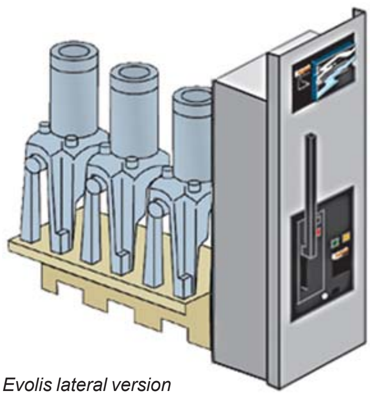
Evolis circuit breaker

Vacuum type circuit breaker: Evolis

■ **Gas tightness**
The Evolis circuit breaker comprises three separate pole units fixed on a structure supporting the control mechanism. Each pole encloses all of the active parts in an insulating enclosure, under vacuum, and its gas tightness is systematically checked in the factory.

■ **Operating safety**
The magnetic field is applied along the contact axis of the vacuum type circuit breaker.
This process diffuses the arc in a regular manner with high currents.
It ensures optimum distribution of the energy along the compact surface so as to avoid local hot spots.
The advantages of this technique:
□ a simplified vacuum type circuit breaker which is consequently very reliable,
□ low dissipation of arcing energy in the circuit breaker,
□ highly efficient contacts which do not distort during repeated breaking,
□ significant reduction in control energy.

PE50798



Evolis lateral version

Safety of people

By operating mechanism safety

61013N

PE50796

Visibility of main contacts (option)

PE57166

PE56823

Reliable operating mechanism

■ **Switchgear status indicator:**
Fitted directly to the drive shaft, these give a definite indication of the contact's position. (appendix A of standard IEC 62271-102).
■ **Operating lever:**
This is designed with an anti-reflex device that stops any attempt to re-open the device immediately after closing the switch or the earthing disconnector.
■ **Locking device:**
Between one and three padlocks enable the following to be locked:
□ access to the switching shaft of the switch or the circuit breaker,
□ access to the switching shaft of the earthing disconnector,
□ operating of the opening release push-button.

Simple and effortless switching

Mechanical and electrical controls are side by side on the front fascia, on a panel including the schematic diagram indicating the device's status (closed, open, earthed):
■ **Closed:** the drive shaft is operated via a quick acting mechanism, independent of the operator. No energy is stored in the switch, apart from when switching operations are taking place.
For combined switch fuses, the opening mechanism is armed at the same time as the contacts are closed.
■ **Opening:** the switch is opened using the same quick acting mechanism, operated in the opposite direction.
For circuit breakers and the combined switch fuses, opening is controlled by:
□ a push-button,
□ a fault.
■ **Earthing**: a specific control shaft enables the opening or closing of the earthing contacts. Access to this shaft is blocked by a cover that can be slid back if the switch is open but which remains locked in place if it is closed.

Visibility of main contacts (option)

The position of main contacts is clearly visible from the front of the cubicle through the window.

Gas pressure indicator (option)

Despite SM6 switch is sealed pressure system and has open and close capacity on rated current at 0 bar relative pressure SF6, to insure you about the internal pressure, we propose on request before sale or on site by after-sales either a pressure switch or an analog manometer on the switch.
These devices are both fitted without any alteration on the switch, they are temperature compensated and compatible with visibility of main contacts if requested.

Voltage presence indicator

This device has integrated VPIS (Voltage Presence Indicating System) type lights, in conformity with IEC standard 61958, enabling the presence (or absence) of voltage to be checked on the cables.

Safety of people
By internal arc protection

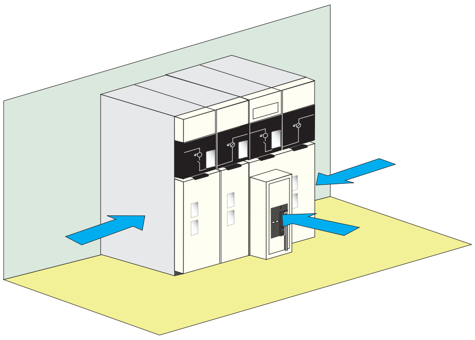
Standard IEC 62271-200 appendix A indicates a method for testing switchgear in metal enclosures under internal arc conditions. The aim of this test is to show that an operator situated in front of a switchboard would be protected against the effects of an internal fault.

To enhance the safety of people, it is desirable to provide as high a degree of protection as possible by evacuating the effects of internal arc using:
■ evacuation systems which direct gases towards the top or the bottom of the switchboard enabling over pressure to be limited in the case of an internal fault in the compartments
■ channelling and evacuating hot gases towards an external area, which is not hazardous for the operator
■ materials which are non-inflammable in the cubicles
■ reinforced panels.

Consequently:

The SM6-24 is designed to offer a good level of safety
■ **Control of the architecture:**
□ compartment type enclosure.
■ **Technological control:**
□ electrotechnical: modelling of electrical fields,
□ mechanical: parts produced using CAD systems.
■ **Use of reliable components:**
□ choice of materials,
□ earthing switch with closing capacity.
■ **Devices for total operating safety:**
□ voltage presence indicator on the front face,
□ natural reliable interlocking,
□ locking using keys or padlocks.

DE55553

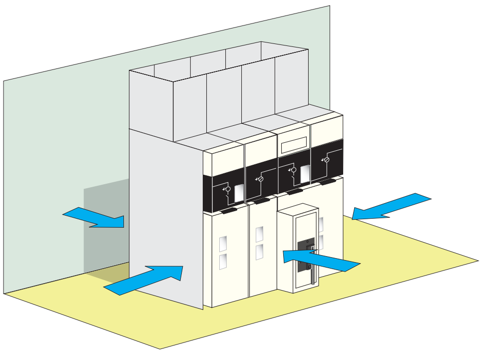


Installation of an SM6-24 switchboard installed against the wall downwards exhaust 12.5 kA 1 s and 16 kA 1 s: 3-sides internal arc protection

Internal arc withstand of the cubicles

■ **2 versions are available:**
□ basic version: 12.5 kA 1 s, IAC: A-FL
□ enhanced internal arc withstand: 16 kA 1 s, IAC: A-FL or IAC: A-FLR.

DE53515

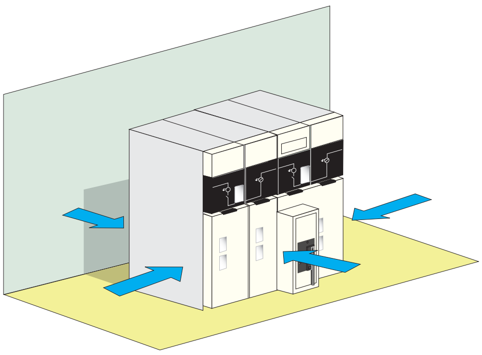


Installation of an SM6-24 switchboard installed in the middle of a room upwards exhaust 16 kA 1 s: 4-sides internal arc protection

SM6-24 internal arc (in conformity with IEC 62271-200 appendix A)

In its internal arc version, the SM6-24 has successfully passed all of the type testing relative to standard IEC 62271-200 (5 acceptance criteria).
The materials used meet the constraints for which the SM6-24 is designed.
The thermal and mechanical forces that an internal arc can produce are perfectly absorbed by the enclosure.
An operator situated in the front of the SM6-24 switchboard during an internal fault will not be exposed to the effects of arcing.

DE53516



Installation of an SM6-24 switchboard installed in the middle of a room downwards exhaust 16 kA 1 s: 4-sides internal arc protection

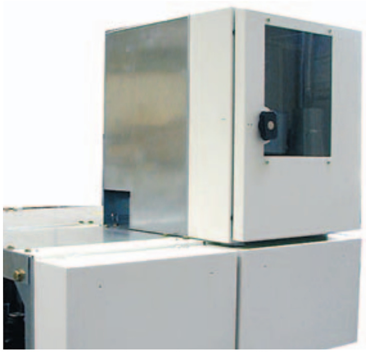
SM6-24 proposes several options to install an internal arc enhanced switchboard

■ **3-sides internal arc protection IAC: A-FL**, 12,5 kA 1 s, 16 kA 1 s
SM6-24 switchboard positioned against the wall, access to the rear of the cubicles is impossible, internal arc protection on three sides is sufficient.
■ **4-sides internal arc protection IAC: A-FLR**, 16 kA 1 s
For SM6-24 switchboards installed in the middle of a room, 4-sides internal arc protection is necessary in order to protect an operator moving around the switchboard.

Choice of exhaust

The choice depends on the civil engineering:
■ **Upwards exhaust:**
A ceiling height greater or equal than 2 800 mm is necessary.
■ **Downwards exhaust:**
Civil engineering with an adequate volume is necessary.

MV electrical network management



Easergy T200 S: remote control interface in LV control cabinet

Easergy T200 S is a simplified MV substation control unit for secondary distribution networks enabling remote control of one or two MV substation switches.
T200 S, a version of the T200 I unit, is integrated in the SM6-24 cubicle LV control cabinet.
It is limited to control 2 switches. It is intended for remote control applications for source transfer switching and back up generator set switching in NSM cubicle.

Easergy T200 S a multifunctional "plug and play" interface which integrates all functions required for remote monitoring and control of MV substations:
- acquisition of various data types: switch position, fault detectors, current values, etc.
- transmission of opening and closing orders to the switches
- exchange with the control center.

Particularly used during network incidents, Easergy T200 S has proven its reliability and availability to be able to operate the switchgear at all times. It is easy to implement and operate.

Functional unit dedicated to Medium Voltage applications

Easergy T200 S is installed in the low voltage control cabinet of IM and NSM cubicles for remote control of one or two switches.
Easergy notably enables source transfer switching between two switches.
It has a simple panel for local operation to manage electrical controls (local/remote switch) and to display switchgear status information.
It integrates a fault current detector (overcurrent and zero sequence current) with detection thresholds configurable channel by channel (threshold and fault duration).

"Plug and play" and secure

Integrated in the low voltage control cabinet of an MV-equipped cubicle, it is ready to connect to the data transmission system.
Easergy T200 S has been subject to severe tests on its resistance to MV electrical constraints. A back-up power supply guarantees several hours continuity of service for the electronic devices, motorization and MV switchgear.
Current transformers are of split core type for easier installation.

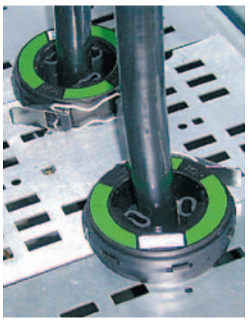
Compatible with all SCADA remote control systems

Easergy T200 S supplies the following standard protocols:
Modbus, DPN3.0 level 2 and IEC 870-5-101.
Data transmission system standards are: RS232, RS485, PSTN, FSK.
Other systems are available on request, the radio frequency emitter/receiver is not supplied.

Control command

Local information

Power unit



Split core CTs

Back up power supply

MV electrical network management (cont.)

PE56311

Easergy T200 I: an interface designed for telecontrol of MV networks

Easergy T200 I is a “plug and play” or multifunction interface that integrates all the functional units necessary for remote supervision and control of the SM6-24:

■ acquisition of the different types of information: switch position, fault detectors, current values...

■ transmission of switch open/close orders

■ exchanges with the control center.

Required particularly during outages in the network, Easergy T200 I is of proven reliability and availability, being able to ensure switchgear operation at any moment. It is simple to set up and to operate.

PE56421

Local information and control

PE56422

Monitoring and control

Functional unit designed for the Medium Voltage network

■ Easergy T200 I is designed to be connected directly to the MV switchgear, without requiring a special converter.

■ It has a simple front plate for local operation, which allows management of electrical rating mechanisms (local/remote switch) and display of information concerning switchgear status.

■ It has an integrated MV network fault current detection system (overcurrent and zero sequence) with detection set points that can be configured channel by channel (current value and fault current duration).

PE56423

Back up power supply

PE56824

Polarized connectors

Medium Voltage switchgear operating guarantee

■ Easergy T200 I has undergone severe MV electrical stress withstand tests.

■ It is a backed up power supply which guarantees continuity of service for several hours in case of loss of the auxiliary source, and supplies power to the Easergy T200 I and the MV switchgear motor mechanisms.

■ **Ready to plug**

□ Easergy T200 I is delivered with a kit that makes it easy to connect the motor mechanisms and collect measurements.

□ the telecontrol cabinet connectors are polarized to avoid any errors during installation or maintenance interventions.

□ current measurement acquisition sensors are of the split type, to facilitate their installation.

□ works with 24 Vdc and 48 Vdc motor units.

Fault indicators

Easergy Flair is a comprehensive range of underground network fault current indicators

Easergy MV underground network fault current passage indicators are a range of products adapted to all neutral earthing systems: insulated, impedant and direct earthing.
■ Easergy Flair 21D-22D-23D, are self-powered with a liquid crystal display, with DIN dimensions for MV cubicle installation.
■ Easergy Flair 279 and 219, have a wall-mounted case for the MV cubicles substation or LV compartment and anexternal power supply which can be backed up.
■ Easergy Flair 200C (communicative), has the same case as Flair 279 and 219, but has advanced measurement functions and long distance communication features (radio, GSM, RTC, etc.).

PE57154

PE57156

PE57157


Easergy Flair	21D - 22D - 23D	279 - 219	200C
Usage			
	Underground MV networks, open loop, insulated, impedant and direct neutral earthing systems.		
Installation			
	Flush fitted	Casing	Casing
Power supply			
	Self-powered or dual power	230 Vac or battery	230 Vac
Fault detection			
	Phase-phase and phase-earth for all 3 ranges		
Indication			
	LCD display	Indicator light	Indicator light (option)
Measurement			
	Current, frequency		Current, voltage, power
Communication			
	SCADA interface by dry contact	SCADA interface by dry contact	Long distance (radio, PSTN, GSM, etc.)

PE57155


Easergy Flair 21D - 22D - 23D

SM6-24 integrates Flair 21D, Flair 21DT, Flair 22D and Flair 23D on every incoming cubicles.

■ **High performance indicators**
□ indication of phase-phase and phase-earth faults,
□ faulty phase indication,
□ compatible with HV/MV substation protection devices.

■ **Clear and comprehensive display**
□ displaying the faulty phase for earth fault,
□ displaying settings,
□ displaying the load current including peak demand and frequency meter.

■ **Maintenance free.**

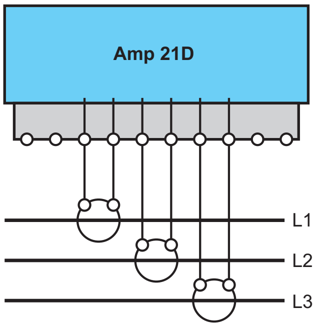
		Flair 21D	Flair 21DT	Flair 22D	Flair 23D
Power supply					
	Self-powered	■	■	■	■
	Dual power supply			■ (battery)	■ (external)
Display					
	Ammeter	■	■	■	■
	Peak demand			■	■
	Frequency meter			■	■
Options					
	SCADA interface	■ (transistor output)	■	■	■
	External light	■	■	■	■
	External reset			■	■
	Advanced settings (keypad)			■	■

Ammeter

■ **At the leading edge of technology,** Amp 21 is suitable for Medium Voltage network load management.
■ **Self-powered,** it ensures a permanent display of currents.
■ **Compact and in DIN format,** it fits naturally into MV cubicles.
■ **Cost efficient,** it uses the CT optimised for Fault Passage Indicator.
■ **Performant,** it displays phase current and maximum of current.

PE56822

DE58404



PE57169

The SM6-24 integrates ammeter Amp 21D on all incoming cubicles and the fuse-switch cubicles

Easergy Amp 21D is an ammeter dedicated to display the load current on a Medium Voltage network.
It is particularly suited for network load management application.

Functions

■ Display of 3 phase current: I1 , I2 , I3. Range: 3 A to 800 A
■ Display of 3 phase current maximeter: I1 , I2 , I3. Range: 3 to 800 A.

Display principle

■ Load curents are permanently displayed
□ continuous scrolling of L1, then L2, then L3.
■ Maximeter
□ access to maximeter display by pressing a dedicated push button
□ continuous scrolling of M1, then M2, then M3
□ reset of all maximeter by pressing a combination of two push buttons.

Assembly

Small size enclosure
■ DIN format : 93 x 45 mm
■ Secured, extraction-proof mounting
■ Terminal connections.

Technical data

Application		
Frequency		50 Hz and 60 Hz
Load current	Minimum current	> 3 A
Measurement		
Range	Phase current	3 to 800 A
	Accuracy (I < 630 A)	±5%, ±2 A
Reset of maximeter	Manual from device	Yes
Power supply		
Self power	From the current sensors	I load > 3 A
Battery		No
Auxiliary supply		No
Display		
	Display	4 digits LCD
	Current per phase	Yes (resolution 1 A)
	Maximeter per phase	Yes
Sensors		
	Phase CTs	3 split core CT
Miscellaneous		
	Test	Yes
Characteristics		
Dielectric	IEC 60255-5	
Electromagnetic	IEC 61000-4-4 (level 4) IEC 61000-4-12	Insulation 10 kV Shock wave 20 kV
Climatic	Operating temperature Storage temperature Salt fog	– 25°C to + 70°C – 40°C to + 85°C 200 h
Mechanical	IEC 60068-2-6 IEC 60068-2-29	Vibrations 10 to 500 Hz: 2 g Protection IP23

Description of the control/ monitoring and protection functions

The Sepam range of protection and metering is designed for the operation of machines and electrical distribution networks of industrial installations and utility substations for all levels of voltage.

It consists of complete, simple and reliable solutions, suited to following four families:

- Sepam series 10,
- Sepam series 20,
- Sepam series 40,
- Sepam series 80.

PE57158

Sepam protection relay

A range adapted at your application

- Protection of substation (incoming, outgoing line and busbars).
- Protection of transformers.
- Protection of motors, and generators.

Accurate measurement and detailed diagnosis

- Measuring all necessary electrical values.
- Monitoring switchgear status: sensors and trip circuit, mechanical switchgear status.
- Disturbance recording.
- Sepam self-diagnosis and watchdog.

Simplicity

Easy to install

- Light, compact base unit.
- Optional modules fitted on a DIN rail, connected using prefabricated cords.
- User friendly and powerful PC parameter and protection setting software to utilize all of Sepam's possibilities.

User-friendly

- Intuitive User Machine Interface, with direct data access.
- Local operating data in the user's language.

Fexibility and evolutivity

- Enhanced by optional modules to evolve in step with your installation.
- Possible to add optional modules at any time.
- Simple to connect and commission via a parameter setting procedure.

Sepam	Characteristics	Protections: Basic	Protections: Specific	Applications: Substation	Transformer	Motor	Generator	Busbars
Sepam series 10 For simple applications	■ 4 logic inputs ■ 7 relay outputs ■ 1 communication port	Phase-overcurrent and earth fault protection		10A 10B	10A 10B			
Sepam series 20 For common applications	■ 10 logic inputs ■ 8 relay outputs ■ 1 Modbus communication port	Current protection		S20	T20	M20		
		Voltage and frequency protection						B21
			Loss of mains (ROCOF)					B22
Sepam series 40 For demanding applications	■ 10 logic inputs ■ 8 relay outputs ■ 1 Modbus communication port ■ Logic equations editor	Current voltage and frequency protection		S40	T40		G40	
			Directional earth fault	S41		M41		
			Directional earth fault and phase overcurrent	S42	T42			
Sepam series 80 For complete applications	■ 42 logic inputs ■ 23 relay outputs ■ 2 Modbus communication port ■ Logic equations editor ■ Removal memory cartridge ■ Battery to save event logging data	Current voltage and frequency protection		S80				
			Directional earth fault	S81	T81	M81		
			Directional earth fault and phase overcurrent	S82	T82		G82	

Description of the control/monitoring and protection functions

PE57159

VIP 35

VIP 35 relay for transformer protection

Integrated in the DM1-S and DMV-S cubicles

The VIP 35 is an independent relay without an auxiliary power supply, powered by the current sensors, and actuating a Mitop release unit.
VIP 35 provides protection against phase-to-phase faults and against earthing faults.

Phase protection

■ phase protection is achieved by a definite time threshold which functions from 1.2 times the operating current (Is).

Earthing protection

■ earthing fault protection functions with the residual current measurement taken from the sum of the secondary currents in the sensors. This is taken via a CRc, 8 A to 80 A gauge.
■ earthing protection is inverse definite time: its threshold and time delay can be set.

Setting the VIP 35 relays

Is: the phase operating current is adjusted directly in accordance with the transformer rating and the operating voltage.
Io: the earth current threshold is adjusted according to the network characteristics.

Setting values of the Is phase operating current for VIP 35

Operating voltage (kV)	Transformer rating (kVA)																
	50	75	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3000
3	10	15	20	25	36	45	55	68	80	140	140	170	200					
3.3	10	15	18	22	28	36	45	56	70	90	140	140	200					
4.2	8	12	15	18	22	28	36	45	56	70	90	140	140	200				
5.5		8	12	15	18	22	28	36	46	55	68	90	140	140	200			
6			10	12	18	20	25	36	46	55	68	80	140	140	200	200		
6.6			10	12	15	18	22	28	36	45	56	70	90	140	140	200		
10				8	10	12	15	20	25	30	37	55	68	80	140	140	170	200
11					10	12	15	18	22	28	36	45	55	68	90	140	140	170
13.8					8	10	12	15	18	22	28	36	46	55	68	90	140	140
15						8	10	15	18	20	25	36	45	55	68	80	140	140
20							8	10	12	15	20	25	30	37	55	68	80	140
22							8	10	12	15	18	22	28	36	45	55	68	80

PE57160

VIP 300 LL

VIP 300 LL protection relay

Integrated in the DM1-S and DMV-S cubicles

VIP 300 provides protection against phase-to-phase and phase-to-earth faults.
A choice of trip curves and the large number of possible settings mean that it can be used in a large variety of selectivity layouts.
VIP 300 is an independent relay powered by the current sensors; it does not require an auxiliary power supply. It actuates a release unit.

Phase protection

■ phase protection is via two independently adjustable thresholds:
□ the lower threshold can be chosen to be inverse definite time or definite time.
The definite time curves are in conformity with IEC standard 60255-3.
They are either of inverse, very inverse or extremely inverse type.
□ the upper threshold is inverse definite time.

Earthing protection

■ protection against phase-to-earth faults uses the residual current measurement, taken from the sum of the secondary currents in the sensors. This is taken via a CRa X1 gauge: 10 to 50 A and X4: 40 to 200 A or via a CRb X1 gauge: 63 to 312 A and X4: 250 A to 1250 A.
■ as for phase protection, phase-to-earth protection had two thresholds that can be independently set.

Signalling

■ two indicators show the origin of the trip operation (phase or earth).
They remain in position after the relay power supply has been cut.
two led indicators (phase and earth) show that the lower threshold has been exceeded and that its time delay is currently in progress.

Description of the control/ monitoring and protection functions

Sepam series 10

Sepam series 10 with CRa/CRb sensors for transformer protection

Integrated in the DM1-S cubicle

Sepam series 10 monitors phase and/or earth-fault currents.
Two models meet a wide range of different needs:

- **10B**: Sepam series 10B protects against overloads, phase-to-phase faults and earth faults.
- **10A**: Sepam series 10A provides the same functions as model B, but with a communication port, more inputs and outputs, and additional protection and monitoring functions.

Setting of Sepam series 10

Is: the phase operating current is adjusted directly in accordance with the transformer rating and the operating voltage.
Io: the earth current threshold is adjusted according to the network characteristics.

Setting values of the Is phase operating current for Sepam series 10

Operating voltage (kV)	Transformer rating (kVA)																		
	50	75	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3000	3500
3			19	24	31	38	48	61	77	96	121	154	192	241	308	385	481	577	
3.3				22	28	35	44	55	70	87	110	140	175	219	280	350	437	525	
4.2					22	27	34	43	55	69	87	110	137	172	220	275	344	412	481
5.5						21	26	33	42	52	66	84	105	131	168	210	262	315	367
6						19	24	30	38	48	61	77	96	120	154	192	241	289	337
6.6							22	28	35	44	55	70	87	109	140	175	219	262	306
10									23	29	36	46	58	72	92	115	144	173	202
11									21	26	33	42	52	66	84	105	131	157	184
13.8										21	26	33	42	52	67	84	105	126	146
15										19	24	31	38	48	62	77	96	115	135
20												23	29	36	46	58	72	87	101
22												21	26	33	42	52	66	79	92

Sensors types legend

CRa 200/1 CRb 1250/1

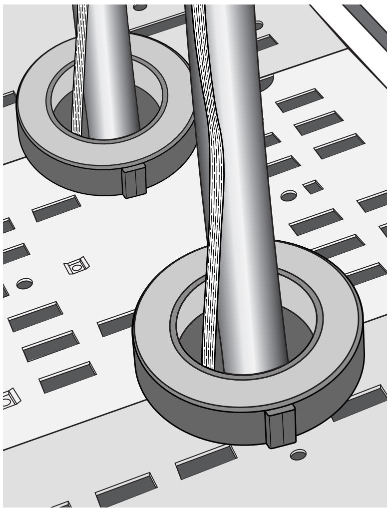
Description of the control/ monitoring and protection functions

Current sensor for VIP 35 and VIP 300LL and Sepam series 10

Type	Dimensions (mm) External Ø	Internal Ø	Thickness (without fastening)	Weight (kg)	Ratio of transformation (*)	Class of precision (*)		VIP 35	VIP 300LL	Sepam 10
CRa	143.5	81	37.5	2.18	1/200	± 2% from 10 A to 100 A ± 1% from 100 A to 1600 A	On load 5.7 Ω (cal. x 1)		■	■
						± 1% from 10 A to 10 kA	On load 0.67 Ω (cal. x 4)			
CRb	143.5	81	37.5	1.26	1/1250	± 1% from 10 A to 11 kA	On load 5.7 Ω (cal. x 1)		■	■
						± 1 % from 10 A to 25 kA	On load 0.67 Ω (cal. x 4)			
CRc	143.5	81	37.5	2	S1-S2: 1/200 S1-S3: 1/500	S1-S2: ± 5% from 10 A to 80 A ± 2.5 % from 80 A to 600 A S1-S3: ± 2% from 20 A to 2200 A	On load 0.6 Ω	■		

(*) not valid for Sepam series 10 application

DE58402



CRa, CRb, CRc current sensor

General common selection of protection units

Protection type	Code	Protection units Sepam series 10	Sepam series 20	Sepam series 40	Sepam series 80	Statimax	VIP 35	VIP 300
Three-phase overcurrent	50 - 51	■	■	■	■	■	■ (2)	■ (1)
Zero-sequence overcurrent	50N - 51N	■	■	■	■	■	■ (3)	■ (1)
Directional zero-sequence current	67N			■	■			
Undervoltage	27			■	■			
Overvoltage	59			■	■			
Thermal image	49	■	■	■	■			
Zero-sequence overvoltage	59N			■	■			
Negative sequence overcurrent	46		■	■	■			
Long start-up and rotor blocking	51LR		■	■	■			
Maximum number of start-ups	66		■	■	■			
Single-phase undercurrent	37		■	■	■			
Communication		■	■	■	■			

(1) DT, EI, SI, VI and RI trip curves.
(2) Inverse curve suited to transformer protection.
(3) DT trip curve.

LPCT protection chain

TLP130, CLP2 sensors and Sepam series 20, series 40 protection units

PE57172

Sepam series 20, series 40 protection unit

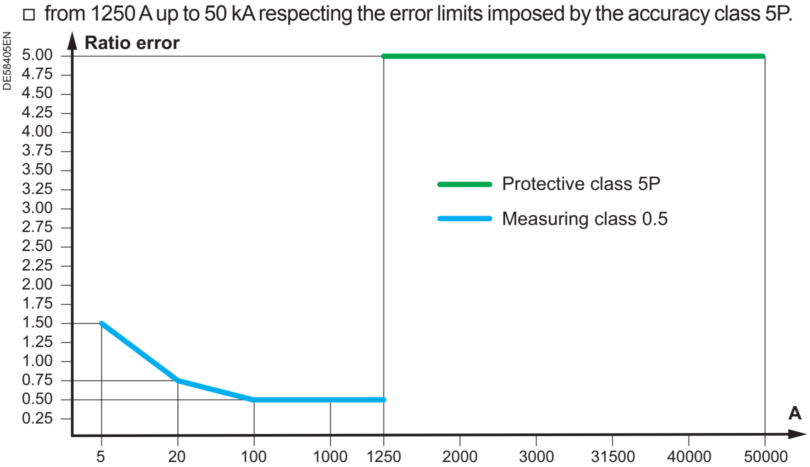
LPCT sensors are voltage-output current sensors (Low Power Current Transformer) compliant with the IEC 60044-8 standard.
These sensors are designed to measure rated current between 5 A and 630 A, with a ratio of 100 A / 22.5 mV.

Sepam series 20, series 40 protection units are at the heart of the LPCT protection chain.
Sepam series 20, series 40 performs the following functions:
■ acquisition of phase currents measured by the LPCT sensors
■ utilization of measurements by the protection functions
■ tripping of the breaking device in case of fault detection.

Advantages

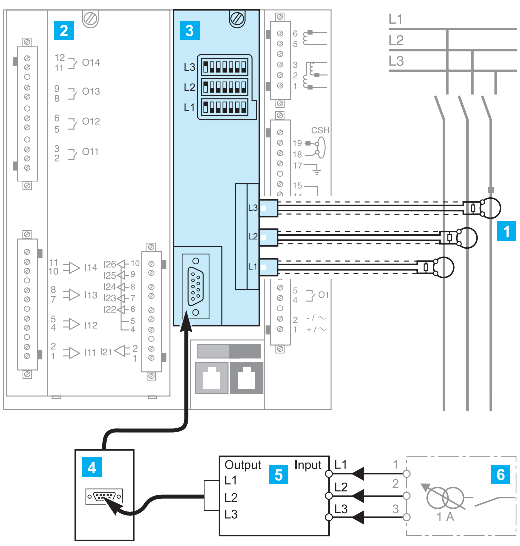
■ **Consistent protection chain with the same sensor measures phase currents from 5 A to 630 A**
■ Simple to install and implement:
□ installation of LPCT sensors
- TLP130 is installed around MV cable
- CLP2 is installed on the MV circuit
□ LPCT connected directly to Sepam series 20, series 40
□ accessories available to test the LPCT protection chain by secondary current injection.
■ LPCTs range of use
LPCT measuring and protection function guaranteeing the accuracy up to the short-time current.
Following the range of use of LPCT:
□ from 5 A up to 1250 A respecting the error limits imposed by the accuracy class 0,5
□ from 1250 A up to 50 kA respecting the error limits imposed by the accuracy class 5P.

DE58405EN



■ **Optimized integration of functions:**
□ measurement of phase rated currents as of 25 A that is set by micro-switch
□ monitoring of LPCT sensor by Sepam series 20, series 40 (detection of phase loss).

MT11325



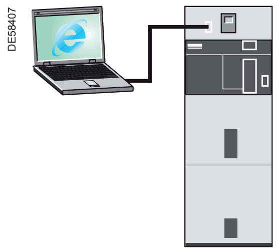
Connections

1 **LPCT sensor,** equipped with a shielded cable fitted with an RJ45 connector to be connected directly to the CCA670 connector
2 **Sepam series 20, series 40 protection unit**
3 **CCA670 connector,** interface that adapts the voltage delivered by the LPCT sensors, with microswitch setting of rated current.

Testing and injection

4 **CCA613 remote test plug,** flush-mounted in front panel of cubicle, equipped with a 3-m cord to be connected to the CCA670 connector test socket (9-pin Sub D)
5 **ACE917 injection interface,** used to test the LPCT protection chain with a standard injection box
6 **Standard 1A injection box.**

Transparent Ready



SM6 Transparent Ready
with front face Intranet connector

Description

The SM6-24 supports all possible MV distribution substations and network configurations. It meets all the standard requirements with respect to continuity of supply and energy availability from 1 to 24 kV.
The EGX400 Web server integration is industrialised for SM6-24 Transparent Ready offer:
■ the DM range of circuit breakers cubicles with Sepam series 20 and one EGX400 per switchboard for remote monitoring via the Intranet
■ an RJ45 Ethernet connector on the front of the switchboard, directly accessible from the front panel (option).
For other SM6-24 configurations (with other devices or other Sepam product ranges),
it is possible to integrate Transparent Ready capability, consult your local Schneider Electric correspondent.

Range selection

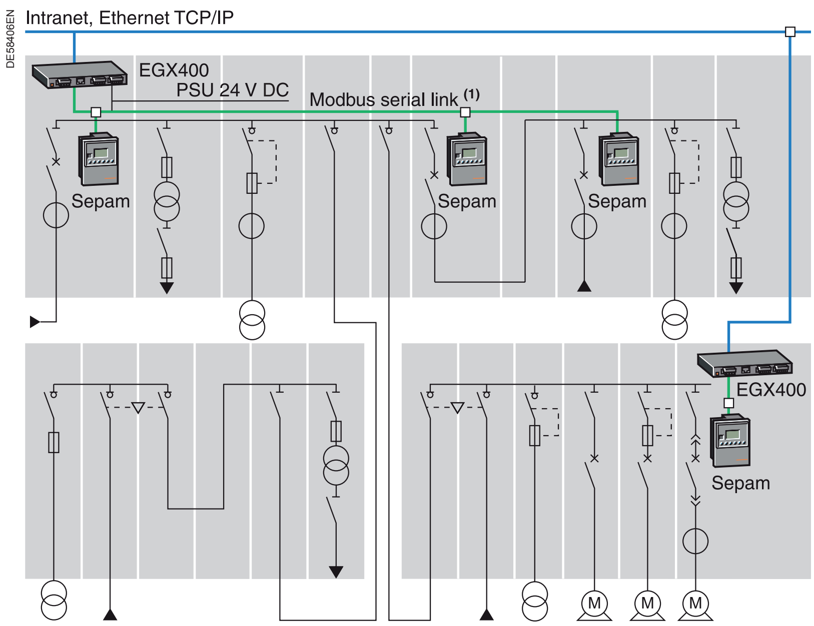
This chart presents the different SM6-24 cubicles proposed with an industrialised Transparent Ready system.

Description	Type of units
Single-isolation circuit breaker unit	DM1-A
Single-isolation circuit breaker unit, right or left outgoing line	DM1-D
Withdrawable single-isolation circuit breaker unit	DM1-W (up to 24 kV)
Withdrawable single-isolation circuit breaker unit, right outgoing line	DM1-Z (up to 24 kV)
Double-isolation circuit breaker unit, right or left outgoing line	DM2

EGX400 summary pages	
Current	A - RMS, three-phase average level
Real power	kW - Present and peak demand - Peak is time stamped by Sepam when available - Signed
Power factor	
Load current, three phases A B C	A - RMS - Actual load
Demand current, three phases A B C	A - Avg - After integration period
Active and reactive energy, last reset date	kWh kvarh - Last reset date is the date the user starts the energy counting - Signed
Circuit breaker status	open - closed - tripped

Typical design

You need to have a Web server in only one CB unit to monitor the whole switchboard.



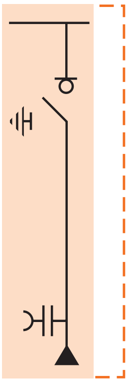
(1) Same cable CCR301 for RS 485 and PSU 24 V DC

Contents

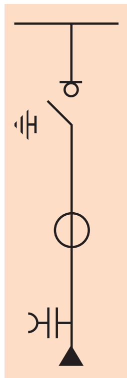
Functional units selection

Network connection

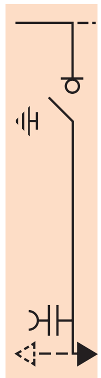
IM (375 ou 500 mm)
Switch



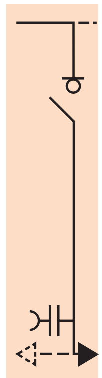
IMC (500 mm)
Switch



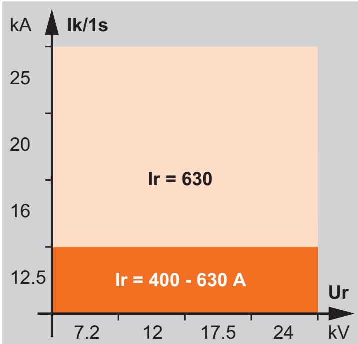
IMB (375 mm)
Switch
with earthing switch
Right or left outgoing



without earthing switch
Right or left outgoing



Electrical characteristics



Basic equipment:

- switch and earthing switch
- three-phase busbars
- CIT operating mechanism
- voltage presence indicator

- connection pads for dry-type cables

- three-phase bottom busbars for outgoing lines (right or left)

- one to three CTs

Versions:

- CI2 operating mechanism

- CI1 operating mechanism

- CI1 operating mechanism

- in 800 A version consult us

Optional accessories:

- motor for operating mechanism
- auxiliary contacts
- additional enclosure or connection enclosure for cabling from above
- key-type interlocks
- 50 W heating element
- plinth
- release units (coil)
- operation counter
- 1250 A three-phase upper busbars
- visibility of main contacts
- pressure indicator device

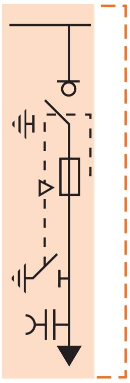
- phase comparator
- fault indicators

- digital ammeter
- surge arresters (for 500 mm cubicle)
- control and monitoring

Functional units selection
Fuse-switch protection

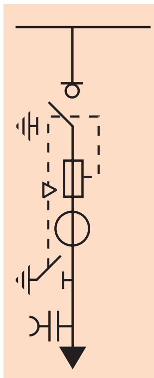
QM (375 or 500 mm)
Fuse-switch
combination unit

DE53522



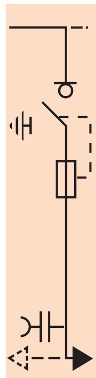
QMC (625 mm)
Fuse-switch
combination unit

DE53523



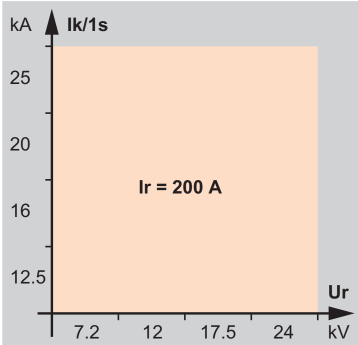
QMB (375 mm)
Fuse-switch
combination unit
Outgoing line right or left

DE53524



Electrical characteristics

DE58352



Basic equipment:
- switch and earthing switch
- three-phase busbars
- CI1 operating mechanism
- voltage presence indicator
- equipment for three UTE or DIN striker fuses
- mechanical indication system for blown fuses

QM and QMC:
- connection pads for dry-type cables
- downstream earthing switch 2 kA rms making capacity

QMB:
- three-phase bottom busbars for outgoing lines (right or left)

QMC:
- one to three CTs

Version:
- CI2 operating mechanism

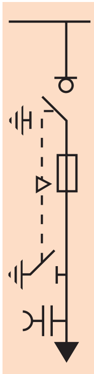
Optional accessories:
- motor for operating mechanism
- auxiliary contacts
- additional enclosure or connection enclosure for cabling from above
- key-type interlocks
- 50 W heating element
- plinth
- indication contact for blown fuses
- UTE or DIN striker fuses
- release units (coil)
- digital ammeter
- visibility of main contacts
- pressure indicator device
- 1250 A three-phase upper busbars

Functional units selection

Fuse-switch protection

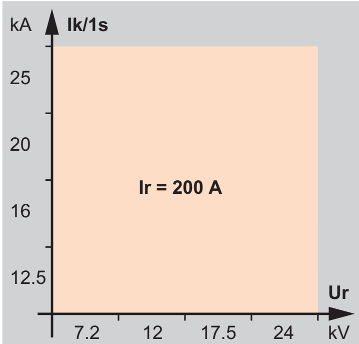
PM (375 mm)
Fused-switch unit

DE53526



Electrical characteristics

DE58352



Basic equipment:

- switch and earthing switch
- three-phase busbars
- CIT operating mechanism
- voltage presence indicator
- connection pads for dry-type cables
- downstream earthing switch 2 kA rms making capacity
- equipment for three UTE or DIN fuses

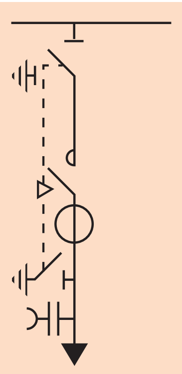
Optional accessories:

- motor for operating mechanism
- auxiliary contacts
- enlarged low-voltage control cabinet
- additional enclosure or connection enclosure for cabling from above
- key-type interlocks
- 50 W heating element
- plinth
- mechanical indication system for blown fuses
- UTE or DIN fuses
- digital ammeter
- visibility of main contacts
- pressure indicator device
- 1250 A three-phase upper busbars

Functional units selection
Contactor protection

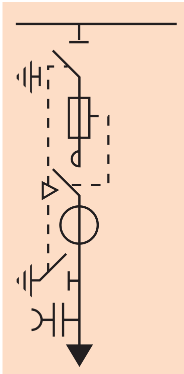
CRM (750 mm)
Contactor

DE53527



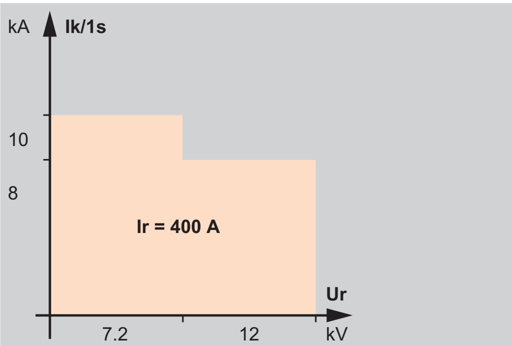
CRM (750 mm)
Contactor with fuses

DE53528

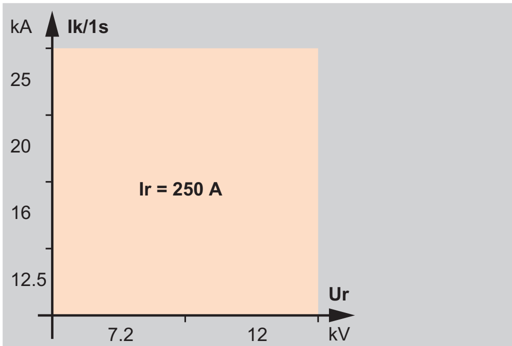


Electrical characteristics

DE58353



DE58354



Basic equipment:

- Rollarc 400 or 400D contactor
- disconnector and earthing switch
- three-phase busbars
- contactor operating mechanism R400 with magnetic holding or contactor R400D with mechanical latching
- disconnector operating mechanism CS
- one to three current transformers
- auxiliary contacts on contactor
- connection pads for dry-type cables
- voltage presence indicator
- downstream earthing switch 2 kA rms making capacity
- additional enclosure
- operation counter

Contactor with fuses only:

- equipment for three DIN fuses

Optional accessories:

- **cubicle:**
  - auxiliary contacts on the disconnector
  - protection using Sepam programmable electronic unit
  - one to three voltage transformers
  - key-type interlocks
  - 50 W heating element
  - plinth
  - 1250 A three-phase upper busbars
- **contactor:**
  - mechanical interlocking

Contactor with fuses only:

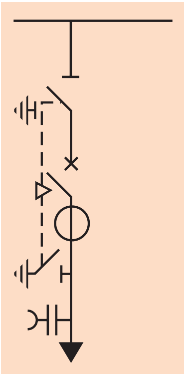
- DIN fuses

Functional units selection

SF6 type circuit breaker protection

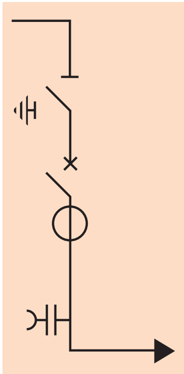
DM1-A (750 mm)
Disconnectable
single-isolation
circuit breaker

DE53531



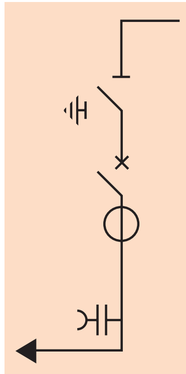
DM1-D (750 mm)
Single-isolation
disconnectable CB
Outgoing line on right

DE53532



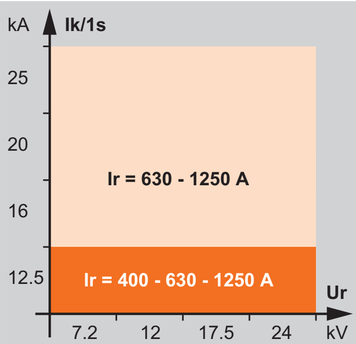
DM1-D (750 mm)
Single-isolation
disconnectable CB
Outgoing line on left

DE53533



Electrical characteristics

DE58355



Basic equipment:

- SF1 circuit breaker disconnectable
- disconnector and earthing switch
- three-phase busbars
- circuit breaker operating mechanism RI
- disconnector operating mechanism CS
- voltage presence indicator
- three CTs for SF1 circuit breaker
- auxiliary contacts on circuit breaker

- connection pads for dry-type cables
- downstream earthing switch 2 kA rms at 630 A and 25 kA rms at 1250 A making capacity

- three-phase bottom busbars

Version:

- LPCT (only with Sepam series 20, series 40)

- SFset circuit breaker disconnectable (only for the 400-630 A performances)

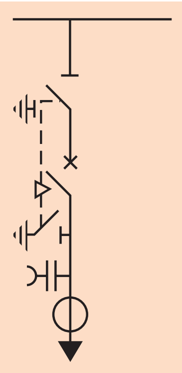
Optional accessories:

- **cubicle:**
  - auxiliary contacts on the disconnector
  - additional enclosure or connection enclosure for cabling from above
  - protection using Statimax relays, or Sepam programmable electronic unit for SF1 circuit breaker
  - three voltage transformers for SF1 circuit breaker
  - key-type interlocks
  - 50 W heating element
  - plinth
  - surge arresters
  - 1250 A three-phase upper busbars at Ir 630 A
- **circuit breaker:**
  - motor for operating mechanism
  - release units (coil)
  - operation counter on manual operating mechanism

Functional units selection
SF6 type circuit breaker protection

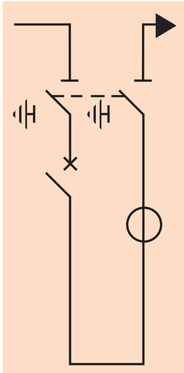
DM1-S (750 mm)
Single-isolation
disconnectable CB
with independent protection

DE58360



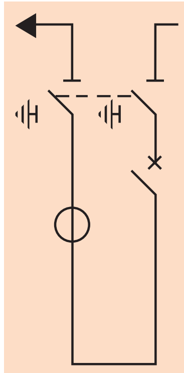
DM2 (750 mm)
Double-isolation
disconnectable CB
Outgoing line on right

DE53536



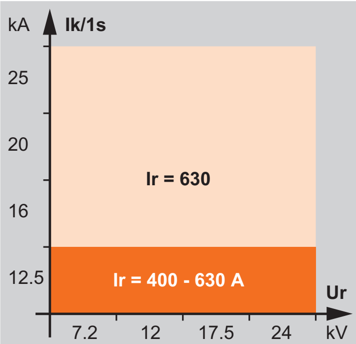
DM2 (750 mm)
Double-isolation
disconnectable CB
Outgoing line on left

DE53537



Electrical characteristics

DE58351



Basic equipment:

- ■ SF1 circuit breaker disconnectable
- ■ disconnector and earthing switch
- ■ three-phase busbars
- ■ circuit breaker operating mechanism RI
- ■ disconnector operating mechanism CS
- ■ auxiliary contacts on circuit breaker

- ■ VIP relay
- ■ three CR sensors for VIP relay protection
- ■ voltage presence indicator
- ■ connection pads for dry-type cables
- ■ downstream earthing switch 2 kA rms making capacity

- ■ three CTs

Version:

- ■ Sepam series 10 with auxiliary supply and three CR sensors

Optional accessories:

- ■ **cubicle:**
  - □ additional enclosure or connection enclosure for cabling from above
  - □ three voltage transformers
  - □ key-type interlocks
  - □ 50 W heating element
  - □ plinth

- ■ **cubicle:**
  - □ protection using Statimax relays or Sepam programmable electronic unit
  - □ auxiliary contacts on disconnectors
  - □ two voltage transformers phase-to-phase or three voltage transformers phase-to-earth

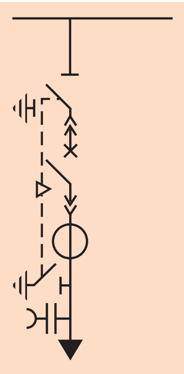
- □ 1250 A three-phase upper busbars at Ir 630 A

- ■ **circuit breaker:**
  - □ motor for operating mechanism
  - □ release units (coil)
  - □ operation counter on manual operating mechanism

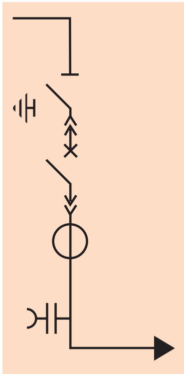
Functional units selection

SF6 type circuit breaker protection

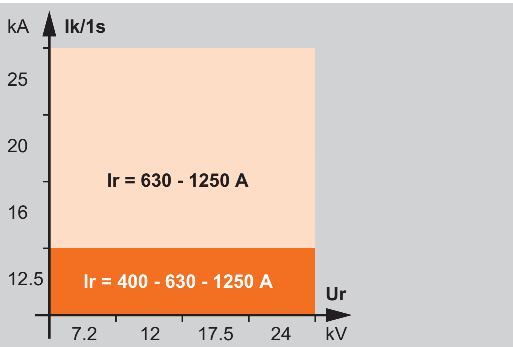
DM1-W (750 mm)
Withdrawable single-isolation
circuit breaker

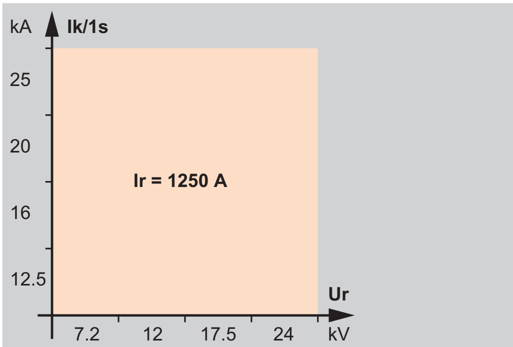


DM1-Z (750 mm)
Withdrawable single-isolation
circuit breaker
Outgoing line on right



Electrical characteristics





Basic equipment:

- SF1 withdrawable circuit breaker
- disconnector and earthing switch
- three-phase busbars
- circuit breaker operating mechanism RI
- disconnector operating mechanism CS
- voltage presence indicator
- three CTs
- auxiliary contacts on circuit breaker

DM1-W:

- earthing switch operating mechanism CC
- connection pads for dry-type cables
- downstream earthing switch 25 kA rms making capacity

DM1-Z:

- three-phase busbars

Version:

- LPCT (only with Sepam series 20, series 40)

Optional accessories:

- **cubicle:**
  - auxiliary contacts on the disconnector
  - additional enclosure or connection enclosure for cabling from above
  - protection using Statimax relays or Sepam programmable electronic unit
  - three voltage transformers
  - key-type interlocks
  - 50 W heating element
  - plinth
  - withdrawable circuit breaker cradle (if there is plinth)
- **circuit breaker:**
  - motor for operating mechanism
  - release units (coil)
  - operation counter on manual operating mechanism

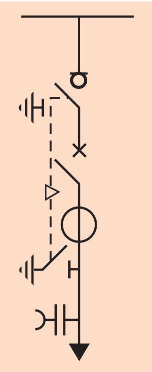
DM1-W:

- 1250 A three-phase upper busbars at Ir 630 A
- surge arresters

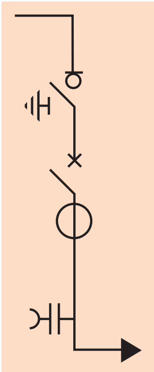
Functional units selection

Vacuum type circuit breaker protection

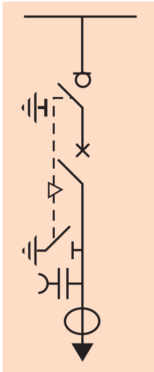
DMV-A (625 mm)
Single-isolation
disconnectable
circuit breaker

DE53541


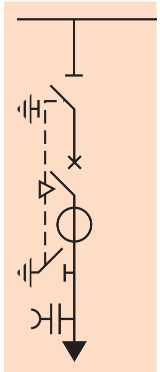
DMV-D (625 mm)
Single-isolation
circuit breaker
Outgoing line on right

DE53542


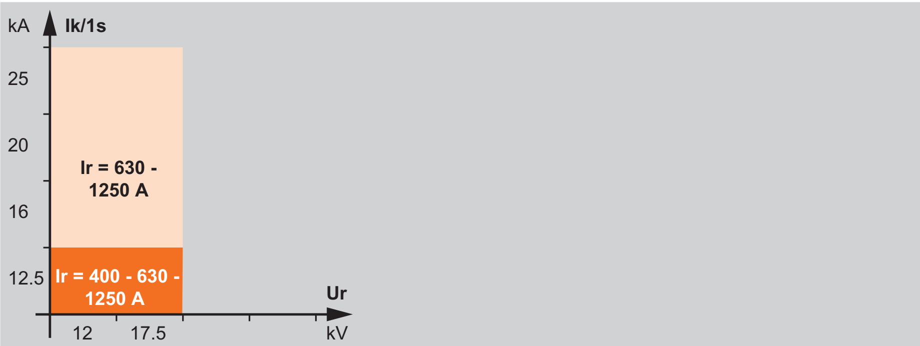
DMV-S (625 mm)
Single-isolation
circuit breaker
with independent protection

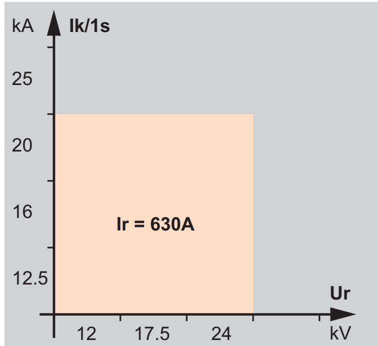
DE53543


DMVL-A (750 mm)
Single-isolation
disconnectable
circuit breaker

DE53535


Electrical characteristics

DE58357


DE58358


Basic equipment:

- Evolis circuit breaker frontal
- switch and earthing switch for 400 - 630 A
- disconnector and earthing switch for 1250 A
- three-phase busbars
- circuit breaker operating mechanism Proxima
- disconnector and switch operating mechanism CIT
- voltage presence indicator
- auxiliary contacts on circuit breaker

- 3 CTs
- Sepam series 20 programmable electronic unit

- 3 CR sensors for VIP relay
- VIP protection relay

- Evolis circuit breaker lateral disconnectable
- disconnector and earthing switch
- three-phase busbars
- circuit breaker operating mechanism RI
- disconnector operating mechanism CS
- voltage presence indicator
- auxiliary contacts on circuit breaker
- 3 CTs

- connection pads for dry-type cables
- downstream earthing switch 25 kA rms making capacity

- connection pads for dry-type cables

- downstream earthing switch 25 kA rms making capacity

- downstream earthing switch 2 kA rms making capacity

Optional accessories:

- **cubicle:**
  - □ auxiliary contacts on the disconnector
  - □ additional enclosure or connection enclosure for cabling from above
  - □ three voltage transformers
  - □ key-type interlocks
  - □ plinth (only 630 A)
  - □ 50 W heating element
  - □ 1250 A three-phase upper busbars at Ir 630 A

- **circuit breaker:**
  - □ motor for operating mechanism
  - □ release units (coil)
  - □ operation counter on manual operating mechanism

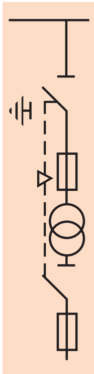
- **cubicle :**
  - □ Sepam series 20 or Statimax relay protection
  - □ surge arresters

Functional units selection

MV metering

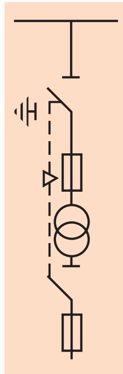
CM (375 mm)
Voltage transformers
for mains with earthed
neutral system

DE53546



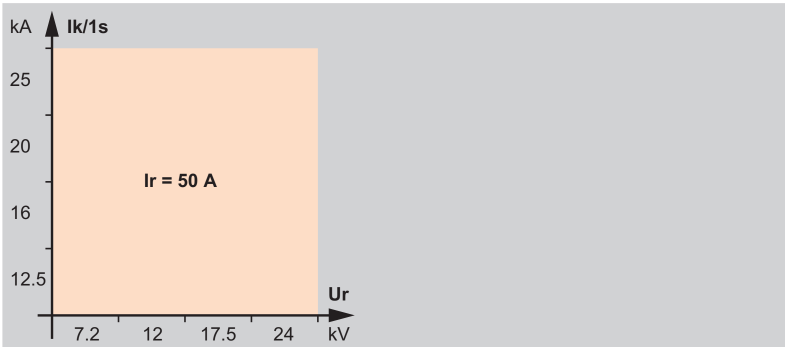
CM2 (500 mm)
Voltage transformers
for mains with insulated
neutral system

DE53547



Electrical characteristics

DE58359



Basic equipment:

- disconnector and earthing switch
- three-phase busbars
- operating mechanism CS
- LV circuit isolation switch
- LV fuses
- three 6.3 A UTE or DIN type fuses

CM	CM2
■ three-voltage transformers (phase-to-earth)	■ two voltage transformers (phase-to-phase)

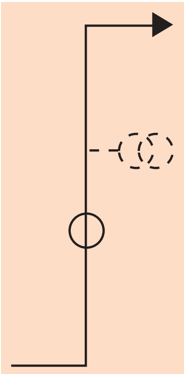
Optional accessories:

- auxiliary contacts
- additional enclosure or connection enclosure for cabling from above
- 50 W heating element
- plinth
- mechanical signalling for blown fuses
- 1250 A three-phase upper busbars

Functional units selection
MV metering

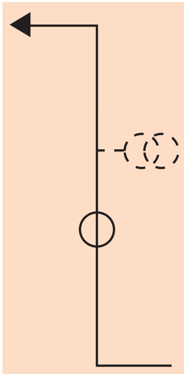
GBC-A (750 mm)
Current and/or voltage measurements
Outgoing line on right

DE53549



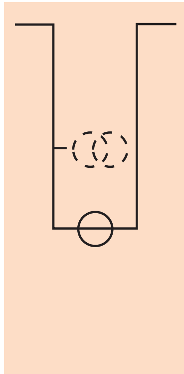
GBC-A (750 mm)
Current and/or voltage measurements
Outgoing line on left

DE53550



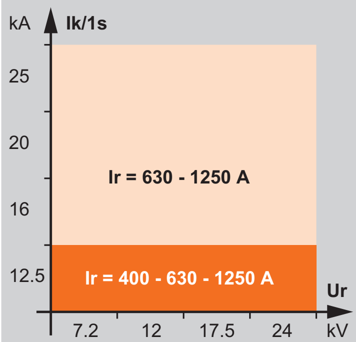
GBC-B (750 mm)
Current and/or voltage measurements

DE53551



Electrical characteristics

DE58355



Basic equipment:
- one to three CTs
- connection bars
- three-phase busbars

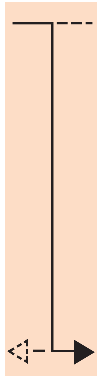
Optional accessories:
- additional enclosure
- three voltage transformers (phase-to-earth), or two voltage transformers (phase-to-phase)
- plinth
- 1250 A three-phase upper busbars at Ir 630 A

Functional units selection
Casings

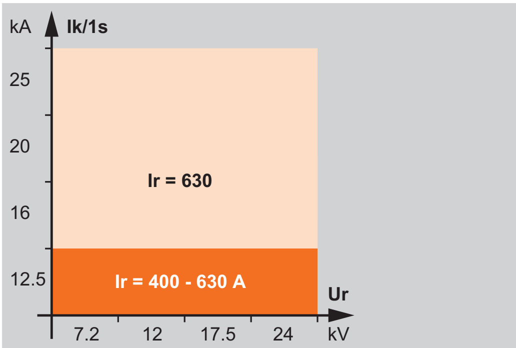
GEM (125 mm)
Extension unit VM6/SM6

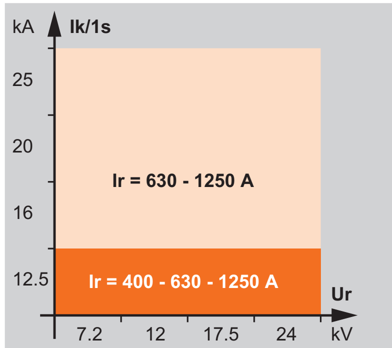
GIM (125 mm)
Intermediate bus unit

GBM (375 mm)
Connection unit
Outgoing line right or left



Electrical characteristics





Basic equipment:

GEM:
- three-phase busbars

GIM:
- metallic envelop

GBM:
- connection bars
- three-phase busbars for outgoing lines right or left

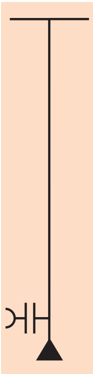
Optional accessories:

- plinth

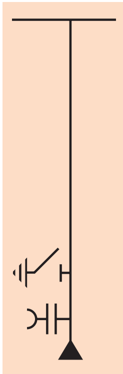
GBM:
- additional enclosure
- 1250 A three-phase upper busbars at Ir 630 A

Functional units selection
Casings

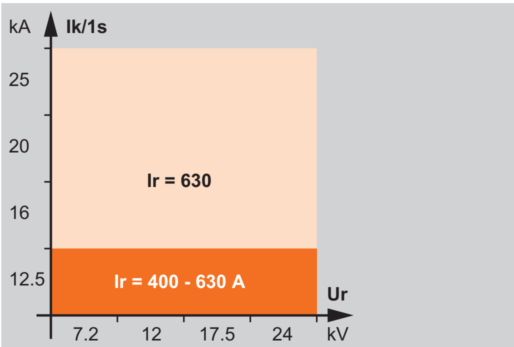
GAM2 (375 mm)
Incoming-cable-connection unit

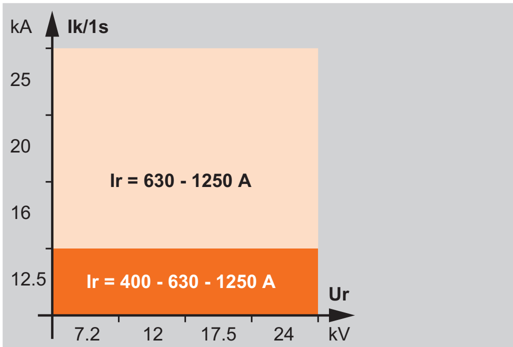


GAM (500 mm)
Incoming-cable-connection unit



Electrical characteristics





Basic equipment:

- three-phase busbars
- voltage presence indicator
- connection pads for dry-type cables
- connection bars

GAM:

- operating mechanism CC
- downstream earthing switch 25 kA rms making capacity

Optional accessories:

- enlarged low-voltage control cabinet
- plinth
- 50 W heating element
- fault indicator
- digital ammeter
- 1250 A three-phase upper busbars at Ir 630 A

GAM:

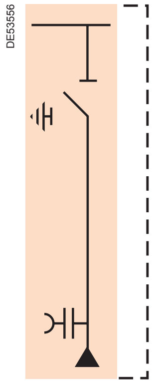
- auxiliary contacts
- surge arresters
- key-type interlocks

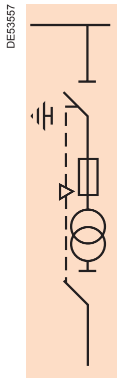
Functional units selection
Other functions

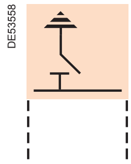
SM (375 or 500[(1)] mm)
Disconnector unit

TM (375 mm)
MV/LV transformer unit
for auxiliaries

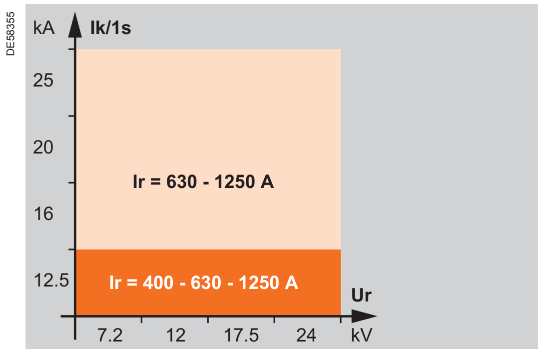
EMB (375 mm)
Busbars earthing
compartment

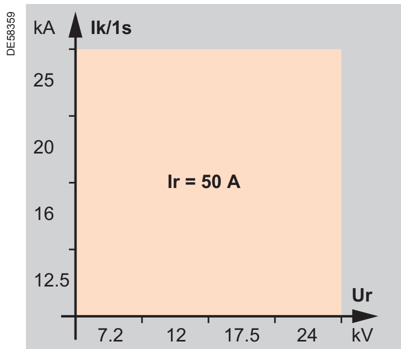


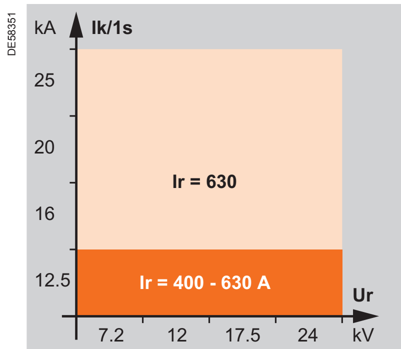




Electrical characteristics







Basic equipment:

SM and TM:
- disconnector and earthing switch
- three-phase busbars
- operating mechanism CS

SM:
- connection pads for dry-type cables
- voltage presence indicator

TM:
- two 6.3 A fuses, UTE or DIN type
- LV circuit isolating switch
- one voltage transformer (phase-to-phase)

EMB:
- earthing switch
- connection bars
- operating mechanism CIT
- installation on 630 A IM 375 mm or DM1-A units (except additional enclosure or connection enclosure for cabling from above)
- require an key-type interlocks adapted to the switchboard network

Optional accessories:

SM and TM:
- auxiliary contacts
- additional enclosure
- key-type interlocks
- plinth
- 50 W heating element
- 1250 A three-phase upper busbars at Ir 630 A

SM:
- connection enclosure for cabling from above
- digital ammeter

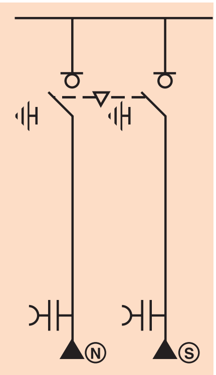
TM:
- mechanical indication system for blown fuses
- connection enclosure for cabling from above

EMB:
- auxiliary contacts

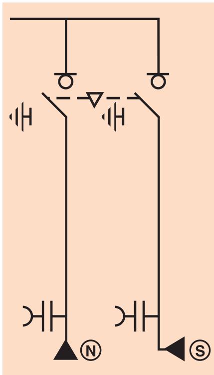
(1) only for 1250 A units.

Functional units selection
Change over

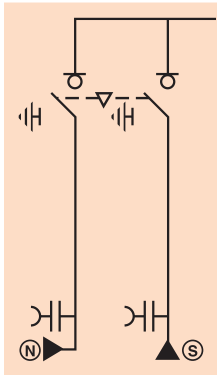
NSM-cables (750 mm)
Cables power supply for main incoming line (N) and standby line (S)



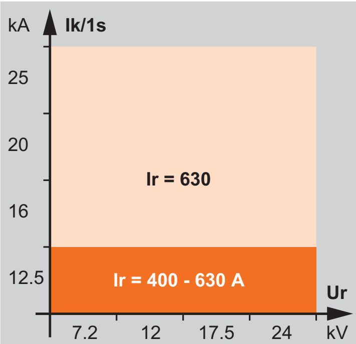
NSM-busbars (750 mm)
Cables power supply for main incoming line on left (N) and busbars for standby line (S) on right



NSM-busbars (750 mm)
Busbars power supply for main incoming line on left (N) and cables for standby line (S) on right



Electrical characteristics



Basic equipment:

- switches and earthing switches
- three-phase busbars
- connection pads for dry-type cables
- voltage presence indicator
- mechanical interlocking
- motorised operating mechanism CI2 with open/close coils
- additional enclosure
- automatic-control equipment (T200 S)

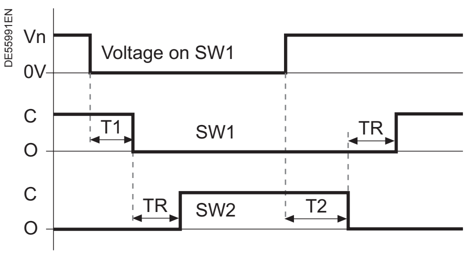
Optional accessories:

- auxiliary contacts
- key-type interlocks
- 50 W heating element
- plinth
- telecontrol
- visibility of main contacts
- pressure indicator device
- 1250 A three-phase upper busbars

Automatic Transfer System

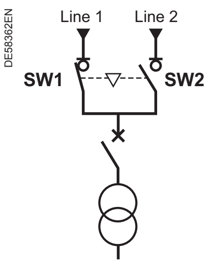
With NSM unit

Network back up



TR: transfer switch response time (< 180 ms - depending on switchgear).
■ Setting of time delay before switching: configurable from 0.1 s to **2 s** (T1) with step of 100 ms.
■ Setting of time delay for return to the initial state: configurable from 5 s to **120 s** (T2) with step of 5 s.
■ Transfer switch configurable with SW1→SW2 or SW2→SW1.

Note: **in bold** = default configuration.



Transfer switch (ACO 1/2)

ACO: Automatic Change-Over

The transfer switch automatic control system gives automatic control and management of sources in the MV secondary distribution network with voltage presence detectors.

Operating modes

Operating mode is selected using the Easergy T200 S configuration tool.

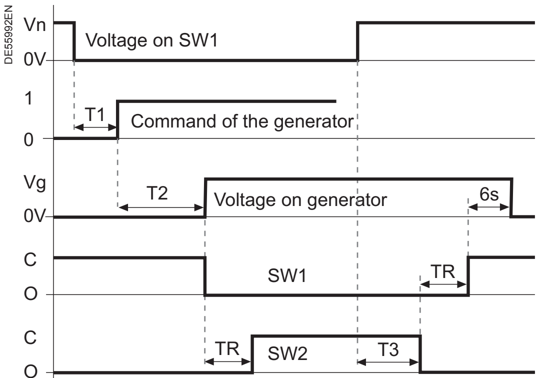
■ **Semi-Auto mode, SW1 ⟷ SW2**
When the voltage disappears on the channel in service, the automatic control switches to the other channel after a time delay T1. The automatic control does not switch back, unless there is a voltage break on the new channel in service.

■ **Mode SW1 → SW2, (SW2 → SW1)**
The automatic control only switches once from channel 1 or 2 to the back up channel.

■ **Mode Auto-SW1 or Auto-SW2**
Channel 1 or 2 is priority if its MV voltage is OK. After switching to the back up channel, the mode switches back to the priority channel if the MV voltage on this channel is OK for a period T2.

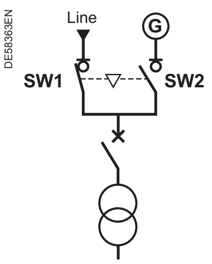
■ **Transfer time SW1 → SW2 for all modes**
It is between 0.34 s to 2.24 s depending on the set values.

Generator back up



TR: transfer switch response time (< 180 ms - depending on switchgear).
■ Setting of time delay before switching to the generator: configurable from 1 s to **15 s** (T1) with step of 1 s.
■ Start up of the generator (T2), depending on kind of generator, not configurable (time max. to wait: 30 s).
■ Switching when the generator voltage is present.
■ Setting of time delay for return to the initial state: configurable from 60 s to **120 s** with step of 5 s (T3).
■ Stopping the generator 6 s after switching.

Note: **in bold** = default configuration.



Switching sequence

■ **Switching takes place if the following conditions are fulfilled:**
□ automatic control on
□ SW1 open/SW2 closed or SW1 closed/SW2 open
□ “transfer locking” off
□ “earthing switch” on both channels off
□ MV voltage on the channel in service is absent
□ MV voltage on the other channel is present
□ no fault current.

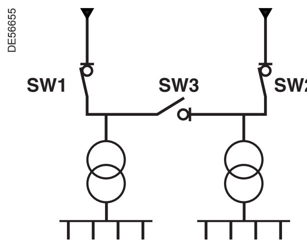
■ **Switching back to the main channel in “AUTO” modes is executed if:**
□ the priority channel is open
□ the MV voltage on the priority channel is OK for a time period of T2.

The closing order on the back up channel is given after confirming the opening of the channel in service.

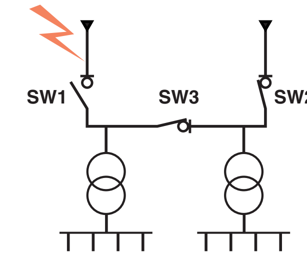
Source transfer locking

A digital input prohibits orders from the local control panel, the automatic control systems and the remote control supervisor.
This input is generally connected to the downstream circuit breaker.

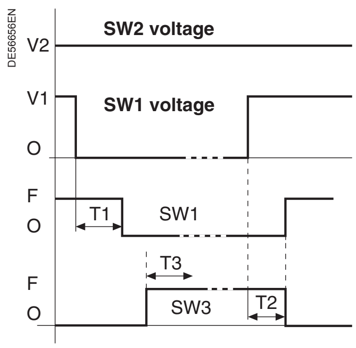
Automatic Transfer System (cont.)



"Normal" position



Active coupling



Configurable parameters:
- Operating mode
- Automatic return SW1/SW2
- Automation system on/off
- Delay before switching
T1: 100 ms to 60 s in 100 ms steps
- Delay before return
T2: 5 s to 300 s in 1 s steps
- Interlock delay on voltage loss
T3: 100 ms to 3 s in 100 ms steps
- Motorisation type: command time.

Bus tie coupling (BTA 2/3)

The BTA (Bus Tie Automatism) is an automation system for switching sources between two incoming lines (SW1 and SW2) and a busbar coupling switch (SW3). It must be used in conjunction with voltage presence detectors and the fault current detection function on the busbar incoming lines.

Operating mode

Operating mode is selected using Easergy T200 I configuration tool.

Two operating modes can be configured:
- Standard mode:
If the voltage is lost on one busbar, the automation system opens the incoming line (SW1 or SW2) and closes the coupling switch SW3. Coupling is conditional upon the absence of a fault current on the main source.
- Interlock on loss of voltage after switching mode:
After execution of the automation system in standard mode, the voltage presence is checked for a configurable period. If the voltage is lost during this period, the coupling switch SW3 is opened and the automation system interlocked.

Coupling sequence
- Coupling takes place if the following conditions are met:
  - the automation system is switched on
  - the switches on incoming channels SW1 and SW2 are closed
  - the earthing switches SW1, SW2 and SW3 are open
  - there is no voltage on an incoming line SW1 or SW2
  - there is no fault current detection on SW1 and SW2
  - there is no transfer interlock
  - voltage is present on the other incoming line.
- The coupling sequence in standard mode is as follows:
  - opening of the de-energised incoming line switch after a delay T1
  - closing of the coupling switch SW3.
- The coupling sequence in "Interlock on loss of voltage after coupling" mode is completed as follows:
  - monitoring of the voltage stability for a delay T3
  - opening of the coupling switch SW3 if this condition is not met
  - locking of BTA automation system.
- The system returns to standard mode after coupling if:
  - the "return to SW1 or SW2" option is activated
  - voltage on the channel has been normal for a delay T2
  - the automation system is activated
  - the automation system is not locked
  - □ there is no coupling interlock.

Coupling interlock

A digital input can be used to prohibit the issuing of orders from the local operator panel, the automation system and the remote control supervisor.
This input is generally connected to the downstream circuit breaker.

Locking the automation system

The BTA automation system is locked if one of the following conditions is met during the coupling process:
- Failure of a command to open or close a switch
- Indication that an earthing switch has closed
- Appearance of a fault current
- Switch power supply fault
- Appearance of the coupling interlock
- Manual or remote ON/OFF command from the automation system.

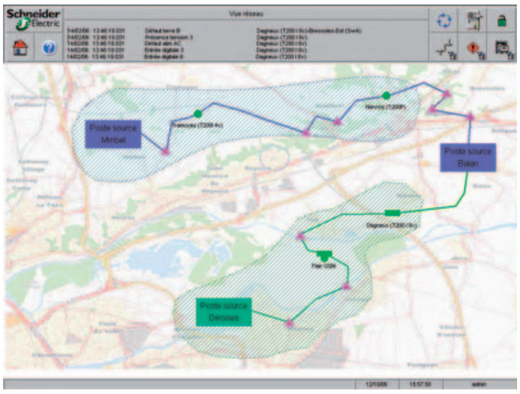
Network remote control and monitoring

Continuity of service guaranteed by an overall telecontrol offer

Schneider Electric offers you a complete solution, including:

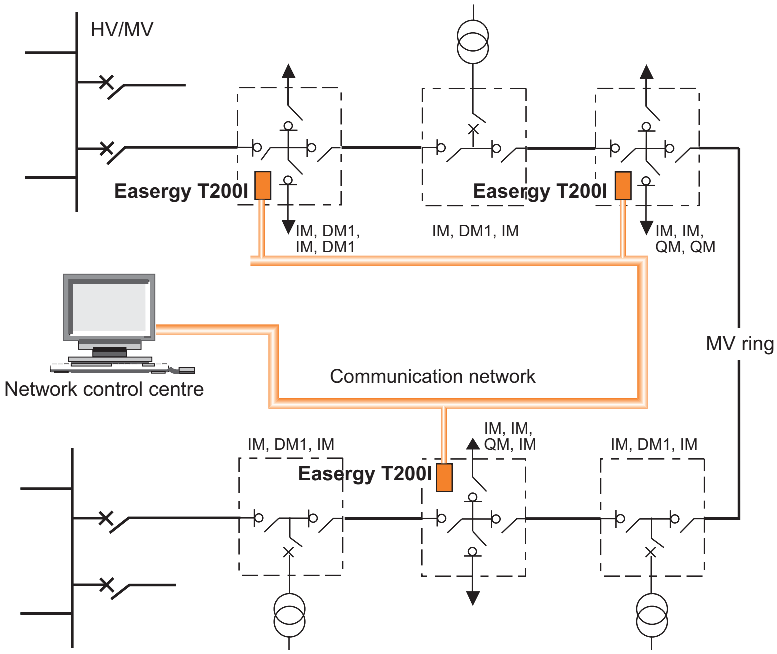
- the Easergy T200 I telecontrol interface,
- SM6 switchgear that is adapted for telecontrol,
- the Easergy L500 SCADA system.

PE56312

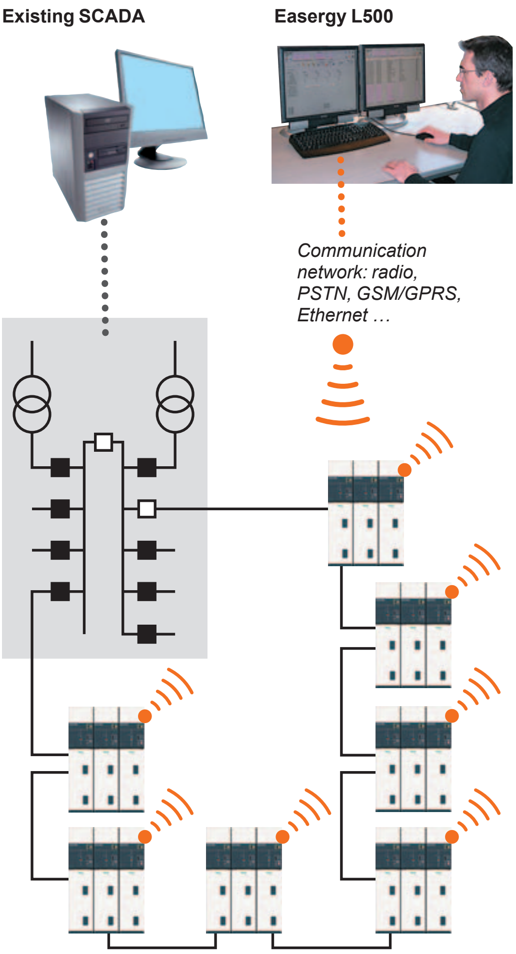


L500 network monitoring screen

DE53729EN



DE58403



SM6-24 range, more than ready

SM6-24 switchgear is perfectly adapted to the telecontrol context, thanks to options such as:

- LV control cabinet including T200 I,
- motorized operating mechanism,
- auxiliary fault and position indication contacts,
- current sensors for fault detection.

Easergy L500, a low cost solution to immediately improve your SAIDI*

** SAIDI: system average interruption duration index*

Easergy L500 is a SCADA providing all the functions needed to operate the MV network in real time

- Pre-configured with Easergy range products for monitoring and control of MV networks:
  - MV/LV substations equipped with T200 I or Flair 200C
  - overhead LBS equipped with T200 P
  - overhead line equipped with Flite 116/G200
- Broad range of transmission supports: Radio, GSM, GPRS, PSTN, LL, FO.

Advantages

- Simple implementation:
  - one to two weeks only for 20 MV/LV units
  - configuration, training and handling within a few days
- Simple and fast evolutions by operations managers
- Short return on investment
- Service quality and operations rapidly improved.

Operating mechanisms

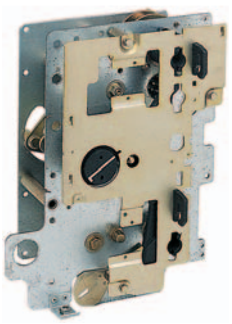
The control devices required for the unit operating mechanisms are centralised on the front panel. The different types of operating mechanism are presented in the table opposite.
Operating speeds do not depend on the operator, except for the CS.
For the interlocks, consult the table pages 56 to 57 according to concerned cubicles.

Units	Type of operating mechanism						
	Switch/disconnector					Circuit breaker	
	CIT	CI1	CI2	CS	CC	RI	P2
IM, IMB, IMC	■	□	□				
PM	■						
QM, QMC, QMB		■	□				
CM, CM2, CRM				■			
DM1-A, DM1-D, DM1-S, DM1-Z, DM2, DMVL-A				■		■	
DM1-A(*), DM1-W				■	■	■	
DMV-A, DMV-D, DMV-S	■						■
NSM-cables, NSM-busbars			■				
GAM					■		
SM, TM				■			
EMB	■						

■ Provided as standard
□ Other possibility
(*) 1250 A version

Operating mechanism types	CIT		CI1		CI2			CS1	
Unit applications	Load-break switch Fused switch		Load-break switch Fuse switch combination		Load-break switch Fuse switch combination			Disconnector	
Main circuit switch	Closing	Opening	Closing	Opening	Mechanism charging	Closing	Opening	Closing	Opening
Manual operating mode	Hand lever	Hand lever	Hand lever	Push button	Hand lever	Push button	Push button	Hand lever	Hand lever
Electrical operating mode (option)	Motor	Motor	Motor	Coil	Motor	Coil	Coil	N/A	N/A
Speed of operation	1 to 2 s	1 to 2 s	4 to 7 s	35 ms	4 to 7 s	55 ms	35 ms	N/A	N/A
Network applications	Remote control network management		Remote control transformer protection		Remote control network management, need of quick reconfiguration (generator source, loop)			N/A	
Earthing switch	Closing	Opening	Closing	Opening	N/A	Closing	Opening	Closing	Opening
Manual operating mode	Hand lever	Hand lever	Hand lever	Hand lever	Hand lever	Hand lever	Hand lever	Hand lever	Hand lever

61029N



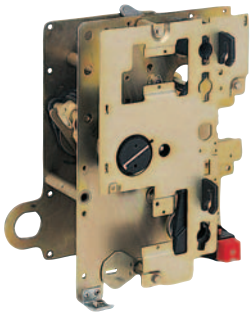
Double-function operating mechanism CIT

■ **Switch function**
Independent-operation opening or closing by lever or motor.
■ **Earthing-switch function**
Independent-operation opening or closing by lever.
Operating energy is provided by a compressed spring which, when released, causes the contacts to open or close.
■ **Auxiliary contacts**
□ switch (2 O + 2 C)*,
□ switch (2 O + 3 C) and earthing switch (1 O + 1 C),
□ switch (1 C) and earthing switch (1 O + 1 C) if motor option.
■ **Mechanical indications**
Fuses blown in unit PM.
■ **Motor option**

(*) Included with the motor option

Operating mechanisms

61030N

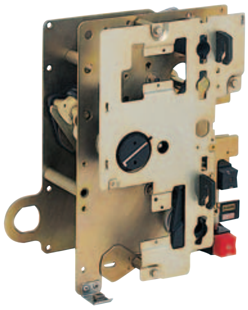


Double-function operating mechanism CI1

■ **Switch function**
□ independent-operation closing by lever or motor.
Operating energy is provided by a compressed spring which, when released, causes the contacts to open to close.
□ independent-operation opening by push-button (O) or trip units.
■ **Earthing-switch function**
Independent-operation closing and opening by lever.
Operating energy is provided by a compressed spring which, when released, causes the contacts to open or close.
■ **Auxiliary contacts**
□ switch (2 O + 2 C)*,
□ switch (2 O + 3 C) and earthing switch (1 O + 1 C),
□ switch (1 C) and earthing switch (1 O + 1 C) if motor option,
□ fuses blown (1 C).
■ **Mechanical indications**
Fuses blown in units QM.
■ **Opening releases**
□ shunt trip,
□ undervoltage for unit QM.
■ **Motor option**

(*) Included with the motor option.

61031N

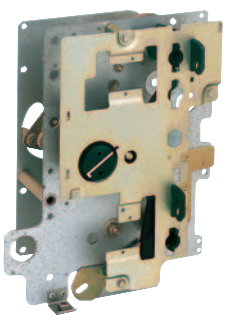


Double-function operating mechanism CI2

■ **Switch function**
□ independent-operation closing in two steps:
1 - operating mechanism recharging by lever or motor,
2 - stored energy released by push-button (I) or trip unit.
□ independent-operation opening by push-button (O) or trip unit.
■ **Earthing-switch function**
Independent-operation closing and opening by lever.
Operating energy is provided by a compressed spring which, when released, causes the contacts to open or close.
■ **Auxiliary contacts**
□ switch (2 O + 2 C)*,
□ switch (2 O + 3 C) and earthing switch (1 O + 1 C),
□ switch (1 C) and earthing switch (1 O + 1 C) if motor option.
■ **Opening release shunt trip**
■ **Closing release shunt trip**
■ **Motor option**

(*) Included with the motor option.

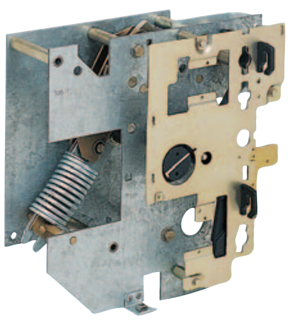
61032N



Double-function operating mechanism CS

■ **Switch and earth switch functions**
Dependent-operation opening and closing by lever.
■ **Auxiliary contacts**
□ disconnector (2 O + 2 C) for units DM1-A, DM1-D, DM1-W, DM2 and CRM without VT,
□ disconnector (2 O + 3 C) and earthing switch (1 O + 1 C) for units DM1-A, DM1-D, DM1-W, DM2 and CRM without VT,
□ disconnector (1 O + 2 C) for units CM, CM2, TM, DM1-A, DM1-D, DM2 and CRM with VT.
■ **Mechanical indications**
Fuses blown in units CM, CM2 and TM.

61033N



Single-function operating mechanism CC

■ **Earthing switch function**
Independent-operation opening and closing by lever.
Operating energy is provided by a compressed spring which, when released, provokes opening or closing of the contacts.
■ **Auxiliary contacts**
Earthing switch (1 O + 1 C).

Operating mechanisms

PE57163

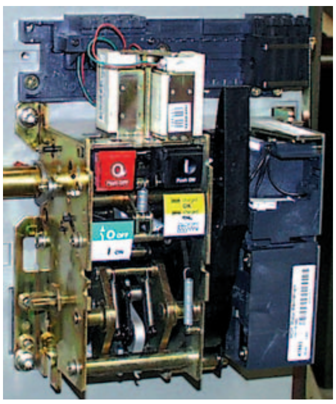
Single-function operating mechanism for the SF circuit breaker and Evolis 24 kV lateral

■ **Circuit-breaker function**
□ independent-operation closing in two steps.
First operating mechanism recharge by motor or lever, then release of the stored energy by push-button (I) or trip unit.
□ independent-operation opening by push-button (O) or trip units.
■ **Auxiliary contacts**
□ circuit breaker (4 O + 4 C),
□ mechanism charged (1 C).
■ **Mechanical indications**
Operation counter.
■ **Opening releases**
□ Mitop (low energy),
□ shunt trip,
□ undervoltage.
■ **Closing release**
□ shunt trip
■ **Motor option** (option and installation at a later date possible).

Possible combinations between opening releases

Release type	SF1						SFset			
	Combinations						Combinations			
	1	2	3	4	5	6	1	2	3	4
Mitop (low energy)	■	■	■				■	■	■	
Shunt trip		■		■	■			■		
Undervoltage			■		■	■				■

61035N

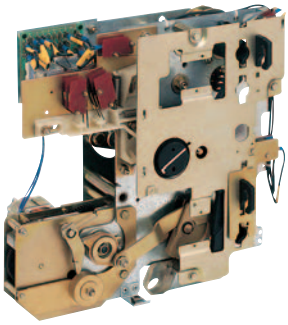


P2 stored energy operating mechanism for the Evolis circuit breaker 17.5 kV frontal

■ **Circuit-breaker function**
□ independent-switching operating closing in two steps.
First operating mechanism recharge by motor or lever, then release of the stored energy by push-button (I) or trip unit.
□ independent-operation opening by push-button (O) or trip units.
□ spring energy release.
■ **Auxiliary contacts**
□ circuit breaker (4 O + 4 C),
□ mechanism charged (1 C).
■ **Mechanical indications**
Operation counter.
■ **Opening releases**
□ Mitop (low energy),
□ shunt trip,
□ undervoltage.
■ **Closing release**
□ shunt trip
■ **Motor option** (option and installation at a later date possible).

Auxiliaries

61036N



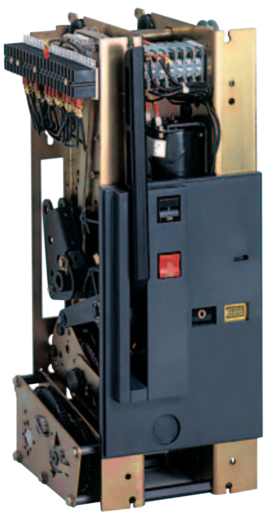
Motor option and releases for switch-units

The operating mechanisms CIT, CI1 and CI2 may be motorised.

Un		DC					AC (50 Hz)*	
Power supply	(V)	24	48	110	125	220	120	230
Motor option								
	(W)	200						
	(VA)						200	
Operating time for CIT		1 to 2 (s)					1 to 2 (s)	
Charging time for CI1, CI2		4 to 7 (s)					4 to 7 (s)	
Opening releases								
Shunt trip	(W)	200	250	300	300	300		
	(VA)						400	750
Response time	(ms)	35					35	
Undervoltage								
Pick-up	(W)	160						
	(VA)						280	550
Hold	(W)	4						
	(VA)						50	40
Response time	(ms)	45					45	
Closing release								
Shunt trip	(W)	200	250	300	300	300		
	(VA)						400	750
Response time	(ms)	55					55	

** Please consult us for other frequencies.*

PE57164



Motor option and releases for SF6 type circuit breakers and Evolis 24 kV lateral

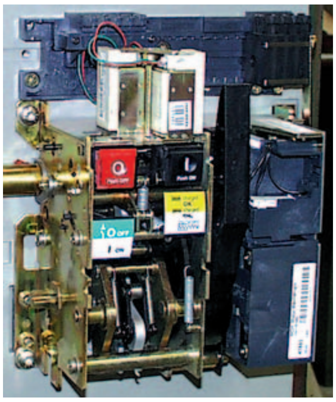
Operating mechanism RI may be equipped with the motor option for the recharging function.

Un		DC					AC (50 Hz)*	
Power supply	(V)	24	48	110	125	220	120	230
Motor option								
	(W)	300						
	(VA)							380
Charging time	(s)	15					15	
Opening releases								
Mitop (low energy)	(W)	3						
Response time	(ms)	30					30	
Shunt trip	(W)	85						
	(VA)							180
Response time	(ms)	45					45	
Undervoltage								
Pick-up	(W)	160						
	(VA)						280	550
Hold	(W)	10						
	(VA)						50	40
Response time	(ms)	55					55	
Closing release								
Shunt trip	(W)	85						
	(VA)							180
Response time	(ms)	65					65	

** Please consult us for other frequencies.*

Auxiliaries

61035N



Motor option and releases for Evolis circuit breakers 17.5 kV frontal

Charging motor and associated mechanism (P2)					
Power supply	(Vac 50/60 Hz)		48/60	100/130	200/240
	(Vdc)	24/30	48/60	100/125	200/250
Threshold		0.85 to 1.1 Ur			
Consumption	(VA or W)	180			
Motor overcurrent		2 to 3 Ir during 0.1 s			
Charging time		6 s max.			
Switching rate		3 cycles per minute max.			
CH contact		10 A 240 V			
Opening release (MITOP low energy)					
Power supply		Direct current			
Threshold		0.6 A < I < 3 A			
Response time to the circuit breaker at Ur		50 ms (protection relay setting)			
Opening release (MX)					
Power supply	(Vac 50/60 Hz)	24	48	100/130	200/250
	(Vdc)	24/30	48/60	100/130	200/250
Threshold		0.7 to 1.1 Ur			
Consumption	(VA or W)	Pick-up: 200 (during 200 ms)			
		Hold: 4.5			
Response time to the circuit breaker at Ur		50 ms ± 10			
Closing release (XF)					
Power supply	(Vac 50/60 Hz)	24	48	100/130	200/250
	(Vdc)	24/30	48/60	100/130	200/250
Threshold		0.85 to 1.1 Ur			
Consumption	(VA or W)	Pick-up: 200 (during 200 ms)			
		Hold: 4.5			

Current transformers

Current transformers synthesis in SM6-24 cubicles (by unit)

Units / CTs	QMC	CRM	DM1-A	DM1-D	DM1-W	DM2	GBC-A	GBC-B	DMVL-A	DMV-A	DMV-D	IMC	DM1-A	DM1-D	DM1-W	DM1-Z	GBC-A	GBC-B	DMV-A	DMV-D
			630 A										1250 A							
ARJP1	■	■																		
ARM3			■	■	■	■	■	■	■											
ARJP2										■	■	■								
ARJP3													■	■	■	■	■	■	■	■
CLP2				■	■															
TLP130			■																	

61040N

Transformer ARJP1/N2F (QMC)
- characteristics according to IEC standard 60044-1
- single primary winding
- double secondary winding for measurement and protection.

Short-time withstand current Ith (kA)

I1n (A)		10	20	30	50	75	100	150	200
Ith (kA)		1.2	2.4	3.6	6	10	10	10	10
t (s)		1							
Measurement and protection	5 A	15 VA - class 0.5							
	5 A	2.5 VA - 5P20							

61040N

Transformer ARJP1/N2F (CRM)
- characteristics according to IEC standard 60044-1
- single primary winding
- double secondary winding for measurement and protection.

Short-time withstand current Ith (kA)

I1n (A)		50	100	150	200
Ith (kA)		6	10		
t (s)		1			
Measurement and protection	5 A	15 VA - class 0.5			
	5 A	2.5 VA - 5P20			

Note: *please consult us for other characteristics.*

61041N

Transformer ARM3/N2F
- characteristics according to IEC standard 60044-1
- double primary winding
- single secondary winding for measurement and protection.

Short-time withstand current Ith (kA)

I1n (A)		10/20	20/40	50/100	100/200	200/400	300/600
Ith (kA)		5	12.5	12.5/21*	12.5/25*	12.5/25*	25
t (s)		1	0.8	1			
Measurement and protection	5 A	7.5 VA - class 0.5					
	1 A	1 VA - 10P30					
	5 A	5 VA - 5P10		5 VA - 5P15			

** For 5 A protection*

- characteristics according to IEC standard 60044-1
- double primary winding
- double secondary winding for measurement and protection.

Short-time withstand current Ith (kA)

I1n (A)		50/100	100/200	200/400	300/600
Ith (kA)		14.5	25	25	25
t (s)		1			
Measurement and protection	5 A	30 VA - class 0.5			
	5 A	5 VA - 5P15	7.5 VA - 5P15		
	5 A	7.5 VA - 5P10	15 VA - 5P10		

Current transformers

61042N

Transformer ARJP2/N2F

- characteristics according to IEC standard 60044-1
- single primary winding
- double secondary winding for measurement and protection.

Short-time withstand current Ith (kA)

I1n (A)		50	100	200	400	600
Ith (kA)		25				
t (s)		1				
Measurement and protection	5 A	10 VA class 0.5	15 VA class 0.5	15 VA class 0.5	15 VA class 0.5	20 VA class 0.5
	5 A	2.5 VA 5P20	2.5 VA 5P20	5 VA 5P20	5 VA 5P20	7.5 VA 5P20

61044N

Transformer ARJP3/N2F

- characteristics according to IEC standard 60044-1
- single primary winding
- double secondary winding for measurement and protection.

Short-time withstand current Ith (kA)

I1n (A)		1000	1250
Ith (kA)		25	
t (s)		1	
Measurement and protection	1 A	30 VA - class 0.5	
	1 A	10 VA - 5P20	
Measurement and protection	5 A	30 VA - class 0.5	
	5 A	10 VA - 5P20	

PE55661

Low Power Current Transformer (LPCT) CLP2

- characteristics according to IEC standard 60044-8
- large primary current range
- direct output voltage for measurement and protection
- RJ45-8 pts secondary connector
- insulation level 24 kV.

Minimum rated primary current	5 A
Rated nominal primary current	100 A
Rated extended primary current	1250 A
Rated nominal secondary output	22.5 mV
Accuracy class for measurement	0.5
Accuracy class for protection	5P
Accuracy limit factor	400
Rated short time thermal current	40 kA 1 s
Highest voltage (Um)	24 kV
Rated power-frequency withstand	50 kV

PE57162

Low Power Current Transformer (LPCT) TLP130

- characteristics according to IEC standard 60044-8
- large primary current range
- direct output voltage for measurement and protection
- RJ45-8 pts secondary connector
- insulation level 0.72 kV
- internal diameter 130 mm.

Minimum rated primary current	5 A
Rated nominal primary current	100 A
Rated extended primary current	1250 A
Rated nominal secondary output	22.5 mV
Accuracy class for measurement	0.5
Accuracy class for protection	5P
Accuracy limit factor	250
Rated short time thermal current	25 kA 1 s
Highest voltage (Um)	0.72 kV
Rated power-frequency withstand	3 kV

Voltage transformers

Voltage transformers synthesis in SM6-24 cubicles (by unit)

VTs \ Units	CM	DM1-A	DM1-D	DM1-W	DM2	GBC-A	GBC-B	DMVL-A	DMV-A	DMV-D	CM2	TM
VRQ2-n/S1	■	■	■	■	■	■	■	■				
VRFR-n/S1									■	■		
VRC2/S1						■	■				■	
VRM3-n/S2						■	■					
VCT24												■

61045N

Transformer VRQ2-n/S1 (phase-to-earth) 50 or 60 Hz
- characteristics according to IEC standard 60044-2.

Rated voltage (kV)	24			
Primary voltage (kV)	10/√3	15/√3	15-20/√3	20/√3
Secondary voltage (V)	100/√3			
Thermal power (VA)	250			
Accuracy class	0.5			
Rated output for single primary winding (VA)	30	30		30
Rated output for double primary winding (VA)			30-50	

Transformer VRFR-n/S1 (phase-to-earth) 50 or 60 Hz
- characteristics according to IEC standard 60044-2.

Rated voltage (kV)	17.5	
Primary voltage (kV)	10/√3	15/√3
Secondary voltage (V)	100/√3	
Thermal power (VA)	250	
Accuracy class	0.5	
Rated output for single primary winding (VA)	30	

61046N

Transformer VRC2/S1 (phase-to-phase) 50 or 60 Hz
- characteristics according to IEC standard 60044-2.

Rated voltage (kV)	24		
Primary voltage (kV)	10	15	20
Secondary voltage (V)	100		
Thermal power (VA)	500		
Accuracy class	0.5		
Rated output for single primary winding (VA)	50		

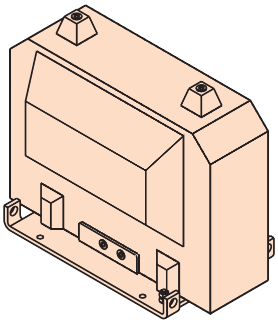
PE55648

Transformer VRM3-n/S2 (phase-to-earth and protected by fuses 0.3 A) 50 or 60 Hz
- characteristics according to IEC standard 60044-2.

	Rated voltage (kV)	12	17.5	24
	Primary voltage (kV)	10/√3	15/√3	20/√3
	Secondary voltage (V)	100/√3 - 100/3		
First secondary	Thermal power (VA)	200		
	Accuracy class	0.5		
	Rated output for single primary (VA)	30-50		
Second secondary	Thermal power (VA)	100		
	Accuracy class	3P		
	Rated output	50		

Voltage transformers

DE53562

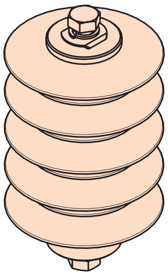


Transformer VCT24 (phase-to-phase) 50 or 60 Hz

Rated voltage (kV)	24		
Primary voltage (kV)	10	15	20
Secondary voltage (V)	220		
Output (VA)	2500	2500	2500
		4000	4000

Note: *the above mentioned voltage transformers are grounded neutral.*
For other characteristics, please consult us.

DE58408



Surge arrester

For units IM500, DM1-A, DM1-W, GAM, DMV-A*, DMVL-A

In (A) (unit)	400/630				
Un (kV) (unit)	7.2	10	12	17.5	24

Note: *the rated voltage of the surge arrester is according to unit's rated voltage.*
(*) limited up to 17.5 kV for DMV-A circuit breaker cubicles.

Protection of transformers

PE57161

Fuse ratings for SM6-24 protection units such as PM, QM, QMB and QMC depend, among other things, on the following criteria:

- service voltage
- transformer rating
- fuse technology (manufacturer)

Different types of fuses with medium loaded striker may be installed:

- □ Solefuse fuses as per standard UTE NCF 64.210
- □ Fusarc CF fuses as per IEC recommendation 60.282.1 and DIN dimensions 43.625.

For fuse-switch combination unit type QM, QMB, QMC, refer only to the selection table and reference list of fuses. For all other type of fuses, consult us.

Example: for the protection of a 400 kVA transformer at 10 kV, select either Solefuse fuses rated 43 A or Fusarc CF fuses rated 50 A.

Fuse selection table

The color code is linked to the rated voltage of the fuse.
Rating in A - no overload at –5°C < t < 40°C.
Please consult us for overloads and operation over 40°C for France Transfo oil immersed type transformers.

Type of fuse	**Service voltage** (kV)	**Transformer rating** (kVA) 25	50	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	**Rated voltage** (kV)
Solefuse (UTE NFC standards 13.100. 64.210)																			
	5.5	6.3	16	31.5	31.5	63	63	63	63	63									**7.2**
	10	6.3	6.3	16	16	31.5	31.5	31.5	63	63	63	63							
	15	6.3	6.3	16	16	16	16	16	43	43	43	43	43	63					
	20	6.3	6.3	6.3	6.3	16	16	16	16	43	43	43	43	43	63				**24**
Solefuse (general case, UTE NFC standard 13.200)																			
	3.3	16	16	31.5	31.5	31.5	63	63	100	100									**7.2**
	5.5	6.3	16	16	31.5	31.5	63	63	63	80	80	100	125						
	6.6	6.3	16	16	16	31.5	31.5	43	43	63	80	100	125	125					
	10	6.3	6.3	16	16	16	31.5	31.5	31.5	43	43	63	80	80	100				**12**
	13.8	6.3	6.3	6.3	16	16	16	16	31.5	31.5	31.5	43	63	63	80				**17.5**
	15	6.3	6.3	16	16	16	16	16	31.5	31.5	31.5	43	43	63	80				
	20	6.3	6.3	6.3	6.3	16	16	16	16	31.5	31.5	31.5	43	43	63				**24**
	22	6.3	6.3	6.3	6.3	16	16	16	16	16	31.5	31.5	31.5	43	63	63			
Fusarc CF and SIBA[1] (general case for QM, QMB and QMC cubicle according to IEC 62271-105)																			
	3.3	16	25	40	50	50	80	80	100	125	125	160[1]	200[1]						**7.2**
	5	10	16	31.5	40	40	50	63	80	80	125	125	160[1]						
	5.5	10	16	31.5	31.5	40	50	50	63	80	100	125	125	160[1]	160[1]				
	6	10	16	25	31.5	40	50	50	63	80	80	125	125	160[1]	160[1]				
	6.6	10	16	25	31.5	40	50	50	63	80	80	100	125	125	160[1]				
	10	6.3	10	16	20	25	31.5	40	50	50	63	80	80	100	100	125[1]	200[1]		**12**
	11	6.3	10	16	20	25	25	31.5	40	50	50	63	80	100	100	125[1]	160[1]		
	13.8	6.3	10	16	16	20	25	31.5	31.5	40	50	50	63	80	80	100[1]	125[1]	125[1]	**17.5**
	15	6.3	10	10	16	16	20	25	31.5	40	50	50	63	80	80	100[1]	125[1]	125[1]	
	20	6.3	6.3	10	10	16	16	25	25	31.5	40	40	50	50	63	80	100[1]	125[1]	**24**
	22	6.3	6.3	10	10	10	16	20	25	25	31.5	40	40	50	50	80	80	100[1]	

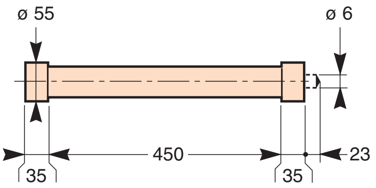
(1) = SIBA fuses

Protection of transformers

Fuses dimensions

Solefuse (UTE standards)

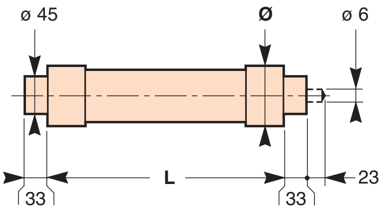
DE53563



Ur (kV)	Ir (A)	L (mm)	Ø (mm)	Weight (kg)
7.2	6.3 to 125	450	55	2
12	100	450	55	2
17.5	80	450	55	2
24	6.3 to 63	450	55	2

Fusarc CF

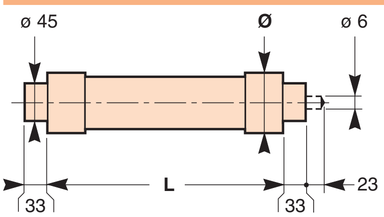
DE53564



Ur (kV)	Ir (A)	L (mm)	Ø (mm)	Weight (kg)
7.2	125	292	86	3.3
12	6.3	292	50.5	1.2
	10	292	50.5	1.2
	16	292	50.5	1.2
	20	292	50.5	1.2
	25	292	57	1.5
	31.5	292	57	1.5
	40	292	57	1.5
	50	292	78.5	2.8
	63	292	78.5	2.8
	80	292	78.5	2.8
	100	292	78.5	2.8
24	6.3	442	50.5	1.6
	10	442	50.5	1.6
	16	442	50.5	1.6
	20	442	50.5	1.6
	25	442	57	2.2
	31.5	442	57	2.2
	40	442	57	2.2
	50	442	78.5	4.1
	63	442	78.5	4.1
	80	442	86	5.3

SIBA

DE53564



Ur (kV)	Ir (A)	L (mm)	Ø (mm)	Weight (kg)
7.2	160	292	85	3.8
	200	292	85	5.4
12	125	292	67	2
	160	292	85	3.8
	200	292	85	3.8
17.5	125	442	85	5.4
24	100	442	85	5.4
	125	442	85	5.4

Motors protection with CRM units

The current rating of fuses installed in CRM units depends on:
- motor current rating In
- starting current Id
- frequency of starts.

The fuses rating is calculated such that a current equal to twice the starting current does not blow the fuse within period equal to the starting time.
The adjacent table indicated the ratings which should be used, based on the following assumptions:
- direct on-line startup
- $Id/In \leqslant 6$
- pf = 0.8 ($P \leqslant 500$ kW) or 0.9 ($P > 500$ kW)
- η = 0.9 ($P \leqslant 500$ kW) or 0.94 ($P > 500$ kW).

The indicated values are for Fusarc fuses (to DIN standard 43-625).

Example:
Consider a 950 kW motor at 5 kV.

$$In = \frac{P}{\sqrt{3} \cdot U \cdot \eta \cdot pf} = 130\ A$$

Id = 6 x In = 780 A

Then select the next higher value, i.e. 790 A.
For six 5-second starts per hour, select fuses rated 200 A.

***Note:** the same motor could not be protected for 12 starts per hour since the maximum service voltage for the required 250 A rated fuses is 3.3 kV.*

Selection of fuses

The color code is linked to the rated voltage of the fuse.

Starting current (A)	Starting time (s) 5		10		20		Maximum service voltage (kV)
	Number of starts per hour						
	6	12	6	12	6	12	
1410	250						
1290	250	250	250				
1140	250	250	250	250	250		
1030	250	250	250	250	250	250	**3.3**
890	250	250	250	250	250	250	
790	200	250	250	250	250	250	
710	200	200	200	250	250	250	
640	200	200	200	200	200	250	
610	200	200	200	200	200	200	**6.6**
540	160	200	200	200	200	200	
480	160	160	160	200	200	200	
440	160	160	160	160	160	200	
310	160	160	160	160	160	160	
280	125	160	160	160	160	160	
250	125	125	125	160	160	160	
240	125	125	125	125	125	160	
230	125	125	125	125	125	125	
210	100	125	125	125	125	125	
180	100	100	100	100	100	125	
170	100	100	100	100	100	100	**11**

Maximum switchable power (kW)
(direct on-line startup, six 5 sec. starts per hour)

Service voltage (kV)		3.3	4.16	5	5.5	6	6.6	10	11
Without fuses		1550	1960	2360	2590	2830	3110	4710	5180
With fuses	100 A	140	180	215	240	260	285	435	480
	200 A	625	800	960	1060	1155	1270		
	250 A	1135							

Access to fuses

Access is via the front with the front panel removed.
Fuses may be removed without tools by simply pulling them forward.
The field deflector pivots and automatically returns to its position.

Replacement of fuses

When fault clearance results in one or two blown fuses, it is still common practice to replace only the blown fuses.

However, though the remaining fuse(s) may apparently be in good condition, their operating characteristics are generally reduced due to the short-circuit.

If non-blown fuses remain in service, they may blow even at very low overcurrent values.
In systems where continuity of service is of importance, it is recommended to **replace all three fuses**, in compliance with IEC recommendation 60282.1.

Please note: all three fuses must come from the same range: Solefuse or Fusarc CF (they have different fusion curves).

Interlocks

Switch units

■ **the switch can be closed** only if the earthing switch is open and the access panel is in position.
■ **the earthing switch can be closed** only if the switch is open.
■ **the access panel for connections can be opened** only if the earthing switch is closed.
■ **the switch is locked** in the open position when the access panel is removed. The earthing switch may be operated for tests.

Circuit-breaker units

■ **the disconnector(s) can be closed** only if the circuit breaker is open and the front panel is locked (interlock type 50).
■ **the earth switch(es) can be closed** only if the disconnector(s) is/are open.
■ **the access panel for connections can be opened** only if:
□ the circuit breaker is locked open,
□ the disconnector(s) is/are open,
□ the earth switch(es) is/are closed.

***Note:** it is possible to lock the disconnector(s) in the open position for no-load operations with the circuit breaker.*

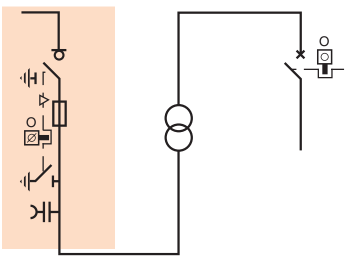
Functional interlocks

These comply with IEC recommendation 62271-200 and EDF specification HN 64-S-41.
In addition to the functional interlocks, each disconnector and switch include:
■ **built-in padlocking** capacities (padlocks not supplied)
■ **four knock-outs** that may be used for keylocks (supplied on request) for mechanism locking functions.

Unit interlock

Units	Interlock										
	A1	C1	C4	A3	A4	A5	50	P1	P2	P3	P5
IM, IMB, IMC				■	■			■			
PM, QM, QMB, QMC, DM1-A, DM1-D, DM1-W, DM1-Z, DM1-S, DMV-A, DMV-D, DMV-S, DMVL-A	■	■	■				■				
CRM		■									
NSM				■				■			
GAM						■	■				■
SM									■	■	
DM2							■				

DE53565
A1 type

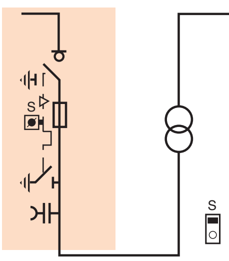


Key-type interlocks

Outgoing units

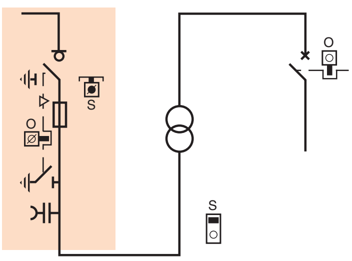
Aim:
■ to prevent the closing of the earthing switch on a transformer protection unit unless the LV circuit breaker is locked in "open" or "disconnected" position.

DE53566
C1 type



■ to prevent the access to the transformer if the earthing switch for transformer protection has not first been closed.

DE53567
C4 type



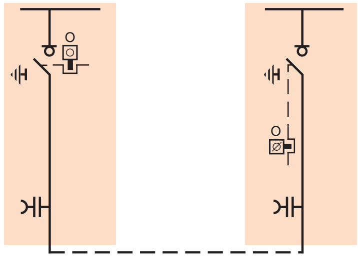
■ to prevent the closing of the earthing switch on a transformer protection unit unless the LV circuit breaker is locked in "open" or "disconnected" position.
■ to prevent the access to the transformer if the earthing switch for transformer protection has not first been closed.

MT20240EN
Legend for key-type interlocks:
no key free key captive key panel or door

Interlocks

DE53568

A3 type



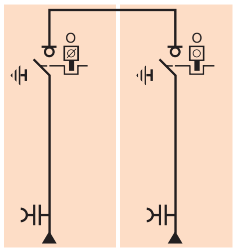
Ring units

Aim:

■ to prevent the closing of the earthing switch of a load-side cubicle unless the line-side switch is locked “open”.

DE53569

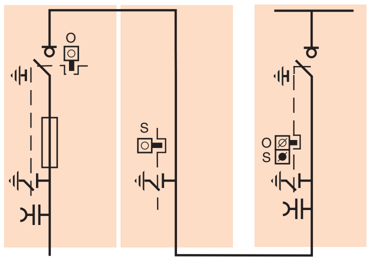
A4 type



■ to prevent the simultaneous closing of two switches.

DE53570

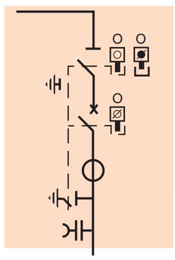
A5 type



■ to prevent the closing of the earthing switch of the casing unit unless the downstream and the upstream switches are locked in the “open” position.

DE53571

50 type



Prevents

■ on-load switching of the disconnectors.

Allows

■ off-load operation of the circuit breaker with the disconnectors open (double isolation).
■ off-load operation of the circuit breaker with the disconnector open (single isolation).

MT20240EN

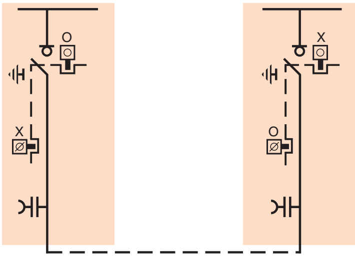
Legend for key-type interlocks:

no key | free key | captive key | panel or door

Interlocks

DE53572

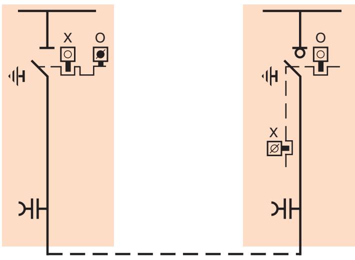
P1 type



■ to prevent the closing of an earthing switch if the switch of the other unit has not been locked in the “open” position.

DE53573

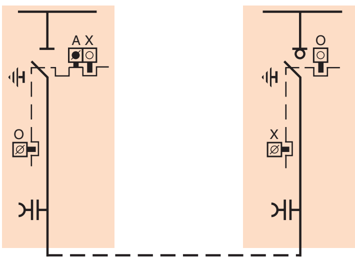
P2 type



■ to prevent on-load operation of the disconnector unless the switch is locked “open”
■ to prevent the closing of the earthing switches unless the disconnector and the switch are locked “open”.

DE53574

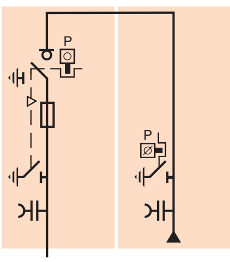
P3 type



■ to prevent on-load operation of the disconnector unless the switch is locked “open”
■ to prevent the closing of the earthing switches with the unit energised, unless the disconnector and the switch are locked “open”
■ to allow off-load operation of the switch.

DE53575

P5 type



■ to prevent the closing of the earthing switch of the incoming unit unless the disconnector and the switch is locked “open”.

MT20240EN

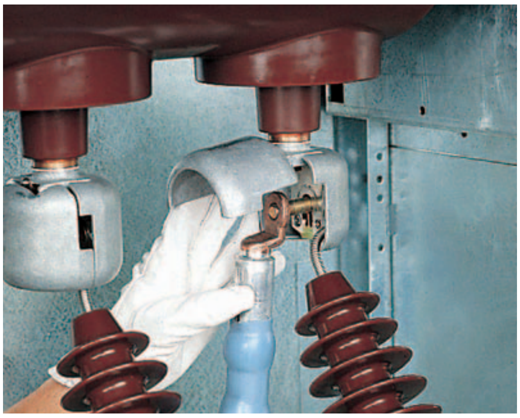
Legend for key-type interlocks:

no key   free key   captive key   panel or door

Contents

Connections selection table

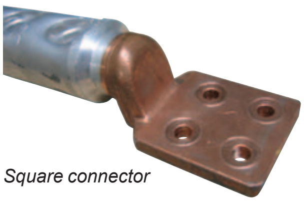
61048N



PE50775

Round connector

PE50776



Square connector

The ageing resistance of the equipment in an MV/LV substation depends on three key factors:

■ **the need to make connections correctly**
New cold fitted connection technologies offer ease of installation that favours resistance over time. Their design enables operation in polluted environments under severe conditions.

■ **the impact of the relative humidity factor**
The inclusion of a heating element is essential in climates with high humidity levels and with high temperature differentials.

■ **ventilation control**
The dimension of the grills must be appropriate for the power dissipated in the substation. They must only traverse the transformer area.

Network cables are connected:
■ on the switch terminals
■ on the lower fuse holders
■ on the circuit breaker's connectors.
The bimetallic cable end terminals are:
■ round connection and shank for cables ⩽ 240 mm^2
■ square connection round shank for cables > 240 mm^2 only.
Crimping of cable end terminals to cables must be carried out by stamping.
The end connectors are of cold fitted type
Schneider Electric's experience has led it to favour this technology wherever possible for better resistance over time.
The maximum admissible cable cross section:
■ 630 mm^2 for 1250 A incomer and feeder cubicles
■ 240 mm^2 for 400-630 A incomer and feeder cubicles
■ 120 mm^2 for contactor cubicles
■ 95 mm^2 for transformer protection cubicles with fuses.
Access to the compartment is interlocked with the closing of the earthing disconnector.
The reduced cubicle depth makes it easier to connect all phases.
A 12 mm Ø pin integrated with the field distributor enables the cable end terminal to be positioned and attached with one hand. Use a torque wrench set to 50 mN.

Dry-type single-core cable

Short inner end, cold fitted

Performance	Cable end terminal type	X-section mm^2	Supplier	Number of cables	Comments
3 to 24 kV 400 A - 630 A	Round connector	50 to 240 mm^2	All cold fitted cable end suppliers: Silec, 3M, Pirelli, Raychem, etc.	1 or 2 per phase	For larger x-sections, more cables and other types of cable end terminals, please consult us
3 to 24 kV 1250 A	Round connector	50 to 630 mm^2	All cold fitted cable end suppliers: Silec, 3M, Pirelli, Raychem, etc.	1 or 2 per phase ⩽ 400 mm^2	For larger x-sections, more cables and other types of cable end terminals, please consult us
	Square connector	> 300 mm^2 admissible		400 < 1 ⩽ 630 mm^2 per phase	

Three core, dry cable

Short inner end, cold fitted

Performance	Cable end terminal type	X-section mm^2	Supplier	Number of cables	Comments
3 to 24 kV 400 A - 630 A	Round connector	50 to 240 mm^2	All cold fitted cable end suppliers: Silec, 3M, Pirelli, Raychem, etc.	1 per phase	For larger x-sections, more cables and other types of cable end terminals, please consult us
3 to 24 kV 1250 A	Round connector	50 to 630 mm^2	All cold fitted cable end suppliers: Silec, 3M, Pirelli, Raychem, etc.	1 per phase	For larger x-sections, more cables and other types of cable end terminals, please consult us

Note:
■ The cable end terminals, covered by a field distributor, can be square,
■ PM/QM type cubicle, round end connections Ø 30 mm max.

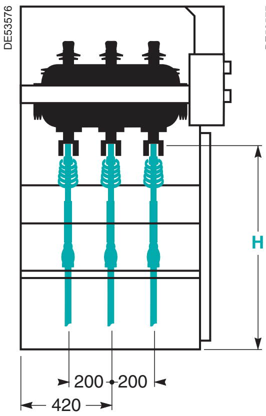
Cable-connection from below

Connection height

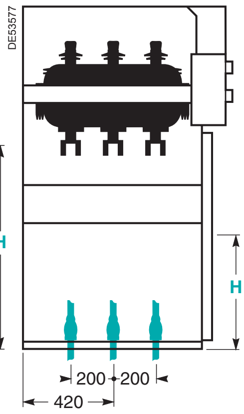
Cable-connection height H measured from floor (mm)

	630 A	1250 A
IM, NSM-cables, NSM-busbars	945	
SM	945	945
IMC	400	
PM, QM	400	
QMC	400	
CRM	430	
DM1-A	430	320
DMVL-A	430	
DMV-S	320	
DM1-W	370	320
GAM2	760	
GAM	470	620
DMV-A	320	313
DM1-S	543	

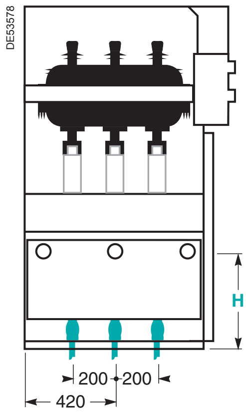
IM, NSM-cables, NSM-busbars, SM



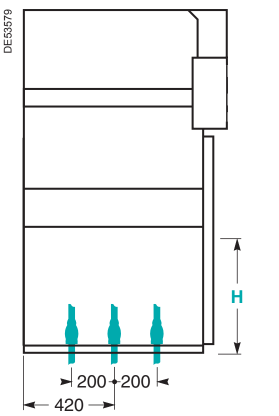
IMC, PM, QM, QMC



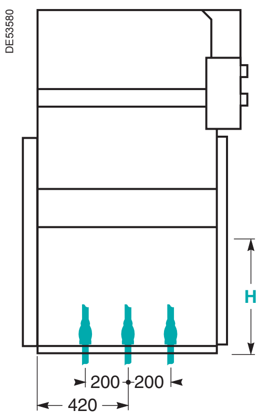
CRM



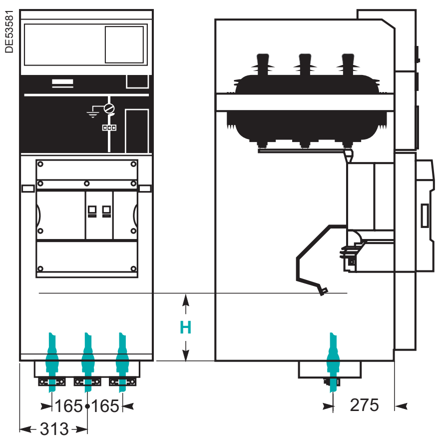
GAM2



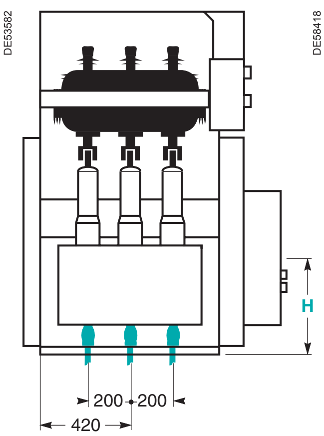
GAM



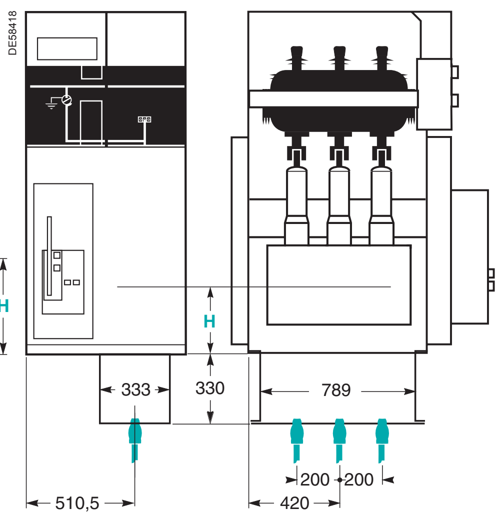
DMV-A, DMV-S (630 A)



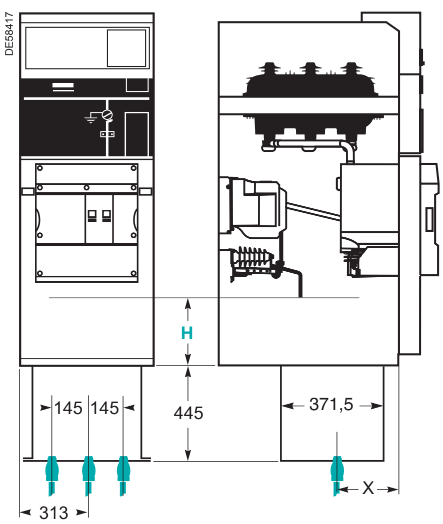
DM1-A, DM1-S, DMVL-A DM1-W (630 A)



DM1-A, DM1-W (1250 A)



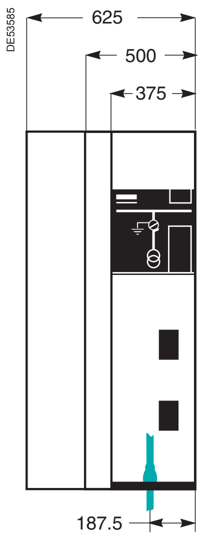
DMV-A (1250 A)



X = 330 : 1 single-core cable
X = 268 : 2 single-core cables
X = 299 : Three core cable

Cable-connection from below

Trenches depth



Cabling from below (all units)

■ **Through trenches:** the trench depth **P** is given in the table opposite for commonly used dry single-core cables type (for tri-core cables consult us).
■ **With stands:** to reduce **P** or eliminate trenches altogether by placing the units on 400 mm concrete footings.
■ **With floor void:** the trench depth **P** is given in the table opposite for commonly used types of cables.

Single-core cables		Units until 630 A					1250 A units		
Cable x-section (mm²)	Bending radius (mm)	IM, SM, NSM-cables, NSM-busbars	IMC, DM1-A, DM1-W, GAM, DM1-S, DMVL-A	CRM	DMV-A, DMV-S	PM, QM, QMC(1)	SM, GAM	DM1-A (2) DM1-W(2)	DMV-A (3)
		Depth **P** (mm) all orientations							
		P1	**P2**	**P2**	**P2**	**P3**	**P4**	**P5**	**P6**
50	370	140	400	400	500	350			
70	400	150	430	430	530	350			
95	440	160	470	470	570	350			
120	470	200	500	500	600				
150	500	220	550		650				
185	540	270	670		770				
240	590	330	730		830				
400	800						1000	1350	1450
630	940						1000	1350	1450

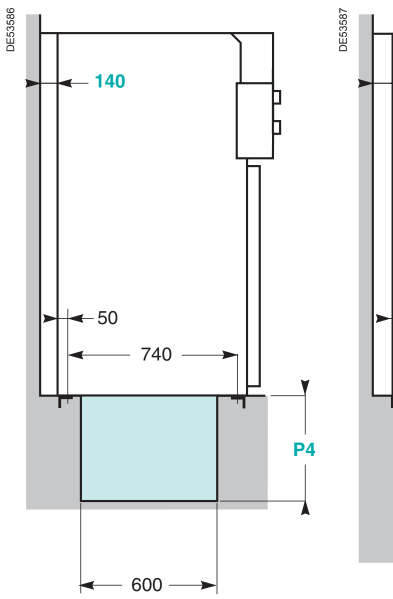
(1) Must be installed with a 100 mm depth metal pan.
(2) Must be installed with a 350 mm depth metal pan, in a floor void.
(3) Mounting with a 445 mm depth metal pan compulsory in a floor void.

***Note:** the unit and the cables requiring the greatest depth must be taken into account when determining the depth **P** or single-trench installations.*
*In double-trench installations, depth **P** must be taken into account for each type of unit and cable orientations.*

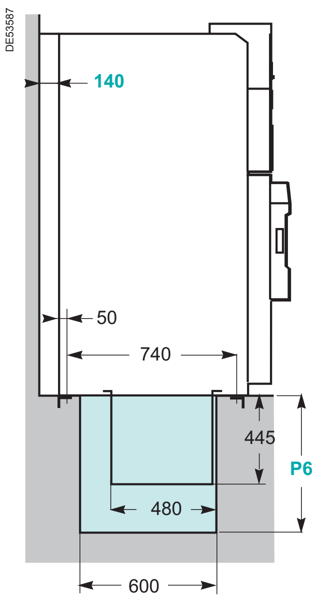
Cable trench drawings

1250 A units (represented without switchboard side panels)

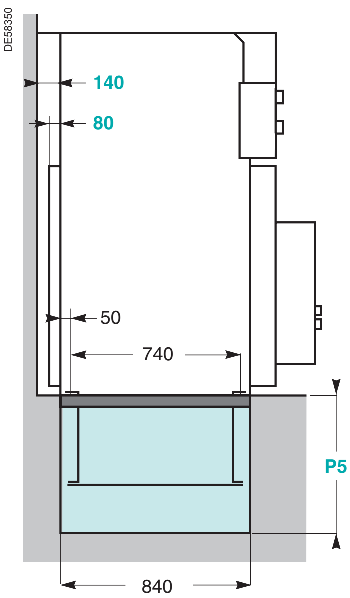
SM, GAM
For single and tri-core cables



DMV-A
For single and tri-core cables

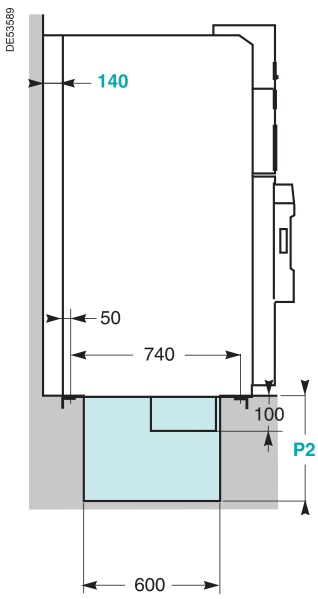


DM1-A, DM1-W
For single-core cables



630 A units

DMV-A, DMV-S
For single cables



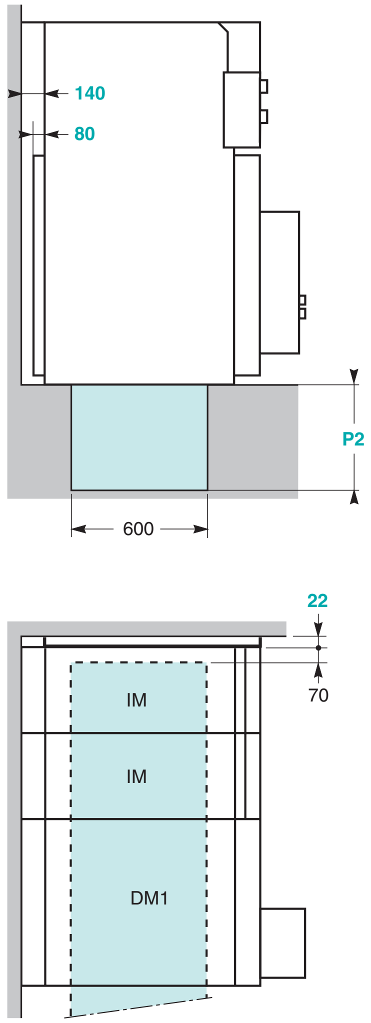
Cable-connection from below

Trench diagrams example

Units represented without switchboard side panels

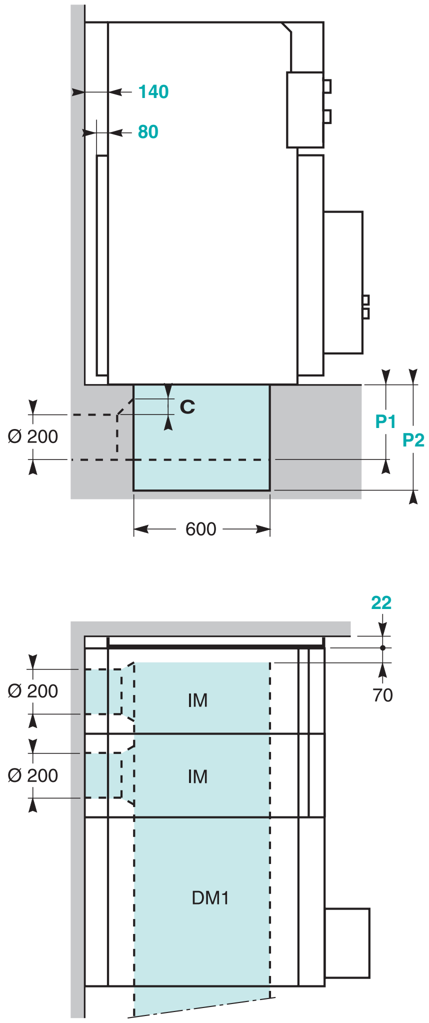
630 A units
Cable entry or exit
through right or left side

DE58409



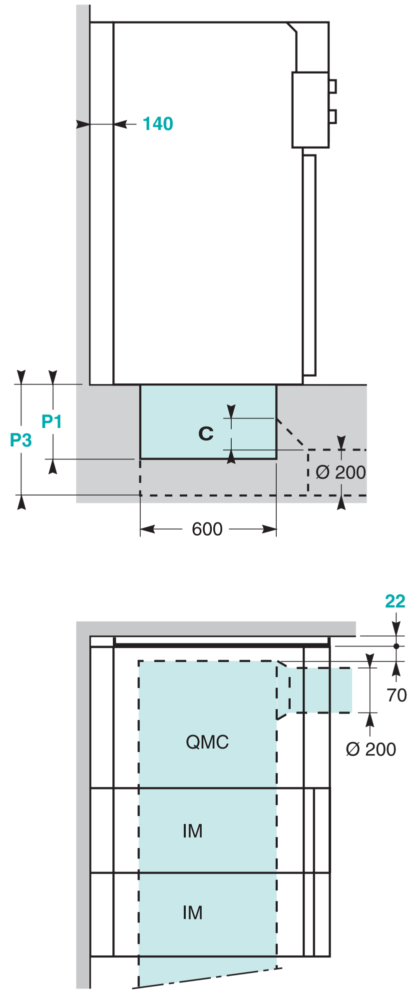
630 A units
Rear entry or exit
with conduits

DE58410



630 A units
Front entry or exit
with conduits

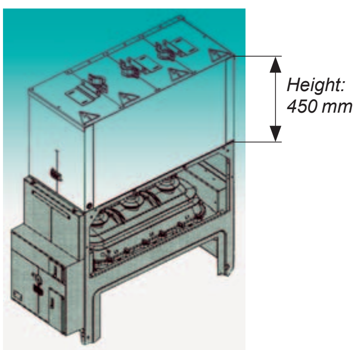
DE58411



Required dimensions (mm)

Note 1: *for connection with conduits, the bevel (C) must correspond to the following trench dimensions: P1 = 75 mm or P2/P3 = 150 mm.*
Note 2: *please refer to chapter "Layout examples" for a site application.*

PE50797



Cabling from above

On each 630 A unit of the range, except those including a low-voltage control cabinet and EMB compartment, the connection is made with dry-type and single-core cables.

Remark : *not available for internal arc IEC 62271-200 in busbar compartment.*

Cable-connection from below

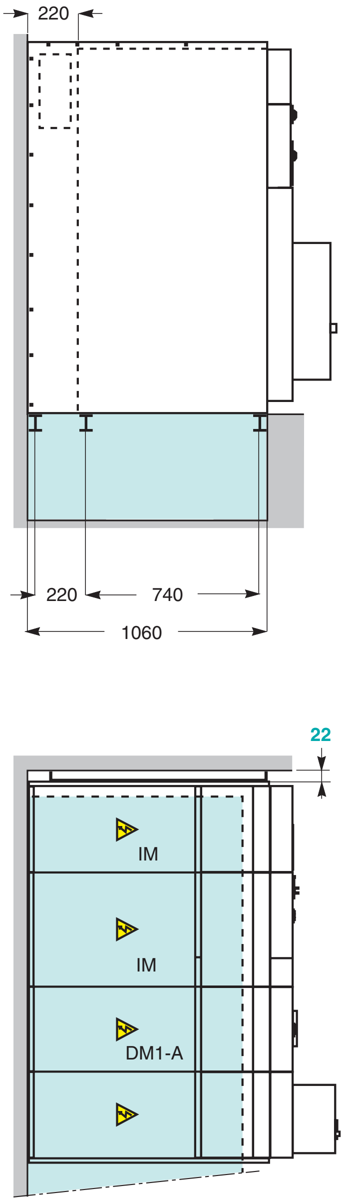
Trench diagrams and floor void drawings enhanced example

For enhanced internal arc 16 kA 1 s cubicles

Installation with floor void

Downwards exhaust

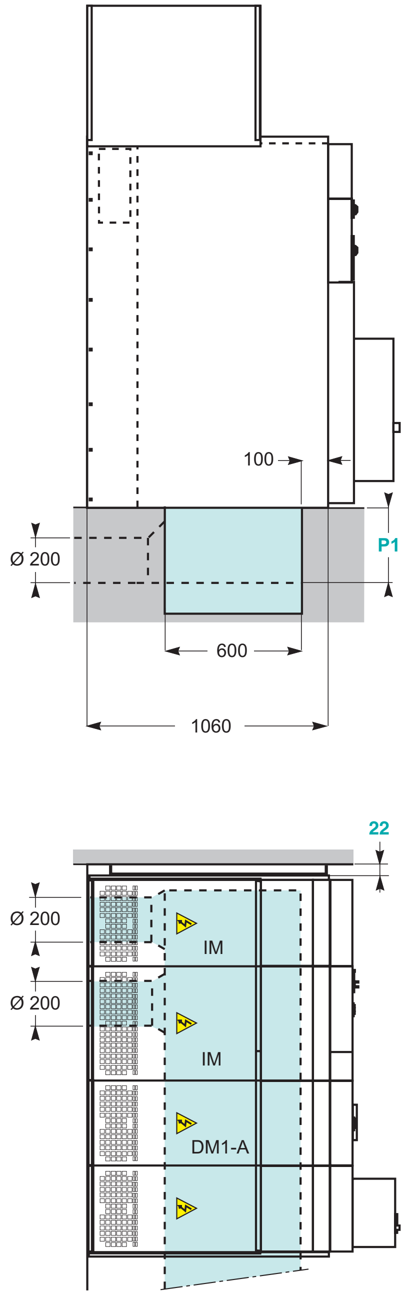
DE58412



Installation with trench

Upwards exhaust

DE58413



Note: *to evacuate gases through the bottom, the floor void volume must be over or equal to 2 m^3.*

Contents

Dimensions and weights

Type of unit	Height (mm)	Width (mm)	Depth (mm)	Weight (kg)
IM,IMB	1600 (1)	375/500	940	120/130
IMC	1600 (1)	500	940	200
PM, QM, QMB	1600 (1)	375/500	940	130/150
QMC	1600 (1)	625	940	180
CRM	2050	750	940	390
DM1-A, DM1-D, DM1-W, DM2, DMVL-A	1600 (1)	750	1220	400
DM1-S	1600 (1)	750	1220	340
DMV-A, DMV-D	1695 (1)	625	940	340
DMV-S	1600 (1)	625	940	260
CM	1600 (1)	375	940	190
CM2	1600 (1)	500	940	210
GBC-A, GBC-B	1600	750	1020	290
NSM-cables, NSM-busbars	2050	750	940	260
GIM	1600	125	840	30
GEM (2)	1600	125	920/1060 (2)	30/35 (2)
GBM	1600	375	940	120
GAM2	1600	375	940	120
GAM	1600	500	1020	160
SM	1600 (1)	375/500 (3)	940	120/150 (3)
TM	1600	375	940	200
DM1-A, DM1-D, DM1-W, DM1-Z (1250 A)	1600	750	1220	420

Add to height:
(1) 450 mm for low-voltage enclosures for control/monitoring and protection functions. To ensure uniform presentation, all units (except GIM and GEM) may be equipped with low-voltage enclosures.
(2) depending on the busbar configuration in the VM6 unit, two types of extension units may be used:
- *to extend a VM6 DM12 or DM23 unit, use an extension unit with a depth of 1060 mm*
- *for all other VM6 units, a depth of 920 mm is required.*

(3) for the 1250 A unit.

PE57167

Installation of 400 - 630 A units on a 350 mm plinth

Ground preparation

Units may be installed on ordinary concrete ground, with or without trenches depending on the type and cross-section of cables.

Installation of 630 A unit on a 350 mm plinth (12.5 kA/1s internal arc only):
- enables installation in rooms where trenches are not possible.

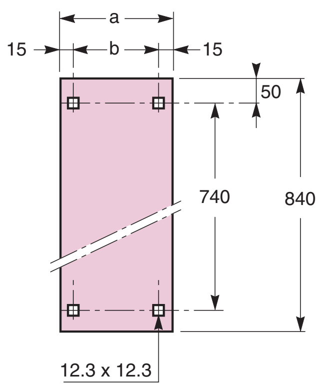
Fixing of units

With each other
The units are simply bolted together to form the MV switchboard (bolts supplied). Busbar connections are made using a torque wrench set to 28 mN.

On the ground
- for switchboards comprising up to three units, the four corners of the switchboard must be secured to the ground with using:
  - M8 bolts (not supplied) screwed into nuts set into the ground using a sealing pistol,
  - screw rods grouted into the ground.
- for switchboards comprising more than three units, each unit may be fixed as necessary.
- position of fixing holes b depends on the width a of units:

a (mm)	125	375	500	625	750
b (mm)	95	345	470	595	720

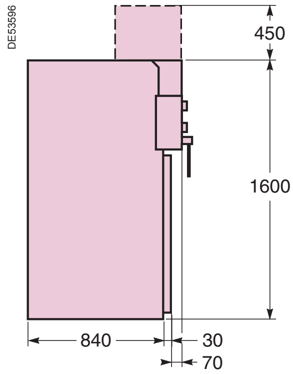
DE53595



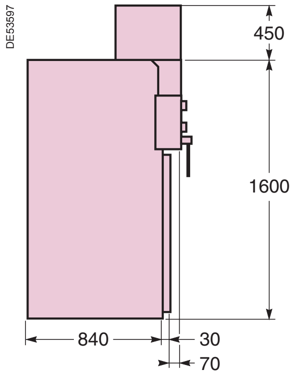
***Note:** in circuit-breaker or contactor units, fixing devices are installed on the side opposite the switchgear*

Units dimensions

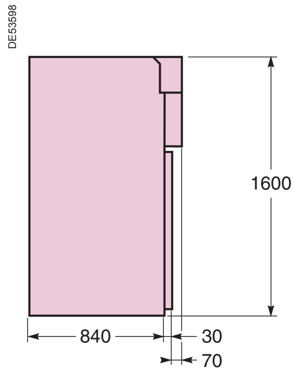
IM, IMB, PM, QM, QMB, SM, IMC, QMC, CM, CM2



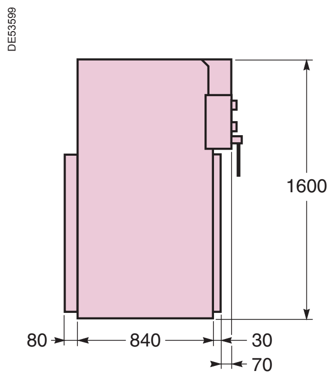
NSM-cables, NSM-busbars, CRM



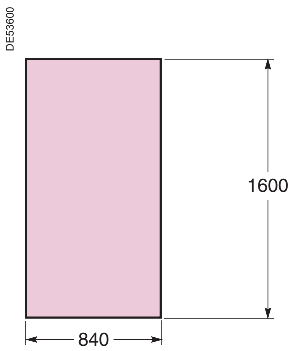
GBM, GAM2



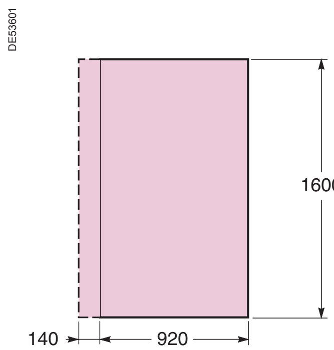
GAM



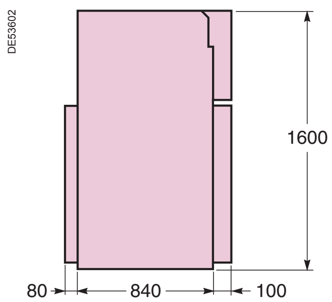
GIM



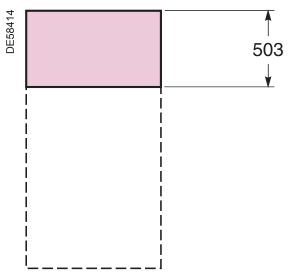
GEM



GBC-A, GBC-B



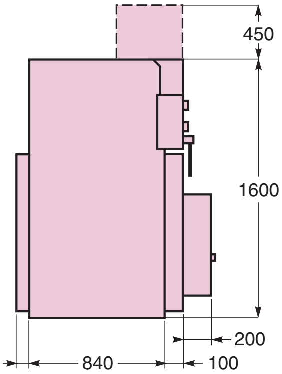
EMB



Units dimensions

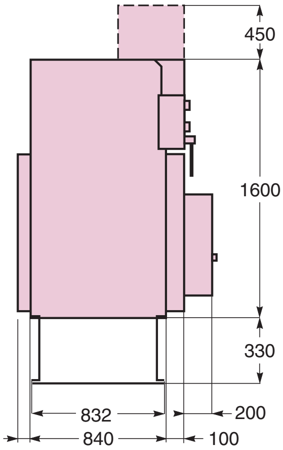
DMVL-A, DM1-A, DM1-D, DM1-W, DM1-Z, DM1-S, DM2 630 A

DE53603



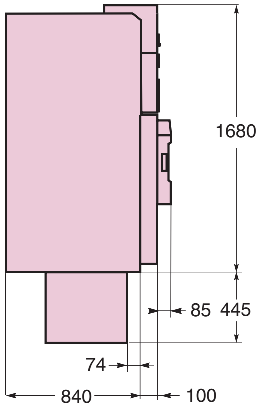
DM1-A, DM1-W 1250 A

DE53604



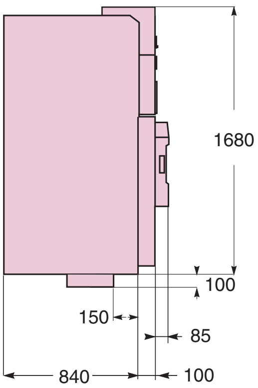
DMV-A 1250 A

DE58415



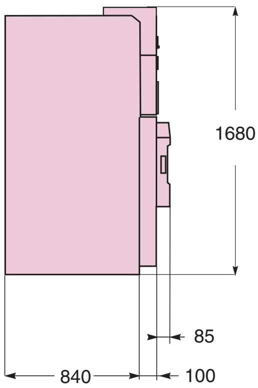
DMV-A 630 A

DE53605



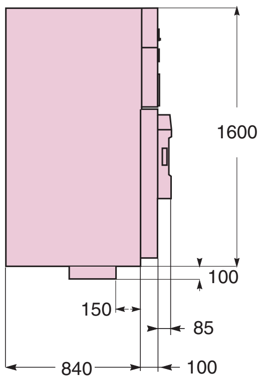
DMV-D

DE53606



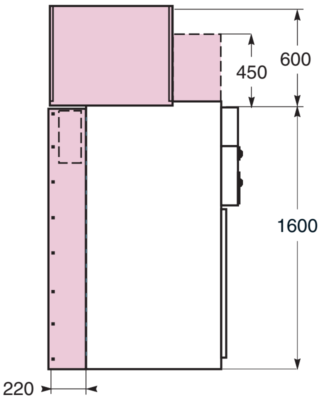
DMV-S

DE53607



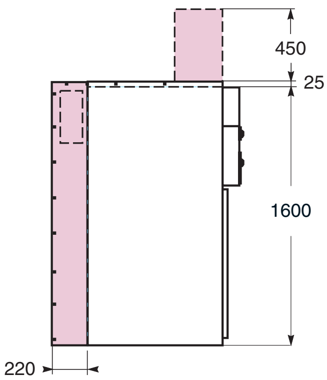
Internal arc enhanced cubicles upwards exhaust

DE53608



Internal arc enhanced cubicles downwards exhaust

DE53609

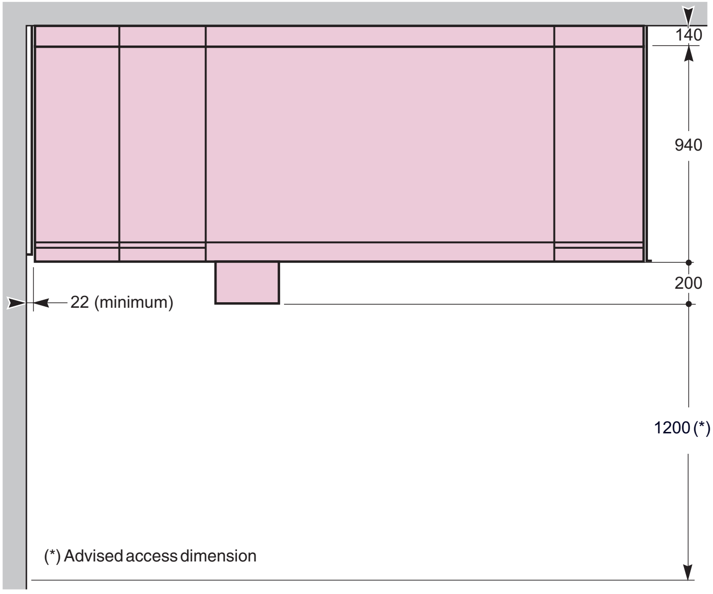


Layout examples

Prefabricated substation (Kiosk)

Conventional substation (Masonery)

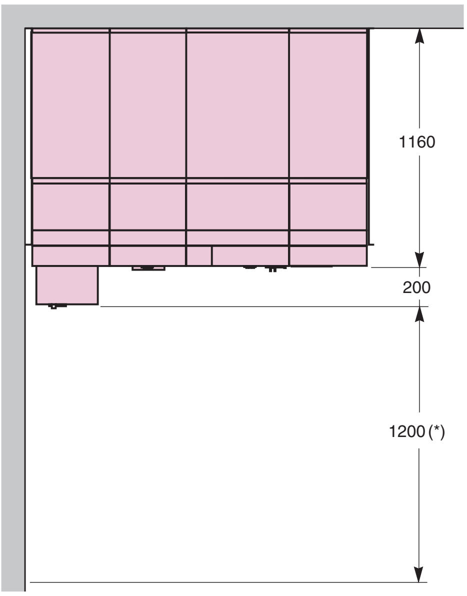
Internal arc cubicles 12.5 kA 1 s



Switchboard extension example

Internal arc cubicles 16 kA 1 s

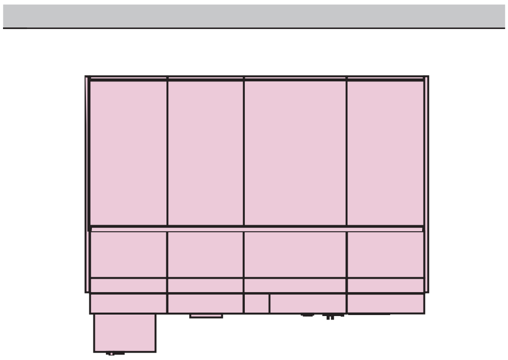
Installed against a wall for downwards and upwards exhaust



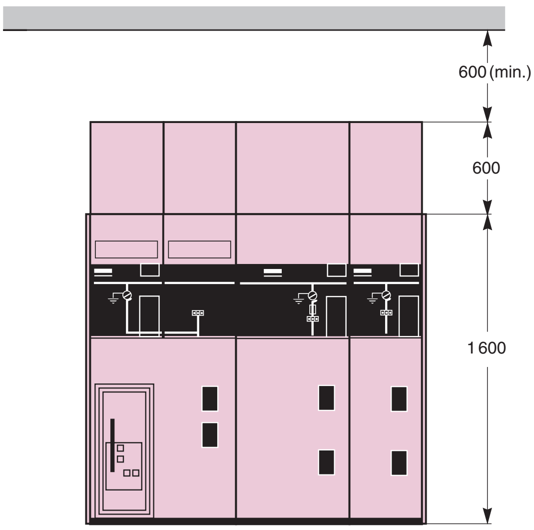
(*) Advised access dimension

Internal arc cubicles 16 kA 1 s

With rear corridor downwards and upwards exhaust

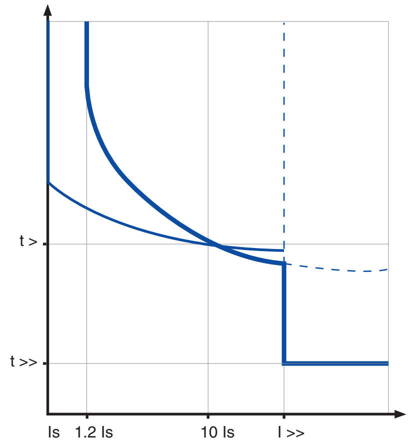


For upwards exhaust (ceiling height ⩾ 2800 mm)

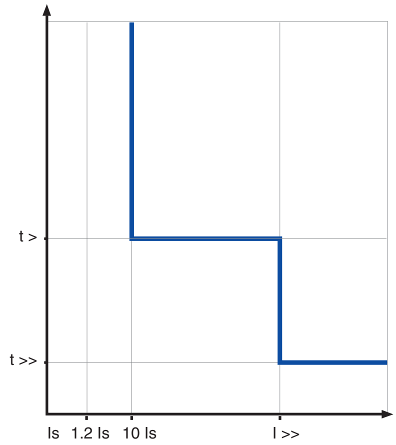


Contents

Trip curves for VIP 300 LL or LH relays



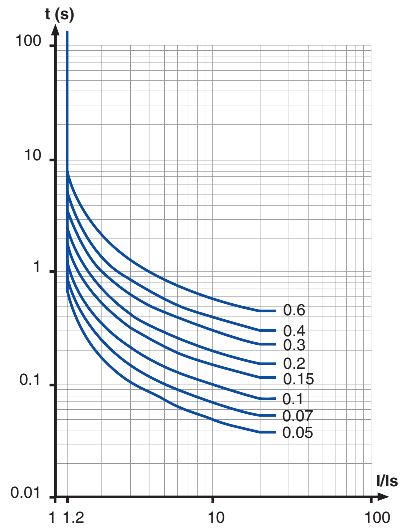
With lower definite time threshold



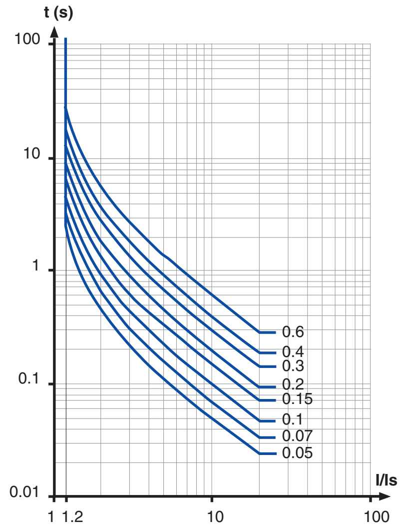
With lower inverse definite time threshold

Definite time tripping curves

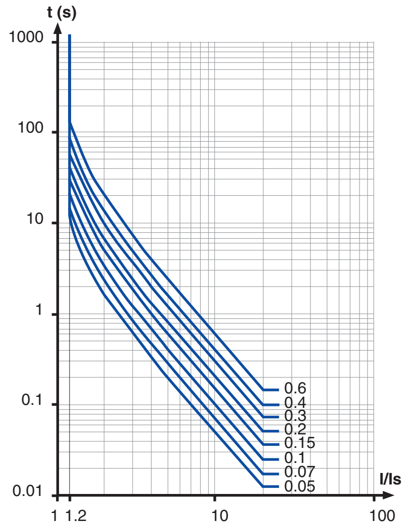
SI curve



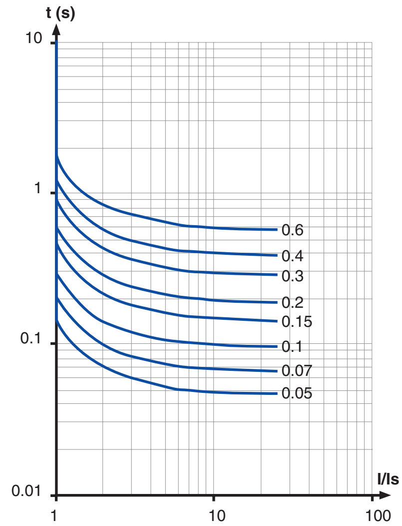
VI curve



EI curve

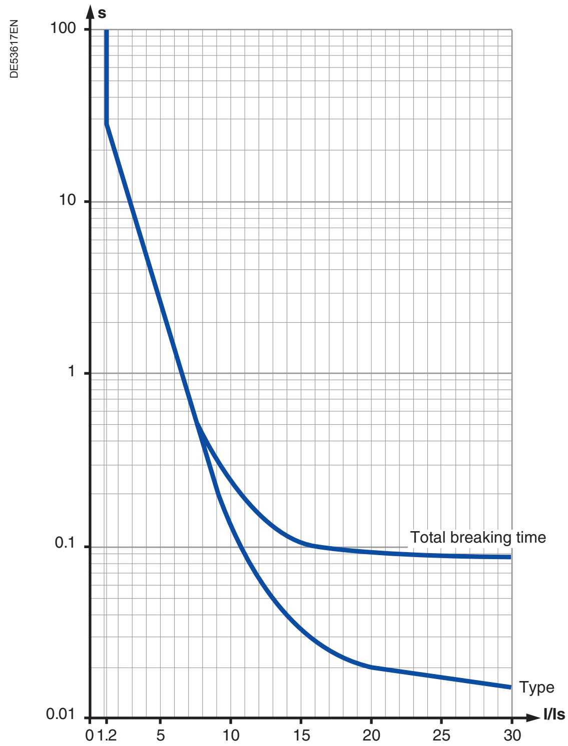


RI curve



Trip curves for VIP 35 relays

Phase protection curve

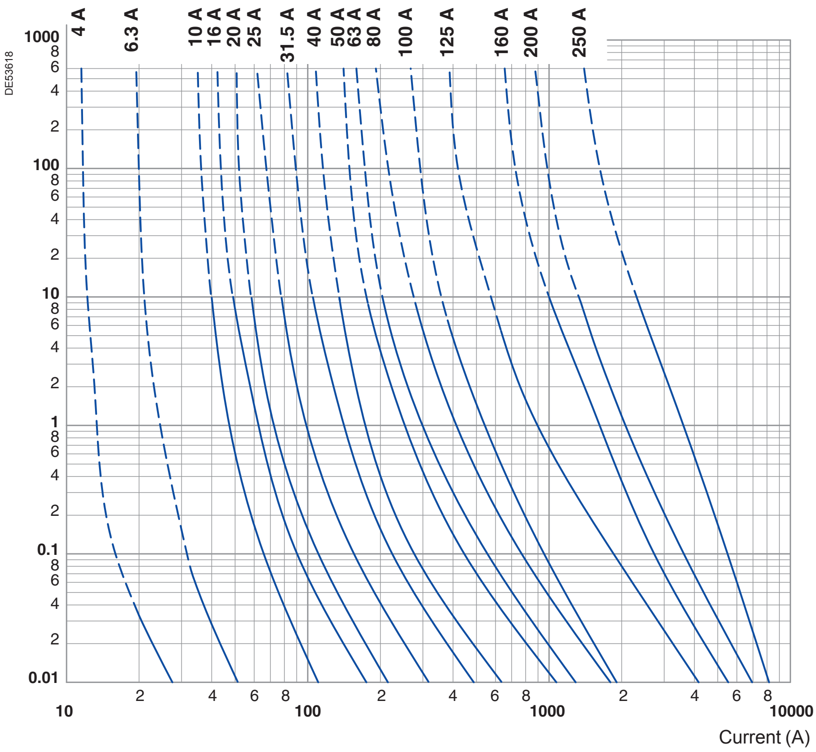


The trip curve shows the time before the relay acts, to which must be added 70 ms to obtain the breaking time.

Fusarc CF fuses

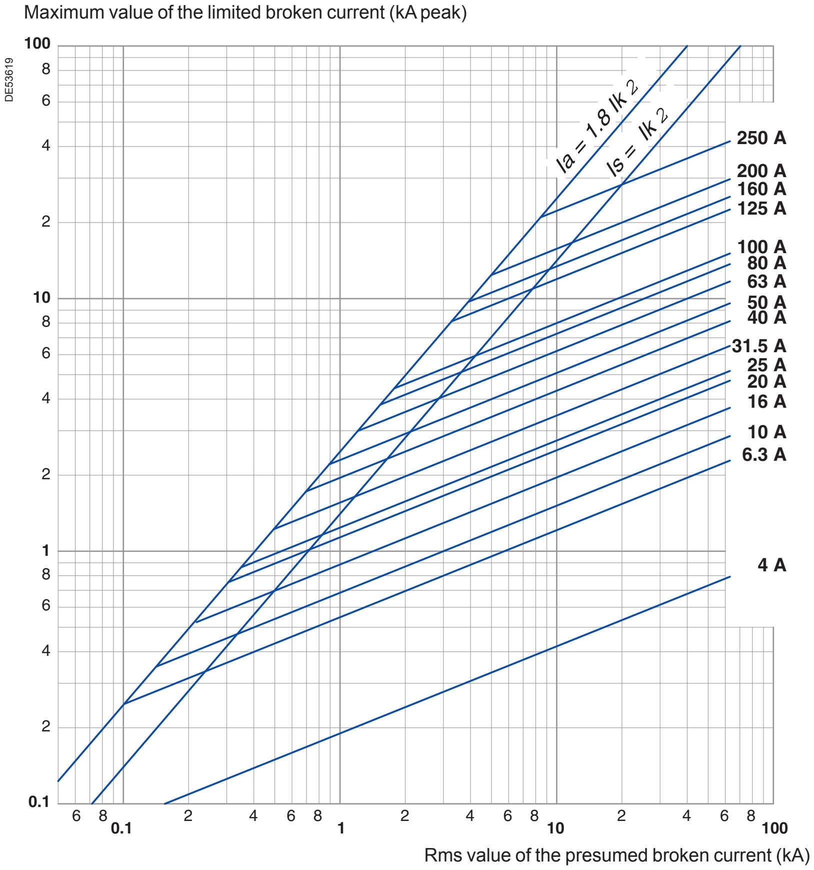
Fuse and limitation curves

Fuse curve 3.6 - 7.2 - 12 - 17.5 - 24 kV



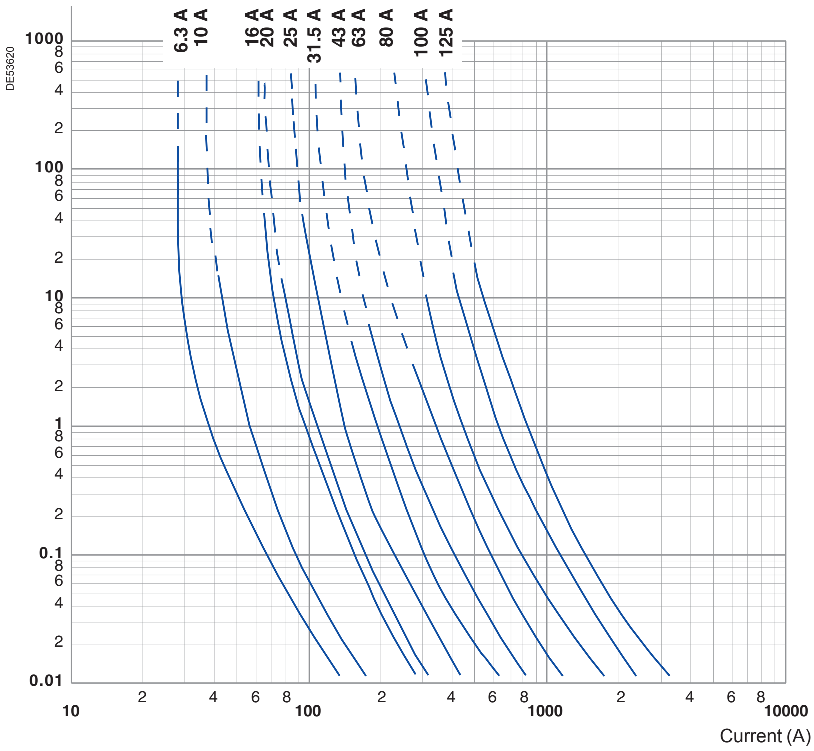
Limitation curve 3.6 - 7.2 - 12 - 17.5 - 24 kV

The diagram shows the maximum limited broken current value as a function of the rms current value which could have occured in the absence of a fuse.



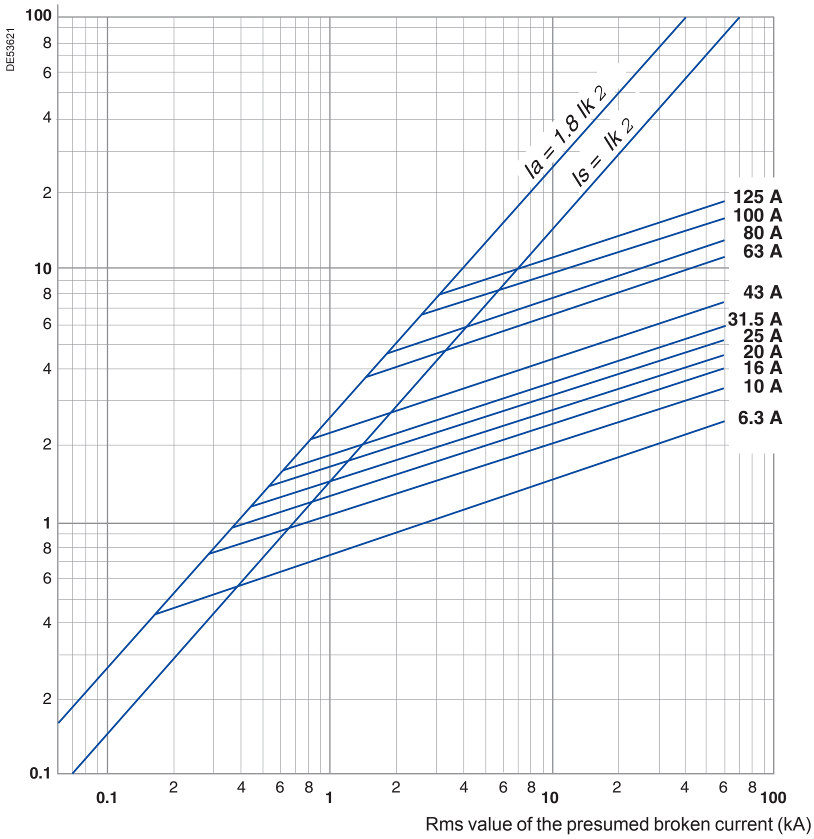
Solefuse fuses
Fuse and limitation curves

Fuse curve 7.2 - 12 - 17.5 - 24 kV



Limitation curve 7.2 - 12 - 17.5 - 24 kV

The diagram shows the maximum limited broken current value as a function of the rms current value which could have occured in the absence of a fuse.



Order form
SM6-24
Connection to the network

Only one of the boxes (ticked X or filled by the needed value) have to be considered between each horizontal line.
Blue box X corresponds to none priced functions.

Basic cubicle

Quantity

Rated voltage Ur	(kV)	
Service voltage	(kV)	
Short-circuit current Isc	(kA)	
Rated current Ir	(A)	

Type of cubicle

SM 375	IM 375	IMB 375	IMB 375 without E/S
SM 500	IM 500	IMC 500	

Position number in the switchboard (from left to right)

Direction of lower busbars for IMB

Left (impossible as first cubicle of switchboard) | Right

Options

Replacement of CIT by — CI1 | CI2

Electrical driving motorization

24 Vdc	110 Vdc	120/127 Vac (50 Hz)
32 Vdc	120-125 Vdc	220/230 Vac (50 Hz)
48 Vdc	137 Vdc	120/127 Vac (60 Hz)
60 Vdc	220 Vdc	220/230 Vac (60 Hz)

Remote control signalling

2 lights | 2 lights and 2 PB | 2 lights and 2 PB + 1 switch

Voltage of the lights (must be the same than electrical driving mechanism)

24 V | 48 V | 110/125 V | 220 V

Signalling contact

1 C on SW and 1 O & 1 C on ES (not applicable on SM cubicle)

2 O & 2 C on SW | 2 O & 3 C on SW and 1 O & 1 C on ES

Roof configuration (A, B or C only one choice possible)

A - Top incomer (cable maxi 240 mm^2 with voltage indicator)

Single core | 2 x single core

B - Low voltage control cabinet (h = 450 mm) — With unpunched door

C - Wiring duct

Cable connection by the bottom (not applicable on IMB, cable maxi 240 mm^2)

Three core | Single core | 2 x single core

Heating element

Interlocking (with key) — Ronis | Profalux

For all cubicle (except SM) — A4 | A3 SM6-SM6 | P1 SM6-SM6

Localisation of 2nd lock for A3 — On switch | On earthing switch

Localisation of 2nd lock for A4 — Cubicle no.

SM cubicle only — P2 SM6-SM6 | P3 SM6-SM6

Surge arresters for IM 500

7.2 kV | 10 kV | 12 kV | 17.5 kV | 24 kV

Operation counter

CTs for IMC (quantity) — 1 | 2 | 3

Replacement of 630 A upper busbar by 1250 A

Internal arc version 16 kA 1 s (not possible with "top incomer" option)

Control and monitoring (48 Vdc electrical motorization compulsory)

Cubicle — With relay | Without relay

Communication protocol — Modbus | IEC | DNP

Modem type — RS232 | RS485

Not for DNP — PSTN | GSM | FSK

3 core balance current transformers

Flair fault indicator

21D | 21DT | 22D | 23D | 23D zero sequence

Digital ammeter (not applicable for IMB)

Visibility of main contacts

Pressure indicator device

Analogic manometer without visibility of main contacts

Analogic manometer with visibility of main contacts

Pressure switch

Plinth 350 mm (applicable only for 630 A and IA 12.5 kA/1 s)

Order form
SM6-24
Fuse switch protection

Only one of the boxes (ticked [X] or filled [ ] by the needed value) have to be considered between each horizontal line.
Blue box [X] corresponds to none priced functions.

Basic cubicle

Quantity [ ]

Rated voltage Ur	**(kV)**	[ ]
Service voltage	**(kV)**	[ ]
Short-circuit current Isc	**(kA)**	[ ]
Rated current Ir	**(A)**	[ ]

Type of cubicle
QM 500 [ ] QM 375 [ ] QMB 375 [ ] QMC 625 [ ] PM 375 [ ]

Position number in the switchboard (from left to right) [ ]

Current transformers for QMC (to see price structure)
Quantity of CTs 1 [ ] 2 [ ] 3 [ ]

Direction of lower busbars for QMB
Left [ ] Right [ ]

Options

Fuses (see fuse price structure) Service voltage ≤ 12 kV [ ]

Replacement of mechanism
CIT by CI1 (only for PM) [ ] CI1 by CI2 (only for QM) [ ]

Electrical driving motorization

24 Vdc [ ]	110 Vdc [ ]	120/127 Vac (50 Hz) [ ]
32 Vdc [ ]	120-125 Vdc [ ]	220/230 Vac (50 Hz) [ ]
48 Vdc [ ]	137 Vdc [ ]	120/127 Vac (60 Hz) [ ]
60 Vdc [ ]	220 Vdc [ ]	220/230 Vac (60 Hz) [ ]

Shunt trip Opening (on CI1) [ ] Closing and opening (on CI2) [ ]

24 Vdc [ ]	110 Vdc [ ]	120/127 Vac (50 Hz) [ ]
32 Vdc [ ]	120-125 Vdc [ ]	220/230 Vac (50 Hz) [ ]
48 Vdc [ ]	137 Vdc [ ]	120/127 Vac (60 Hz) [ ]
60 Vdc [ ]	220 Vdc [ ]	220/230 Vac (60 Hz) [ ]
		380 Vac (50/60 Hz) [ ]

Remote control signalling (not applicable on PM, QMC and QMB)
2 lights [ ] 2 lights and 2 PB [ ] 2 lights and 2 PB + 1 switch [ ]

Voltage of the lights (must be the same than electrical driving mechanism)
24 V [ ] 48 V [ ] 110/125 V [ ] 220 V [ ]

Auxiliary contact signalling 1 C on SW and 1 O & 1 C on ES [ ]
2 O & 2 C on SW [ ] 2 O & 3 C on SW and 1 O & 1 C on ES [ ]

Blown fuse signalling contact (mechanical indication PM, electrical for the other cubicles) [ ]

Roof configuration (A, B or C only one choice possible)
A - Top incomer (cable maxi 240 mm^2 with voltage indicator)
Single core [ ] 2 x single core [ ]
B - Low voltage control cabinet (h = 450 mm) With unpunched door [ ]
C - Wiring duct [ ]

Interlocking Ronis [ ] Profalux [ ]
C4 [ ] A1 [ ] C1 [ ]

Heating element [ ]
Operation counter [ ]
Replacement of 630 A upper busbar by 1250 A (not possible for QMB) [ ]
Internal arc version 16 kA 1 s (not possible with "top incomer" option) [ ]
Digital ammeter (not applicable for QMB) [ ]
Visibility of main contacts [ ]

Pressure indicator device
Analogic manometer without visibility of main contacts [ ]
Analogic manometer with visibility of main contacts [ ]
Pressure switch [ ]

Plinth 350 mm (applicable only for 630 A and IA 12.5 kA/1 s) [ ]

Order form
SM6-24
Circuit breaker protection

Only one of the boxes (ticked X or filled by the needed value) have to be considered between each horizontal line.
Blue box X corresponds to none priced functions.

Basic cubicle

				Quantity
Rated voltage Ur				**(kV)**
Service voltage				**(kV)**
Short-circuit current Isc				**(kA)**
Rated current Ir				**(A)**
Type of cubicle				
For **SF1** circuit breaker	DM1-A 750	DM1-D left 750	DM1-D right 750	
	DM1-S 750	DM2 left 750	DM2 right 750	
	DM1-W 750	DM1-Z 750		
For **SFset** circuit breaker		DM1-D left 750	DM1-D right 750	
For **Evolis frontal 630 A** CB	DMV-A	DMV-S	DMV-D right	
For **Evolis lateral 630 A** CB			DMVL-A	
Position number in the switchboard (from left to right)				
Busbar (Ir ⩾ Ir cubicle)				
For DM1-A, DM1-S, DM1-W, DMVL-A	400 A	630 A	1250 A	
For DM1-D, DM2	400 A	630 A	1250 A	
For DM1-A, DM1-D, DM1-W, DM1-Z			1250 A	
For DMV-A, DMV-D, DMV-S		630 A	250 A	
Protection				
For DM1-S, DMV-S	VIP35 with CRc		VIP300LL with CRa	
			VIP300LL with CRb	
For DM1-S	Sepam series 10 with CRa		Sepam series 10 with CRb	
For DMV-A, DMV-D			Sepam series 20/40	
For DM2, DM1-Z, DM1-W		Statimax 5 A, 2 s	Statimax 1 A, 2 s	
Control for DMV-A and DMV-D				
Local (shunt trip coil compulsory)				
Remote (opening coil and closing coil compulsory)				
Local and remote (opening coil and closing compulsory)				
Voltage of the auxiliaries	48/60 Vdc		110/125 or 220/250 Vdc	
			110/130 or 220/240 Vac (50 Hz)	
Voltage of signalling	48/60 Vdc	110/125 Vdc	220/250 Vdc	
	110/130 Vac (50 Hz)		220/240 Vac (50 Hz)	
Cable connection by the bottom				
For DM1-A, DM1-W, DMVL-A				
	3 x single core cable maxi 240 mm^2		6 x single core cable maxi 240 mm^2	
Current sensors	MV type CT		LPCT ring type for DM1-A 630 A	
			LPCT MV type for DM1-D,DM1-W 630 A	
VTs (not applicable for DM1-S, DMV-S)			See specific order form	
Circuit breaker			See order form	

Options

Roof configuration (not applicable on DMV-A, DMV-S, DMV-D)			
(A, B or C only one choice possible)			
A - Top incomer (cable maxi 240 mm^2 with voltage indicator)			
		Single core	2 x single core
	DM2	1 set	2 sets
B - Low voltage control cabinet			
	DM2	1 cabinet	2 cabinets
C - Wiring duct			
	DM2	1 set	2 sets
	Other cubicles	1 set	
Interlocking		Ronis	Profalux
Not applicable on DM2	C4	A1	C1
Surge arrester (for DM1-W 630 A without VTs)			
Signalling contact			2 O & 2 C on SW (not applicable with VTs)
			2 O & 3 C on SW and 1 O & 1 C on ES (not applicable with VTs)
			1 O & 2 C on SW (available only on cubicle with VTs)
Heating element			
Internal arc version 16 kA 1 s			
Replacement of 630 A upper busbars 400-630 A by 1250 A			
Plinth 350 mm (applicable only for 630 A and IA 12.5 kA/1 s)			

Order form
SM6-24
MV metering

Only one of the boxes (ticked [X] or filled [ ] by the needed value) have to be considered between each horizontal line.
Blue box [X] corresponds to none priced functions.

Basic cubicle

Basic cubicle	Quantity	[ ]
Rated voltage Ur	**(kV)**	[ ]
Service voltage	**(kV)**	[ ]
Short-circuit current Isc	**(kA)**	[ ]
Rated current Ir	**(A)**	[ ]

Type of cubicle/upper busbar

Ir = 630 A, Ir busbar = 400 A	CM [ ]	CM2 [ ]	TM [ ]	GBC-A [ ]	GBC-B [ ]
Ir = 630 A, Ir busbar = 630 A	CM [ ]	CM2 [ ]	TM [ ]	GBC-A [ ]	GBC-B [ ]
Ir = 630 A, Ir busbar = 1250 A	CM [ ]	CM2 [ ]	TM [ ]	GBC-A [ ]	GBC-B [ ]
Ir = 1250 A, Ir busbar = 1250 A				GBC-A [ ]	GBC-B [ ]

Direction of lower busbars for GBC-A	Left [ ]	Right [ ]
VTs for GBC (to see price structure)	Phase/phase [ ]	Phase/earth [ ]
CTs for GBC (to see price structure)	Quantity 1 [ ]	2 [ ] 3 [ ]
Ratio choice for GBC		
Protections	1 secondary [ ]	1 high secondary [ ]
	2 secondaries [ ]	1 low secondary [ ]
Signalling contact		1 O and 1 C on SW (CM, CM2, TM) [ ]
		Blown fuse mechanical indication (CM, CM2, TM) [ ]
Fuses for CM, CM2 and TM only (see fuse price structure)		

Options

Roof configuration (A, B or C only one choice possible)

A - Top incomer (cable maxi 240 mm^2 with voltage indicator)		
	Single core [ ]	2 x single core [ ]
B - Low voltage control cabinet (h = 450 mm) [ ]		With unpunched door [ ]
C - Wiring duct		[ ]

Heating element for CM, CM2, TM	[ ]
Internal arc version 16 kA 1 s	[ ]
Plinth 350 mm (applicable only for 630 A and IA 12.5 kA/1 s)	[ ]

Order form
SM6-24
Casing

Only one of the boxes (ticked X or filled ☐ by the needed value) have to be considered between each horizontal line.
Blue box X corresponds to none priced functions.

Basic cubicle

Quantity ☐

Rated voltage Ur			**(kV)** ☐
Service voltage			**(kV)** ☐
Short-circuit current Isc			**(kA)** ☐
Rated current Ir			**(A)** ☐
Type of cubicle/upper busbar			
Ir = 630 A, Ir busbar = 400 A	GAM 500 ☐	GAM2 375 ☐	GBM 375 ☐
Ir = 630 A, Ir busbar = 630 A	GAM 500 ☐	GAM2 375 ☐	GBM 375 ☐
Ir = 1250 A, Ir busbar = 1250 A	GAM 500 ☐		GBM 375 ☐
Position number in the switchboard (from left to right)			☐
Direction of lower busbars for GBM			
Left (impossible on the first cubicle of the switchboard)	☐		Right ☐

Options

Roof configuration (A, B or C only one choice possible)		
A - Top incomer (cable maxi 240 mm² with voltage indicator)		
	Single core ☐	2 x single core ☐
B - Low voltage control cabinet (h = 450 mm)		With unpunched door ☐
C - Wiring duct		☐
Wiring duct for GBM		☐
ES auxiliary contact (only on GAM 500)		1 O and 1 C ☐

Surge arresters for GAM 500, 630 A

7.2 kV ☐	10 kV ☐	12 kV ☐	17.5 kV ☐	24 kV ☐

Interlocking on GAM 500	Ronis ☐	Profalux ☐
	A3 SM6-SM6 ☐	P5 SM6-SM6 ☐
Localisation of 2nd lock for P5		Cubicle no. ☐
Heating element (on GAM 500 630 A and on GAM2)		☐
Internal arc version 16 kA 1 s		☐

Flair fault indicator

21D ☐	21DT ☐	22D ☐	23D ☐	23D zero sequence ☐

Digital ammeter (not applicable for GBM)	☐
Plinth 350 mm (applicable only for 630 A and IA 12.5 kA/1 s)	☐

Order form

SM6-24
Change Over

Only one of the boxes (ticked [X] or filled [ ] by the needed value) have to be considered between each horizontal line.
Blue box [X] corresponds to none priced functions.

Basic cubicle

Basic cubicle			Quantity [ ]
Rated voltage Ur			(kV) [ ]
Service voltage			(kV) [ ]
Short-circuit current Isc			(kA) [ ]
Rated current Ir			(A) [ ]
Type of cubicle/upper busbar			
Ir = 630 A, Ir busbar = 400 A		NSM busbar [ ]	NSM cable [ ]
Ir = 630 A, Ir busbar = 630 A		NSM busbar [ ]	NSM cable [ ]
Ir = 630 A, Ir busbar = 1250 A			NSM cable [ ]
Position in the switchboard (from left to right)			[ ]
Incoming bottom busbar for NSM busbar		Left [ ]	Right [ ]
Cable connection by the bottom (cable maxi 240 mm²) **for NSM cable**			
	Three core on both [ ]	Single core on both [ ]	2 x single core on both [ ]
			3 x single core on one cubicle and 2 x three core on the other one [ ]
Stand by source	Generator		Without paralleling [ ]
	Utility	With paralleling [ ]	Without paralleling [ ]

Options

Signalling contact			1 C on SW and 1 O & 1C on ES [ ]
Operation counter			[ ]
Interlocking	SM6-SM6	Ronis [ ]	Profalux [ ]
	1 x P1	Right cubicle [ ]	Left cubicle [ ]
	2 x P1		Right and left cubicle [ ]
	1 x A3	Right cubicle [ ]	Left cubicle [ ]
		On switch [ ]	On earthing switch [ ]
	2 x A3 Right cubicle	On switch [ ]	On earthing switch [ ]
	Left cubicle	On switch [ ]	On earthing switch [ ]
2 heating elements (set)			[ ]
Telecontrol (only with utility stand by source)			[ ]
Communication protocol	Modbus [ ]	IEC [ ]	DNP [ ]
Modem type		RS232 [ ]	RS485 [ ]
Not for DNP	PSTN [ ]	GSM [ ]	FSK [ ]
Plinth 350 mm (applicable only for 630 A and IA 12.5 kA/1 s)			[ ]

Order form

SF1 lateral disconnectable or withdrawable for SM6-24

Only one of the boxes (ticked X or filled by the needed value) have to be considered between each horizontal line.
Blue box X corresponds to none priced functions.

Basic circuit breaker

Quantity

Rated voltage Ur				**(kV)**
Service voltage				**(kV)**
Impulse voltage Up				**(kVbil)**
Short-circuit current Isc				**(kA)**
Rated current Ir				**(A)**
Frequency		50 Hz		60 Hz
Mechanism position	Disconnectable	A1		B1
	Withdrawable			B1

Colour for push buttons and indicators
Push buttons open/close: Red/black
Indicator open/close: Black/white
Operating mechanism charged/discharged: White/yellow

Circuit breaker options

1st opening release (see possible choices combination table below)

Shunt opening release **YO1**

24 Vdc	60 Vdc	220 Vdc	220 Vac (50 Hz)
30 Vdc	110 Vdc	48 Vac (50 Hz)	120 Vac (60 Hz)
48 Vdc	125 Vdc	110 Vac (50 Hz)	240 Vac (60 Hz)

Undervoltage release **YM**

24 Vdc	60 Vdc	220 Vdc	220 Vac (50 Hz)
30 Vdc	110 Vdc	48 Vac (50 Hz)	120 Vac (60 Hz)
48 Vdc	125 Vdc	110 Vac (50 Hz)	240 Vac (60 Hz)

Mitop — Without contact — With contact

2nd opening release (see possible choices combination table below)

Shunt opening release **YO2**

24 Vdc	60 Vdc	220 Vdc	220 Vac (50 Hz)
30 Vdc	110 Vdc	48 Vac (50 Hz)	120 Vac (60 Hz)
48 Vdc	125 Vdc	110 Vac (50 Hz)	240 Vac (60 Hz)

Undervoltage release **YM**

24 Vdc	60 Vdc	220 Vdc	220 Vac (50 Hz)
30 Vdc	110 Vdc	48 Vac (50 Hz)	120 Vac (60 Hz)
48 Vdc	125 Vdc	110 Vac (50 Hz)	240 Vac (60 Hz)

Mitop — Without contact — With contact

Remote control

Electrical motor **M**

24…32 Vdc	110…127 Vdc/ac
48…60 Vdc/ac	220…250 Vdc/ac

Shunt closing release **YF**

24 Vdc	60 Vdc	220 Vdc	220 Vac (50 Hz)
30 Vdc	110 Vdc	48 Vac (50 Hz)	120 Vac (60 Hz)
48 Vdc	125 Vdc	110 Vac (50 Hz)	240 Vac (60 Hz)

Leaflets language — French — English

Different releases combinations

Shunt opening releases **YO1/YO2**	1			2	1	1	
Undervoltage release **YM**			1		1		1
Mitop		1				1	1

Order form

SFset lateral disconnectable for SM6-24

Only one of the boxes (ticked X or filled by the needed value) have to be considered between each horizontal line.
Blue box X corresponds to none priced functions.

Basic circuit breaker

Quantity

Rated voltage Ur			**(kV)**
Service voltage			**(kV)**
Impulse voltage Up			**(kVbil)**
Short-circuit current Isc			**(kA)**
Rated current Ir			**630 A maximum**
Frequency	50 Hz		60 Hz
Mechanism position	A1		B1

Colour for push buttons and indicators
Push buttons open/close: Red/black
Indicator open/close: Black/white
Operating mechanism charged/discharged: White/yellow

Control unit and sensors

VIP 300P (not available for all electrical characteristics)	CSa 200/1	Is = 10 to 50 A	Is = 40 to 200 A
	CSb 1250/1	Is = 63 to 312 A	Is = 250 to 1250 A
VIP 300LL	CSa 200/1	Is = 10 to 50 A	Is = 40 to 200 A
	CSb 1250/1	Is = 63 to 312 A	Is = 250 to 1250 A

Circuit breaker options

2nd opening release (see possible choices combination table below)

Shunt opening release **YO2**

24 Vdc	60 Vdc	220 Vdc	220 Vac (50 Hz)
30 Vdc	110 Vdc	48 Vac (50 Hz)	120 Vac (60 Hz)
48 Vdc	125 Vdc	110 Vac (50 Hz)	240 Vac (60 Hz)

Undervoltage release **YM**

24 Vdc	60 Vdc	220 Vdc	220 Vac (50 Hz)
30 Vdc	110 Vdc	48 Vac (50 Hz)	120 Vac (60 Hz)
48 Vdc	125 Vdc	110 Vac (50 Hz)	240 Vac (60 Hz)

Remote control

Electrical motor **M**

24…32 Vdc	110…127 Vdc/ac
48…60 Vdc/ac	220…250 Vdc/ac

Shunt closing release **YF**

24 Vdc	60 Vdc	220 Vdc	220 Vac (50 Hz)
30 Vdc	110 Vdc	48 Vac (50 Hz)	120 Vac (60 Hz)
48 Vdc	125 Vdc	110 Vac (50 Hz)	240 Vac (60 Hz)

Test box (VAP 6)

Leaflets language	French	English

Different releases combinations

Mitop	1	1	1
Shunt opening release **YO2**		1	
Undervoltage release **YM**			1

Order form

Evolis frontal fixed version for SM6-24 up to 17.5 kV

Only one of the boxes (ticked X or filled ☐ by the needed value) have to be considered between each horizontal line.
Blue box X corresponds to none priced functions.

Basic fixed circuit breaker		Quantity ☐
Rated voltage Ur (kV)	**12** ☐	**17.5** ☐
Service voltage		**(kV)** ☐
Short-circuit current Isc		**25 kA**
Rated normal current Ir (A)	**630** ☐	**1250** ☐
Phase distance		**185 mm**

Circuit breaker options

Opening release (see possible choices in combination table below)

Shunt opening release **MX**			
	24 Vac ☐	24…30 Vdc ☐	100…130 Vdc/ac ☐
	48 Vac ☐	48…60 Vdc ☐	200…250 Vdc/ac ☐
Low energy release **Mitop**			
1 AC fault signalling SDE and reset 200...250 Vac are included			☐

Remote control (operation counter already included)

Electrical motor **MCH**			
	24…30 Vdc ☐	100…125 Vdc ☐	200…250 Vdc ☐
	48…60 Vdc/ac ☐	100…130 Vac ☐	200…240 Vac ☐
Shunt closing release **XF**			
	24 Vac ☐	24…30 Vdc ☐	100…130 Vdc/ac ☐
	48 Vac ☐	48…60 Vdc ☐	200…250 Vdc/ac ☐

Operation counter CDM			☐
Additional auxiliary contacts OF (4 AC)		1 ☐	2 ☐
Ready to close contact PF (1 AC)			☐
Locking of the circuit breaker in the open position			
By padlock	☐		
or by locks and keys		Profalux ☐	Ronis ☐
If locks	1 lock ☐	2 identical locks ☐	2 different locks ☐
Disabling of O/C circuit breaker push buttons			☐

Different releases combinations

Shunt opening release **MX**	1		1
Mitop		1	1

Order form

Evolis lateral disconnectable version for SM6-24 at 24 kV

Only one of the boxes (ticked X or filled by the needed value) have to be considered between each horizontal line.
Blue box X corresponds to none priced functions.

Basic circuit breaker

Quantity

Rated voltage Ur	**24 (kV)**
Service voltage	**(kV)**
Impulse voltage Up	**(kVbil)**
Rated normal current Ir	**630 A maximum**
Phase distance	**250 mm**
Mechanism position	**B1**

Colour for push buttons and indicators
Push buttons open/close: Red/black
Indicator open/close: Black/white
Operating mechanism charged/discharged: White/yellow

Circuit breaker options

1st opening release (see possible choices combination table below)

Shunt opening release **YO1**

24 Vdc	110 Vdc	110 Vac (50 Hz)
48 Vdc	125-127 Vdc	220-230 Vac (50 Hz)
	220 Vdc	120 Vac (60 Hz)

Undervoltage release **YM**

24 Vdc	110 Vdc	110 Vac (50 Hz)
48 Vdc	125-127 Vdc	220-230 Vac (50 Hz)
	220 Vdc	120 Vac (60 Hz)

2nd opening release (see possible choices combination table below)

Shunt opening release **YO2**

24 Vdc	110 Vdc	110 Vac (50 Hz)
48 Vdc	125-127 Vdc	220-230 Vac (50 Hz)
	220 Vdc	120 Vac (60 Hz)

Undervoltage release **YM**

24 Vdc	110 Vdc	110 Vac (50 Hz)
48 Vdc	125-127 Vdc	220-230 Vac (50 Hz)
	220 Vdc	120 Vac (60 Hz)

Low energy release **Mitop**

Remote control (operation counter already included)

Electrical motor **M**

24…32 Vdc	110…127 Vdc/ac
48…60 Vdc/ac	220…250 Vdc/ac

Shunt closing release **YF**

24 Vdc	110 Vdc	110 Vac (50 Hz)
48 Vdc	125-127 Vdc	220-230 Vac (50 Hz)
	220 Vdc	120 Vac (60 Hz)

Operation counter (already included if remote control supplied)

Different releases combinations

Shunt opening releases **YO1**	1		1	1	1		
Shunt opening releases **YO2**			1				
Undervoltage release **YM**		1		1		1	
Mitop					1	1	1

Notes

Notes

Schneider Electric Industries SAS
89, boulevard Franklin Roosevelt
F-92505 Rueil-Malmaison Cedex
Tel.: +33 (0)1 41 29 85 00
www.schneider-electric.com

Publishing: Schneider Electric Industries SAS
Design: Schneider Electric Industries SAS
Printing: Imprimerie du Pont de Claix/JPF - Made in France