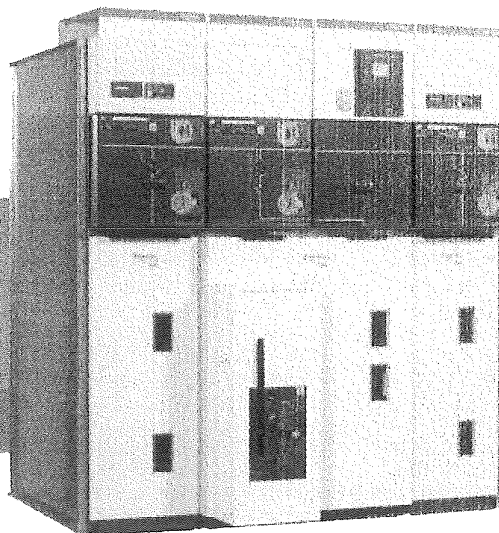


2017 Catalog



# SM6 modular units

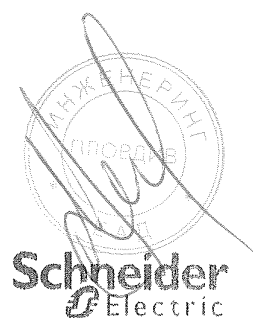
Air insulated switchgear up to 36kV

Medium Voltage Distribution

ВЯРНО С ОРИГИНАЛА

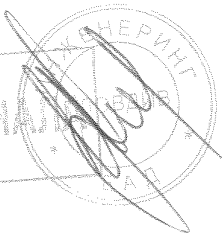
[schneider-electric.com](http://schneider-electric.com)

Life Is On



44-

ВЯРНО С ОРИГИНАЛА

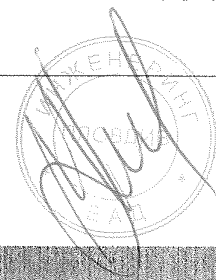


# General Contents

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|  |     |
|--|-----|
| Presentation                               | 10  |
| <hr/>                                      |     |
| General characteristics                    | 20  |
| <hr/>                                      |     |
| Characteristics<br>of the functional units | 42  |
| <hr/>                                      |     |
| Protection, control and<br>monitoring      | 78  |
| <hr/>                                      |     |
| Connections                                | 102 |
| <hr/>                                      |     |
| Installation                               | 114 |
| <hr/>                                      |     |
| Schneider Electric services                | 128 |
| <hr/>                                      |     |
| Appendices<br>Order form                   | 134 |

ВЕРНО С ОРИГИНАЛА



# Your requirements

Safety



Reliability



Flexibility



Connectivity



ВЯРНО С ОРИГИНАЛА




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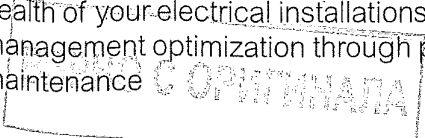

## Our solutions

---

- Enclosures able to withstand internal arcing  
3 or 4 sides internal arc protection IAC: A-FL and A-FLR.  
Internal arc withstand: 12.5 kA 1s, 16 kA 1s and 20 kA 1s
  - Mechanical and electrical interlocks, to prevent incorrect operations
- 

- 1,500 000 functions installed world-wide
  - 100% factory-tested without the need for further tests on site
- 

- Easy upgraded to meet your need and adapted to the extension of your installations
  - Integration in factory-built outdoor substations for which the SM6 is particularly well designed
- 
- 

- Intelligent, connectable components like SC110 and TH110 provide continuous information about the health of your electrical installations, enabling asset management optimization through preventive maintenance
- 
- 
- 
-





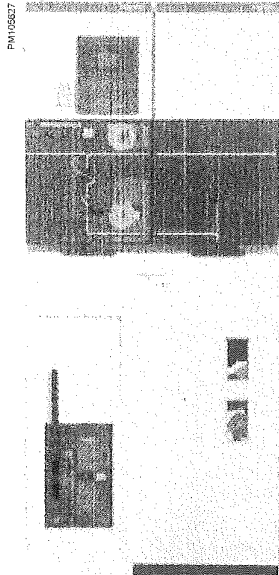
# SM6

a truly professional solution!  
More than 1,500,000 cubicles installed world-wide.





# Our solutions

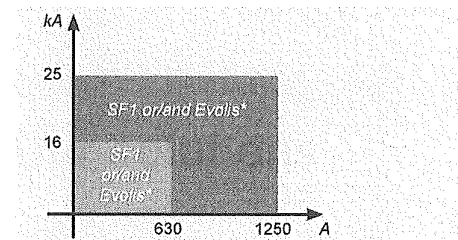


Schneider Electric has developed protection, monitoring and control solutions specifically dedicated to Medium Voltage networks for over 40 years.

SM6 switchgear has been specifically designed on the basis of that extensive experience.

It also incorporates some very new solutions, giving the best in terms of continuity of service and operators' safety.

## High-performance breaking devices

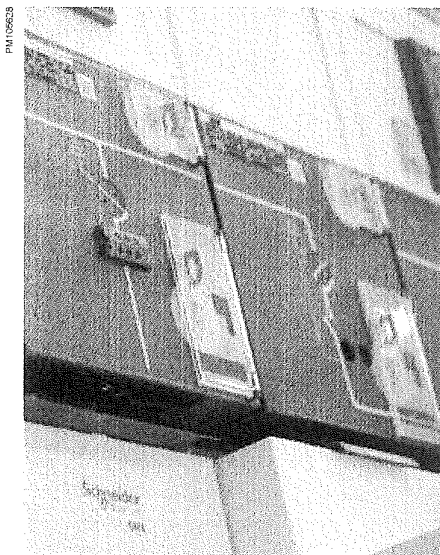


(\*) Not available at 36 kV.

## A comprehensive solution

SM6 switchgear is fully compatible with

- PowerMeter metering units.
- Sepam multi-function protection relays
  - Protection
  - Measurements and diagnosis.
- VIP protection self powered relay for protection. SM6 switchboards can thus be easily integrated into any monitoring and control system.
  - Local & remote indication and operation.



## Enclosures able to withstand internal arcing

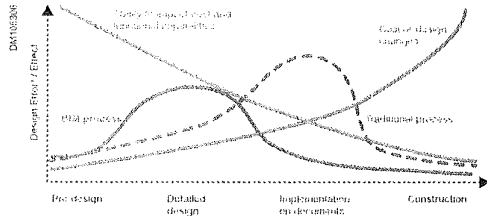
Internal Arc Classification: A-FL and A-FLR.

- 3-sides internal arc protection IAC: A-FL, 12.5 kA 1s, 16 kA 1s and 20 kA 1s for SM6-24 and 16 kA 1s for SM6-36.
- 4-sides internal arc protection IAC: A-FLR, 12.5 kA 1s, 16 kA 1s and 20 kA 1s for SM6-24.
- Choice of exhaust:
  - downwards exhaust
  - upwards exhaust for SM6-24.

ВАЖНО С ОРИГИНАЛА



A unique opportunity to improve the key driver of the Building market  
BIM interoperability is a challenge



## What is BIM

- BIM is an evolution of the Computer Aided Design (CAD) and modeling software market and key to digitization
- It improves on traditional CAD drawings by not only including geometry, but also information that helps in technical and budget calculations
- BIM also refers broadly to the collaborative processes between and or within companies to leverage the value of the models throughout the building design & lifecycle
- Helps create, construct, manage and operate projects more economically and with less environmental impact

### Customer requirements



Business

- High value business



Efficiency

- Reduce time and effort required for work.
- Pain: disconnected tools and incapability to share and interact with each other



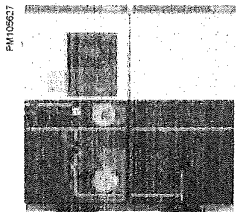
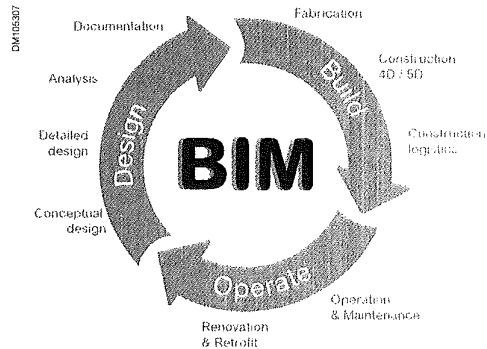
Collaboration

- Project management across multiple design environment, colleagues and stakeholders is inefficient and not productive.
- Pain: no collaborative platform to support seamless experience for electrical industry to perform electrical tasks and share across companies and geographies.

### Benefits of BIM

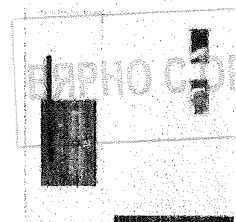
- Save time on designs
- Decrease project costs
- Improves co-ordination and collaboration
- Minimizes risk
- Helps to easily maintain building lifecycle

### BIM and the Building Lifecycle



## SM6 24 & SM6 36 BIM repositories

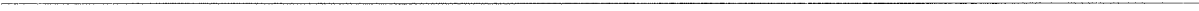
- BIM Object SM6 24 :  
<http://bimobject.com/fr/schneider/product/sm6-24>
- BIM Object SM6 36 :  
<https://bimobject.com/en/schneider/product/sm6-36>



## SM6 3D drawing

- **Objective :**  
3D drawings are useful for our partners (contractor & panel builders) for simulating the installation conditions (fixation points, connection points etc) in a 3D environment.
- **Customer values:**  
Reduction of design time. Reduce chances of mistake at installation site.

-51-

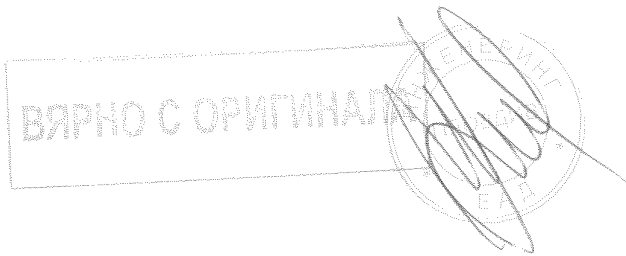


A handwritten signature in black ink, consisting of several loops and strokes.

ВЕРНО С ОРИГИНАЛА



# Presentation



# Presentation

## Contents

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|   |           |
|---|-----------|
| <b>The experience of a world leader</b> | <b>12</b> |
| <b>The references of a leader</b>       | <b>13</b> |
| <b>The range's advantages</b>           | <b>14</b> |
| <b>Protecting the environment</b>       | <b>15</b> |
| <b>Quality assurance</b>                | <b>16</b> |
| <b>Schneider Electric Services</b>      | <b>17</b> |
| <b>Facility Hero</b>                    | <b>18</b> |
| <b>QRcode for SM6 functions</b>         | <b>19</b> |

ВЯРНО С ОРИГИНАЛА



# The experience of a world leader

The Schneider Electric experience 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 standard or enhanced internal arc withstand cubicles to reinforce the safety of people according to the IEC standard.

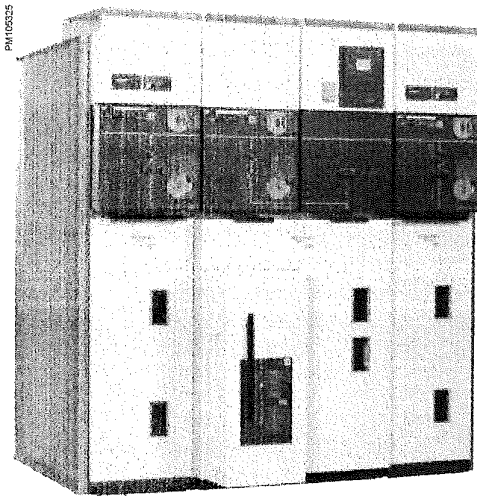
This gives you the advantage of unique experience, that of a world leader, with over 2,500 000 SF6 Medium Voltage units installed throughout the world.

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.

The modular SM6 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 36 kV by superposing their various functions.

The result of in-depth analysis of your requirements, both now and in the future, SM6 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.

#### 2015 - A leading position:

With over 1,500 000 SM6 cubicles installed around the world, Schneider Electric consolidates its position as uncontested leader in the Medium Voltage field.

ВЯРНО С ОРИГИНАЛА



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# 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 Riyadh, Saudi Arabia

### Africa

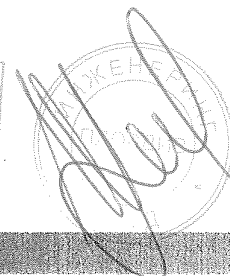
- ONAFEX, Hilton Hotel, Algeria
- Yaounde University, Cameroon
- Karoua Airport, Cameroon
- Libreville Airport, Gabon
- Ivarto Hospital, CORIF, Madagascar
- Central Bank of Abuja, ADEFEMI, Nigeria
- OCI Dakar, Oger international, CGE, Senegal
- Bamburi cement Ltd, Kenya
- Ivory Electricity Company, Ivory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

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



# The range's advantages



## Ease and safe to operate

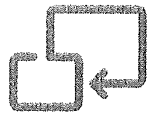
### SM6, a proven range

- 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 connection compartments
- Clear and animated display diagrams
- Switching lever with an "anti-reflex" function
- Compartmented cubicles.



## SM6: a range designed with control and monitoring in mind

SM6 switchgear is perfectly adapted to control and monitoring applications. Motorised, either when installed or at a later date on-site without any interruption in service, SM6 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.



## Compactness

### SM6, 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 is particularly well designed.



## Upgradability

### SM6, 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 control and monitoring of your installations.

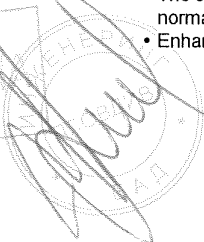


## Maintenance

### SM6, 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 intended to function with reduced maintenance under normal operating conditions
- Enhanced electrical endurance when breaking.

ВЯРНО С ОРИГИНАЛ



Signature



# Protecting the environment

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

## Environmental performance

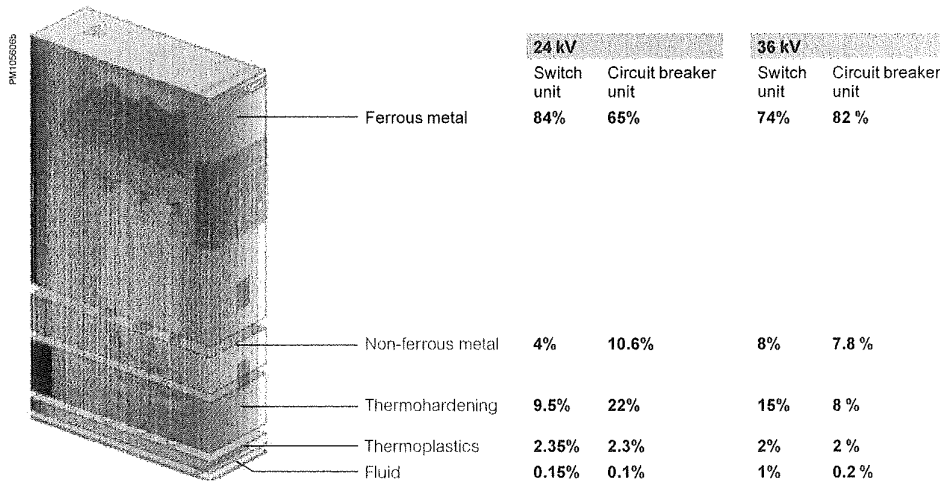
Schneider Electric is committed to a long-term environmental approach.

All necessary measures have been taken in conjunction with our services, suppliers and subcontractors to ensure that the materials used in the composition of the equipment do not contain any substances prohibited by regulations and directives.

Schneider Electric's ambition is to reduce the environmental impact of its products throughout their whole life cycle, by offering end-of-life SF6 recycling solutions. Up to 98% of its equipment can be recycled for re-use.

Our Air Insulated Switchgear is designed with environmental protection in mind:

- The materials used, insulators and conductors are identified, easily separable and recyclable
- The SF6 can be recovered at the end of the equipment's life and reused after Treatment
- The environmental management system adopted by Schneider Electric's production sites for the manufacture of our Air Insulated Switchgear has been assessed and recognised as conforming to the requirements of the ISO 14001 standard.



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

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ВСТРНО С ОРИГИНАЛА

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# 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 French Quality Assurance Association (FQAA).

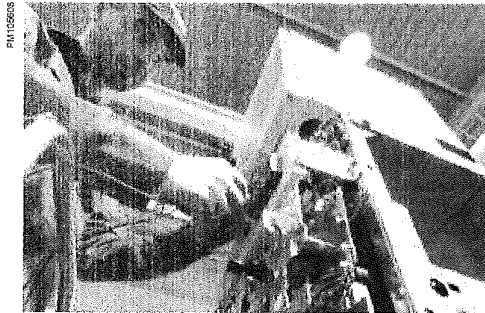
**The quality system for the design and manufacture of SM6 units has been certified in conformity with the requirements of the ISO 9001: 2000 quality assurance model.**

## Meticulous and systematic controls

During manufacture, each SM6 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.



## Mean Operating Time To Failure (MTTF)

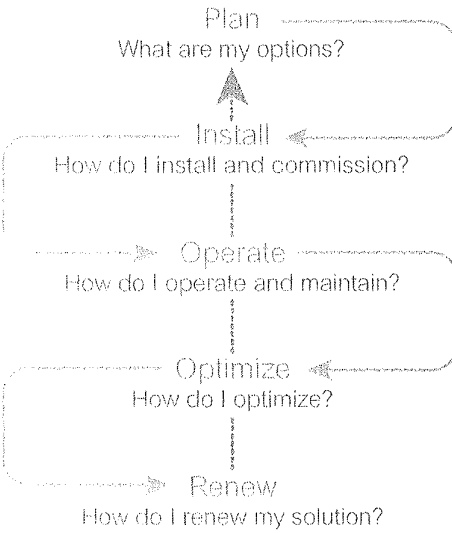
As result of Schneider Electric quality assurance system, SM6 has negligible "Mean Down Time (MDT)" in comparison to the "Mean Up Time (MUT)", thus "Mean Operating Time Between Failures (MTBF)" is as similar as to the MTTF.

- MTTF (cumulative) = 3890 years for SM6-24
- MTTF (cumulative) = 6259 years for SM6-36.



Peace of mind throughout your installation life cycle

## Life Cycle Services

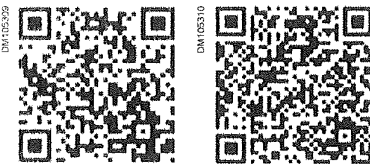


When it comes to your electrical distribution installation, we can help you:

- Increase productivity, reliability, and safety
- Mitigate risk and limit downtime
- Keep equipment up to date and extend lifespan
- Cut cost and increase savings
- Improve your return on investment.

Now improve the efficiency on maintenance. Access automatically to your SM6 equipment maintenance planning by flashing the QR code. Find the QR codes on your products or on the catalogue product data sheet.

Flash only with Facility Hero app  
Free Download:



Download the free version of Facility Hero

## Plan

Schneider Electric helps you to plan the full design and execution of your solution, looking at securing your process and optimising your time:

- **Technical feasibility studies:** Accompany customer to design solution in his given environment.
- **Preliminary design:** Accelerate turn around time to come to a final solution design.

## Install

Schneider Electric will help you to install efficient, reliable and safe solutions based on your plans.

- **Project Management:** Designed to help you complete your projects on time and within budget.
- **Commissioning:** Ensures your actual performance versus design, through on site testing & commissioning, tools & procedures.

## Operate

Schneider Electric helps you maximise your installation uptime and control your capital expenditures through its services offering.

- **Asset Operation Solutions:** The information you need to increase safety, enhance installation training performance, and optimise asset maintenance and investment.
- **Advantage Service Plans:** Customised services plans which cover preventive, predictive and corrective maintenance.
- **On site Maintenance services:** Extensive knowledge and experience in electrical distribution maintenance. For Diagnosis services see on pages from F1 to F3.
- **Spare parts management:** Ensure spare parts availability and optimised maintenance budget of your spare parts.
- **Technical Training:** To build up necessary skills and competencies in order to properly operate your installations in safety.

## Optimise

Schneider Electric propose recommendations for improved safety, availability, reliability & quality.

- **MP4 Electrical Assessment:** Define improvement & risk management program.

## Renew

Schneider Electric extends the life of your system while providing upgrades. Schneider Electric offers to take full responsibility for the end-of-life processing of old electrical equipments.

- **ECOFIT™:** Keep up to date & improve performances of your electrical installations (LV,MV, Protection Relays...).
- **MV product End of life:** recycle & recover outdated equipment with end of life services.

## Frequency of maintenance intervention

Schneider Electric equipment manufacturers recommend a schedule for maintenance activities to extend Electrical Distribution equipment performance over time. Frequencies under normal/healthy operation (minor equipment criticality and optimal environmental conditions) can be generally defined as follows:

| Maintenance | Minimal frequency (1)<br>(every) | Who                                 |                                     |                                     |
|-------------|----------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
|             |                                  | Manufacturer                        | Certified Partner                   | End user                            |
| Exclusive   | 4 years                          | <input checked="" type="checkbox"/> |                                     |                                     |
| Advanced    | 2 years                          | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |                                     |
| Light       | 1 years                          | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

(1) Recommended under normal operating conditions (minor equipment criticality and optimal environmental conditions). However, this recommended frequency should be increased according to: a) the level of criticality (low, major, critical) b) the severity of environment conditions (i.e. corrosive, naval, offshore) following recommendations of Manufacturer's services.

# Facility Hero

Preventive & predictive maintenance using QR codes



## What is Facility Hero?

Facility Hero is a smart maintenance log book that can be accessed from any smartphone, tablet, or computer. This 100% collaborative, connected system keeps maintenance technicians in the field in constant contact with their maintenance community: manager, customer, contractors and peers for fast and effective interventions.

Accessible by anyone, anywhere, anytime

Facility Hero works on 3G, 4G, and Wi-fi networks and can also be used offline. Simply download the application right to your smartphone or tablet, set up an account, and get started.

The right information, fast

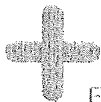
- Overall view of equipment (status, tasks, the week's reminders)
- Full maintenance logs (breakdowns, maintenance reports)
- Fast access to history equipment maintenance logs via the QR code on the equipment
- Rich maintenance reports including voice memos, notes, photos, and measurements.

The right decision and the right action at the right time

- Quickly add a new piece of equipment
- Access periodic reading measurements, recent malfunctions, etc.
- Locate equipment by GPS in real time
- Monitor equipment remotely and in real time

Manage your maintenance teams and interventions effectively

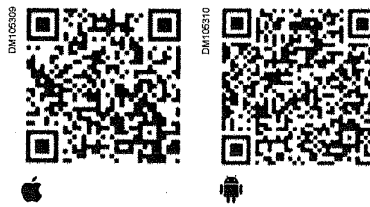
- Real-time work orders sharing, and reporting with selected users
- Get inspection reports by mail and share them in just two clicks
- Monitor all regular operations such as scheduling, and incomplete or upcoming tasks.



### Facility Hero benefits

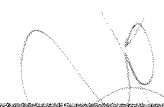
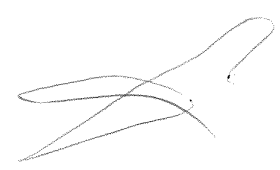
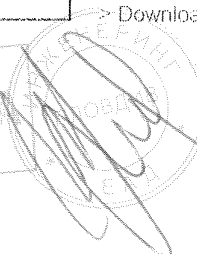
Enhance the efficiency of maintenance operations and insure your uptime.

- Access automatically to the maintenance recommendations of your equipments by flashing the QR codes
- Cloud Logbook to organise and follow your maintenance
- Remote alarming on connected equipments.



Download the free version of Facility Hero

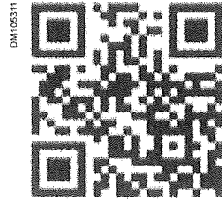
ВЕРНО С ОРИГИНАЛОМ



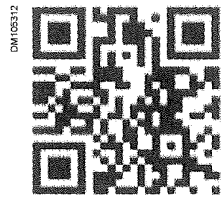
# QRcode for SM6 functions

## SM6 24 kV cubicle

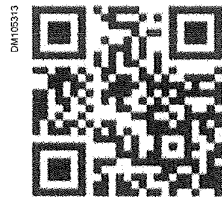
circuit breaker function



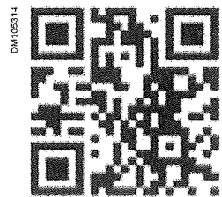
switch function



fuse-switch function

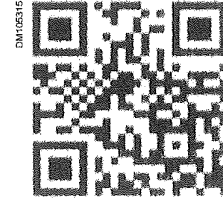


other functions

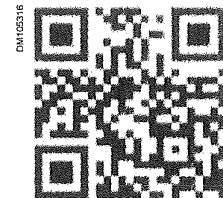


## SM6 36 kV cubicle

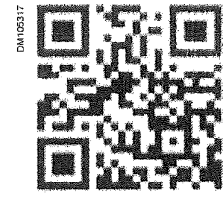
circuit breaker function



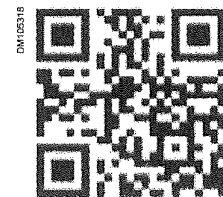
switch function



fuse-switch function



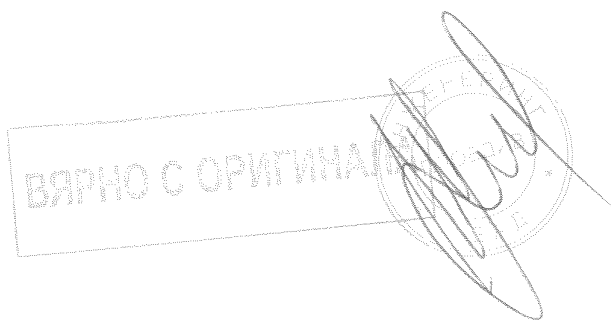
other functions



ВЕРНО С ОРИГИНАЛА



# General characteristics



# General characteristics

## Contents

---

|   |           |
|---|-----------|
| <b>Field of application</b>                 | <b>22</b> |
| <b>Units for switching function</b>         | <b>24</b> |
| <b>Units for protection function</b>        | <b>25</b> |
| <b>Units for metering function</b>          | <b>28</b> |
| <b>Units for other functions</b>            | <b>29</b> |
| <b>Operating conditions</b>                 | <b>30</b> |
| <b>Standards</b>                            | <b>31</b> |
| <b>Main characteristics</b>                 | <b>32</b> |
| <b>Factory-built cubicles description</b>   | <b>34</b> |
| <b>Compartments and devices description</b> | <b>36</b> |
| <b>Safety of people</b>                     | <b>38</b> |
| By switchgear                               | 38        |
| By operating mechanism safety               | 40        |
| By internal arc protection                  | 41        |

ВЯРНО С ОРИГИНАЛА

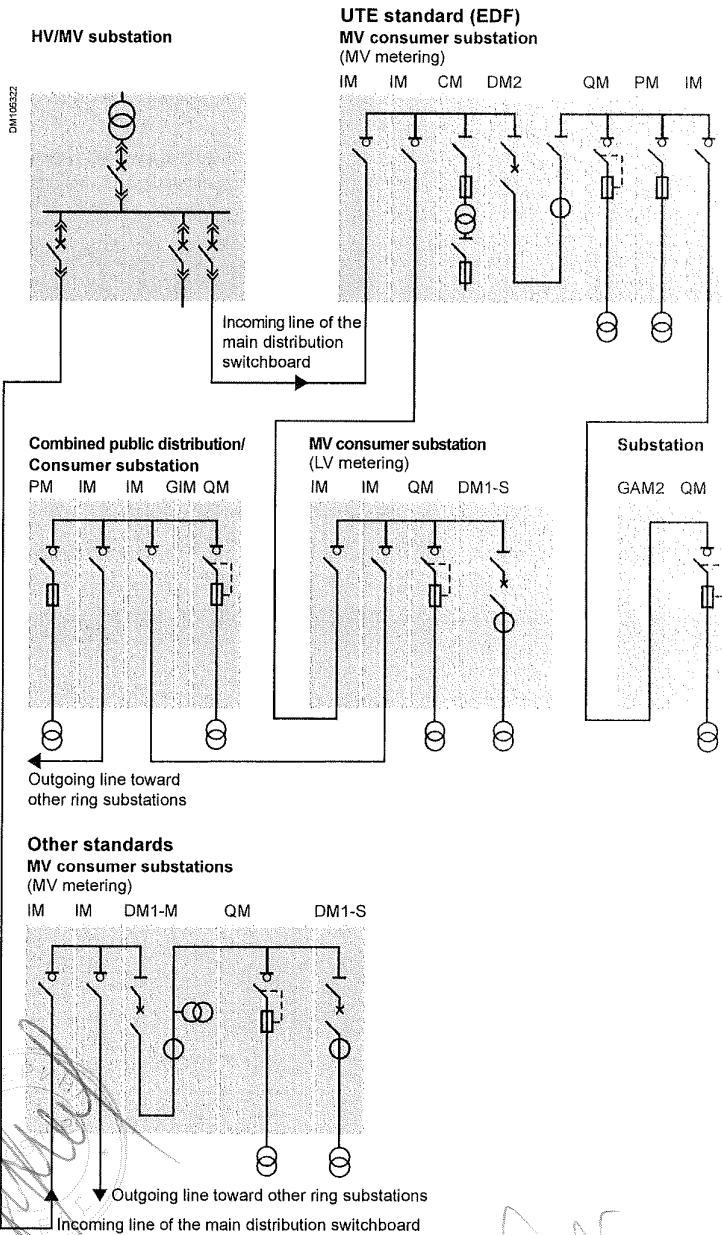
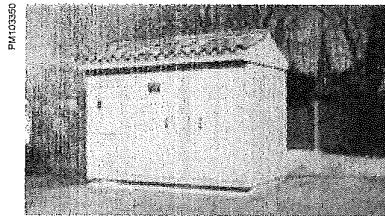
# Field of application

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

- Switch-disconnector
- SF1, SFset or Evolis circuit breaker
- Vacuum contactor
- Disconnecter.

SM6 units are used for the MV section in MV/LV transformer substations in public distribution systems and MV consumer or distribution substations up to 36 kV.

## MV/LV transformer substations



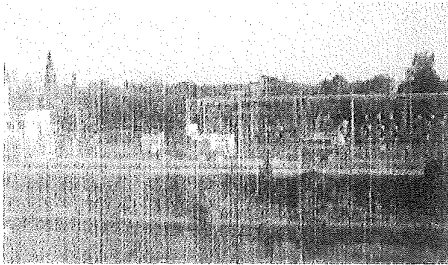
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# Field of application

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## Industrial distribution substations

HV/MV substation

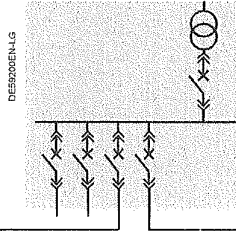
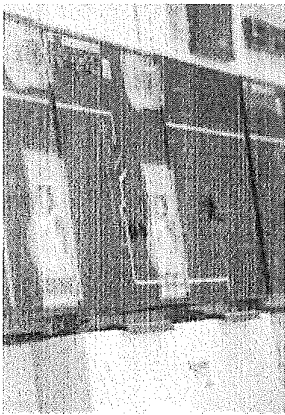
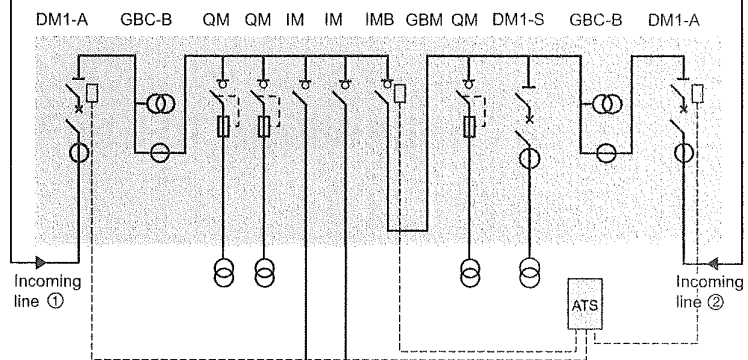


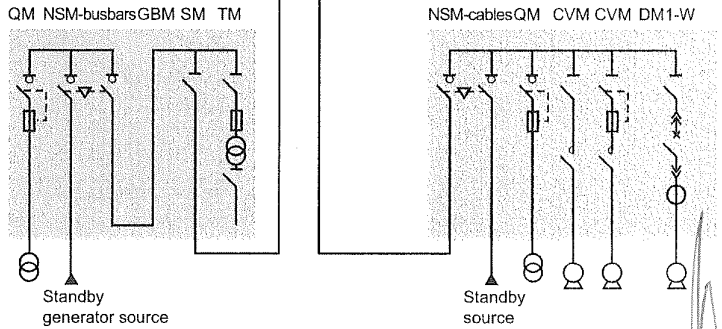
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Distribution switchboard



MV/LV transformer substations

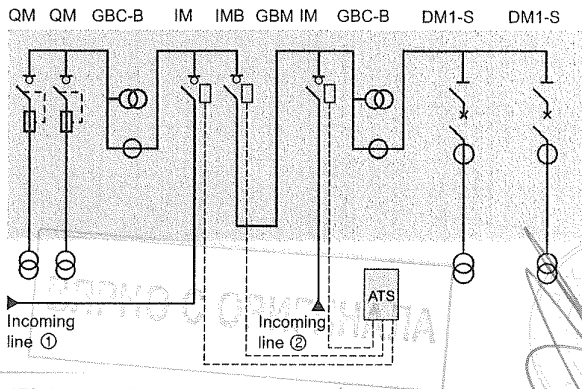


### Unit definitions

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

- IM, IMC, IMB, IMM switch
- PM fused switch
- QM, QMC, QMB fuse-switch combination
- CVM contactor and contactor with fuses
- DM1-M, DM1-A, DM1-D, DM1-S single-isolation disconnectable SF6 type circuit breaker
- DMV-A, DMV-D, single-isolation vacuum type circuit breaker frontal
- DMVL-A, DMVL-D single-isolation disconnectable vacuum type circuit breaker lateral
- DM1-W, DM1-Z withdrawable single-isolation SF6 type circuit breaker for SM6-24
- 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 disconnecter
- TM MV/LV transformer unit for auxiliaries
- Other units, consult us
- Special function EMB busbar earthing only for SM6-24.

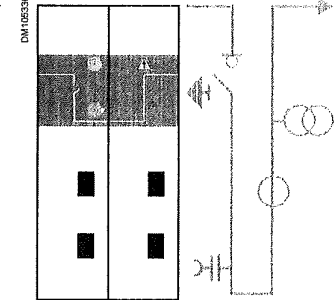
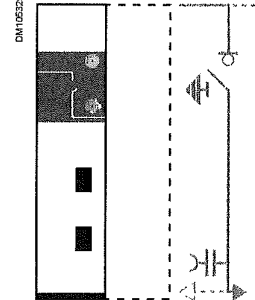
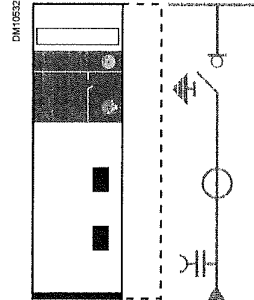
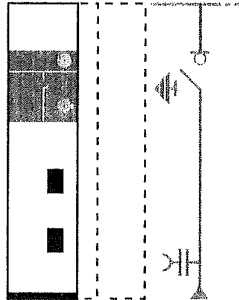
Distribution switchboard



ATS: Automatic Transfer System

## Switching

See in details on page 44



**New!**

44

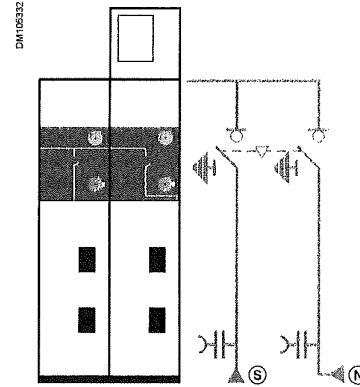
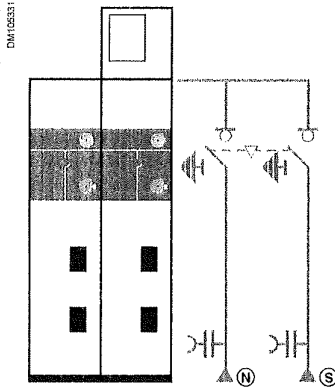
**IM**  
Switch unit  
SM6-24: 375 or 500 mm  
SM6-36: 750 mm

**IMC**  
Switch unit  
SM6-24: 500 mm  
SM6-36: 750 mm

**IMB**  
Switch unit  
with earthing disconnectors  
right or left outgoing line  
SM6-24: 375 mm  
SM6-36: 750 mm

**IMM**  
Switch and measurement unit,  
right or left outgoing line  
SM6-24: 750 mm

## Automatic transfer system



45

**NSM-cables**  
Cables power supply  
for main incoming line  
and standby line  
SM6-24: 750 mm

**NSM-busbars**  
Busbars power supply  
for main incoming line on right or left  
and cables for standby line  
SM6-24: 750 mm

ВЕРНО С ОРИГИНАЛОМ

**New!**

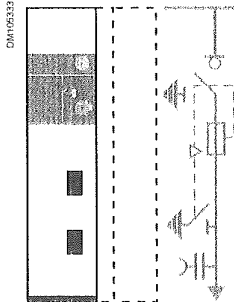
NOTE: the new feature is serviced for SM6-24

*Signature*

# Units for protection function

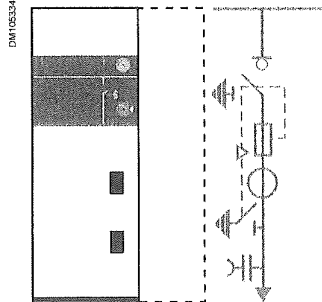
## Fuse-switch

See in details on page 46

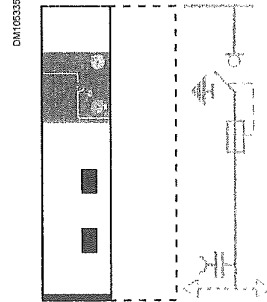


46

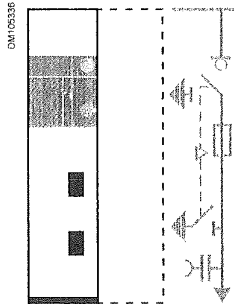
**QM**  
Fuse-switch combination unit  
SM6-24: 375 or 500 mm  
SM6-36: 750 mm



**QMC**  
Fuse-switch combination unit  
SM6-24: 625 mm  
SM6-36: 1000 mm



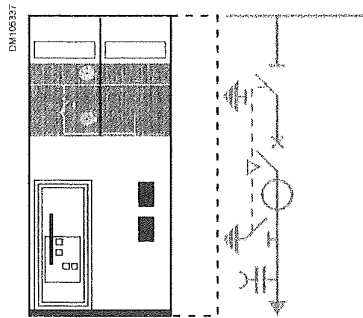
**QMB**  
Fuse-switch combination unit  
right or left outgoing line  
SM6-24: 375 mm  
SM6-36: 750 mm



47

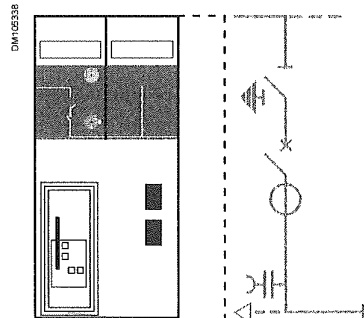
**PM**  
Fuse-switch unit  
SM6-24: 375 mm  
SM6-36: 750 mm

## SF6 circuit-breaker

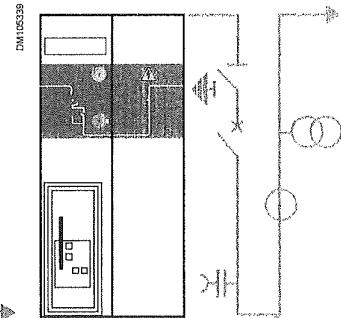


48

**DM1-A**  
Single-isolation, disconnectable  
circuit breaker unit  
SM6-24: 750 mm  
SM6-36: 1000 mm



**DM1-D**  
Single-isolation, disconnectable  
circuit breaker unit  
right or left outgoing line  
SM6-24: 750 mm  
SM6-36: 1000 mm



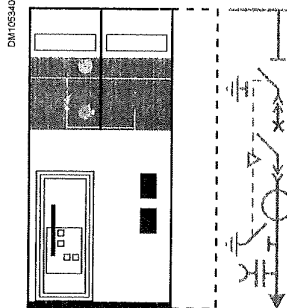
**DM1-M**  
Single-isolation, disconnectable  
circuit breaker and measurement unit  
right outgoing line  
SM6-24: 750 mm



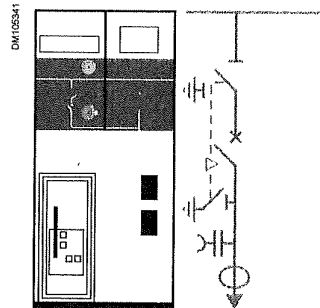
# Units for protection function

## SF6 circuit-breaker

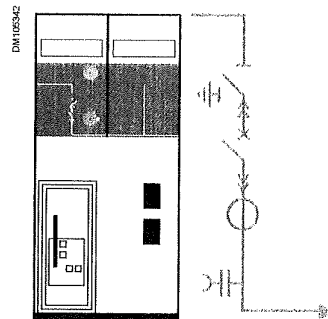
See in details on page



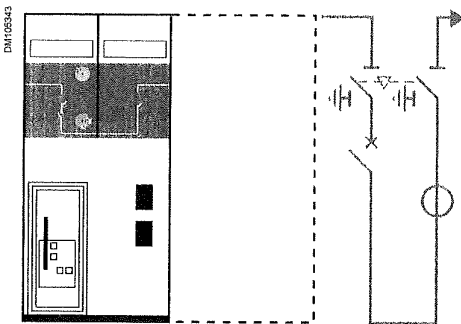
49  
50  
**DM1-W**  
Withdrawable single-isolation  
circuit breaker unit  
SM6-24: 750 mm



**DM1-S**  
Single-isolation, disconnectable  
circuit breaker unit with  
autonomous protection  
SM6-24: 750 mm

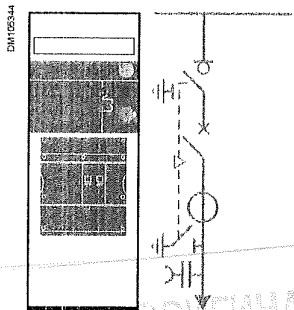


**DM1-Z**  
Withdrawable single-isolation  
circuit breaker unit  
right outgoing line  
SM6-24: 750 mm

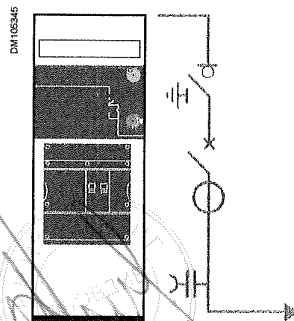


49  
**DM2**  
Double-isolation, disconnectable  
circuit breaker unit right or left outgoing line  
SM6-24: 750 mm  
SM6-36: 1500 mm

## Vacuum circuit-breaker



51  
**DMV-A**  
Single-isolation  
circuit breaker unit  
SM6-24: 625 mm

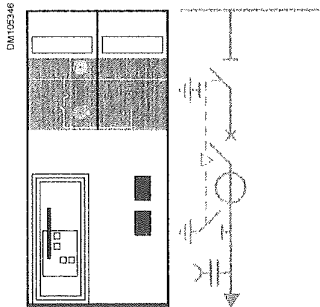


**DMV-D**  
Single-isolation  
circuit breaker unit  
right outgoing line  
SM6-24: 625 mm

# Units for protection function

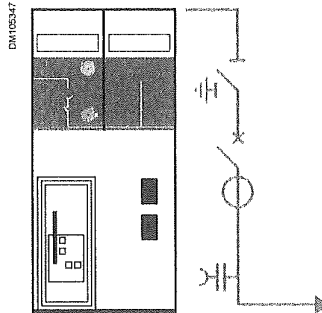
See in details on page

## Vacuum circuit-breaker



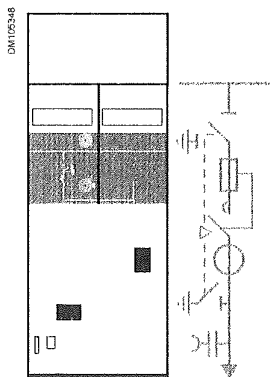
52

**DMVL-A**  
Single-isolation, disconnectable  
circuit breaker unit  
SM6-24: 750 mm



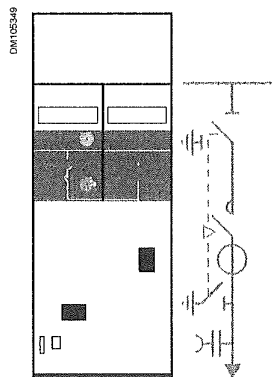
**DMVL-D**  
Single-isolation, disconnectable  
circuit breaker unit right outgoing line  
SM6-24: 750 mm

## Vacuum contactor (Direct Motor Starter)



53

**CVM**  
Fuse-contactor unit  
SM6-24: 750 mm



**CVM**  
Contactor unit  
SM6-24: 750 mm

*[Handwritten signature]*

*[Handwritten signature]*

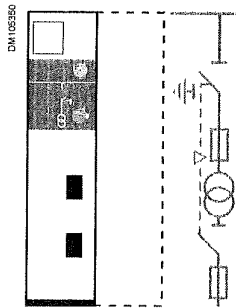
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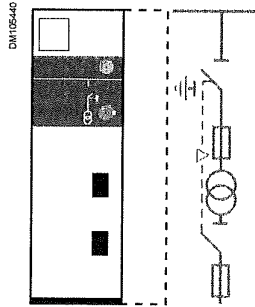
# Units for metering function

See in details on page

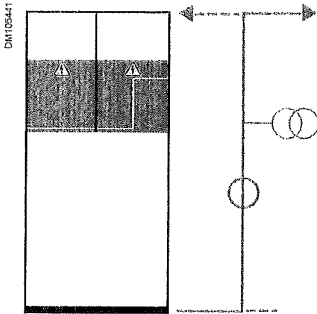


54

**CM**  
Voltage transformers for mains with earthed neutral system  
SM6-24: 375 mm  
SM6-36: 750 mm

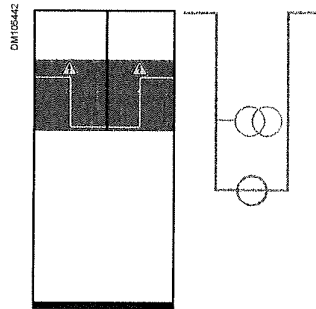


**CM2**  
Voltage transformers for mains with insulated neutral system  
SM6-24: 500 mm  
SM6-36: 750 mm



55

**GBC-A**  
Current and/or voltage measurement unit right or left outgoing line  
SM6-24: 750 mm  
SM6-36: 750 mm



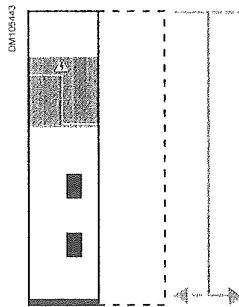
**GBC-B**  
Current and/or voltage measurement unit  
SM6-24: 750 mm  
SM6-36: 750 mm

ВЯРНО С ОРИГИНАЛА

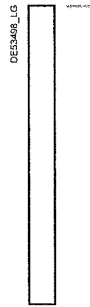
A rectangular stamp with the text 'ВЯРНО С ОРИГИНАЛА' (True to the original) is placed over a circular official stamp. A handwritten signature is written across the circular stamp.

A handwritten signature or mark located in the bottom right corner of the page.

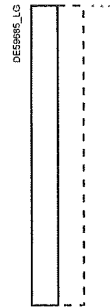
See in details on page



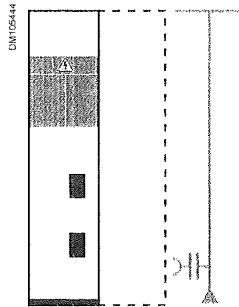
**56 GBM**  
**Connection unit**  
 right or left outgoing line  
 SM6-24: 375 mm  
 SM6-36: 750 mm



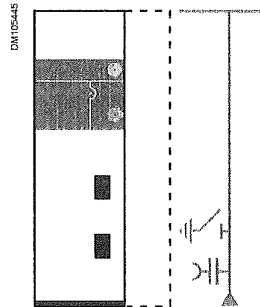
**GEM**  
**Extension unit VM6/SM6**  
 SM6-24: 125 mm



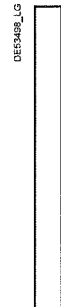
**GIM**  
**Intermediate bus unit**  
 SM6-24: 125 mm  
 SM6-36: 250 mm



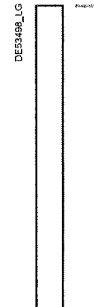
**58 GAM2**  
**Incoming cable-connection unit**  
 SM6-24: 375 mm  
 SM6-36: 750 mm



**GAM**  
**Incoming cable-connection unit with earthing**  
 SM6-24: 500 mm  
 SM6-36: 750 mm



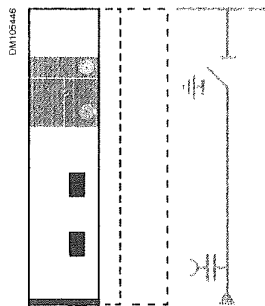
**GFM**  
**Extension unit**  
**Fluokit M24/M24+ /M9/SM6-24**  
 SM6-24: 125 mm  
**Fluokit M36/SM6-36**  
 SM6-36: 250 mm



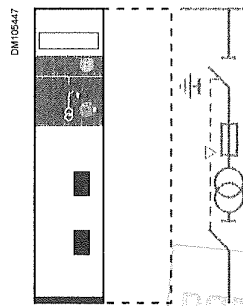
**GMM**  
**Extension unit**  
**Modular/ SM6-36**  
 SM6-36: 250 mm



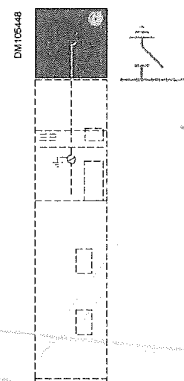
**GUM**  
**Extension unit**  
**Unifluor/ SM6-24**  
 SM6-24: 125 mm



**59 SM**  
**Disconnecter unit**  
 SM6-24: 375 mm or 500<sup>(1)</sup> mm  
 SM6-36: 750 mm  
<sup>(1)</sup> only for 1250 A units.



**TM**  
**MV/LV transformer unit for auxiliaries**  
 SM6-24: 375 mm  
 SM6-36: 750 mm



**EMB**  
**Busbar earthing enclosure**  
 SM6-24: 375 mm

ВЕРНО КОПИРОВАНА



# Operating conditions

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

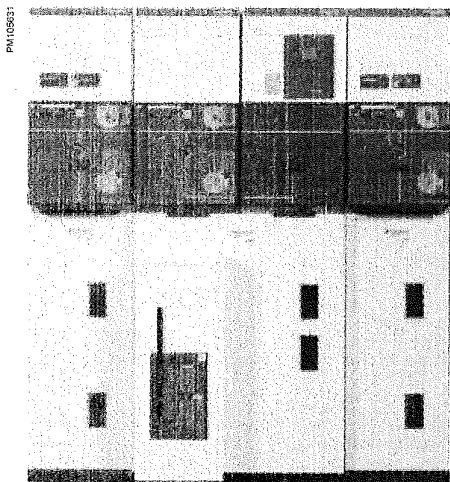
SM6 units are designed for indoor installations.

Their compact dimensions are:

- 375 to 1500 mm width
- 1600 to 2250 mm height
- 840 to 1400 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.).



## Normal operating conditions

- **Ambient air temperature:**

- 1) less than or equal to 40°C
- 2) less than or equal to 35°C on average over 24 hours
- 3) greater or equal to -5°C.

- **Altitude**

- 1) less than or equal to 1000 m
- 2) above 1000 m, a derating coefficient is applied (please consult us).

- **Solar radiation**

- 1) no solar radiation influence is permitted.

- **Ambient air pollution**

- 1) no significant pollution by dust, smoke, corrosive and/or flammable gases, vapours or salt.

- **Humidity**

- 1) average relative humidity over a 24 hour period, less than or equal to 95%
- 2) average relative humidity over a 1 month period, less than or equal to 90%
- 3) average vapor pressure over a 24 hour period, less than or equal to 2.2 kPa
- 4) average vapor pressure over a 1 month period, less than or equal to 1.8 kPa.

For these conditions, condensation may occasionally occur. Condensation can be expected where sudden temperature changes occur in periods of high humidity.

To withstand the effects of high humidity and condensation, such as breakdown of insulation, please pay attention on Civil Engineering recommendations for design of the building or housing, by suitable ventilation and installation.

- **Seismic (for 24 Kv and 36 kV):**

- 1) Up to 0.5 g (horizontal) and 0.4 g (vertical)
- 2) Class 2 for 24 kV and Class 1 for 36kV
- 3) According to standards IEEE-693/2005 and EN 60068-3/1993 for the 24 kV and 36 kV

**Severe operating conditions (please consult us).**





# Standards

SM6 units meet all the following standards and specifications:

- IEC standards

- UTE standards for SM6-24

- EDF specifications for SM6-24

- SEISMIC standards for 24 kV

## IEC standards

|           |   |
|-----------|---|
| 62271-200 | High-voltage switchgear and controlgear - Part 200: A.C. metal-enclosed switchgear and controlgear for rated voltage above 1 kV and up to and including 52 kV.  |
| 62271-1   | High-voltage switchgear and controlgear - Part 1: Common specifications.  |
| 62271-103 | High voltage switches - Part 1: switches for rated voltages above 1 kV and less or equal to 52 kV.  |
| 62271-105 | High-voltage switchgear and controlgear - Part 105: High voltage alternating current switch-fuse combinations.  |
| 60255     | Electrical relays.  |
| 62271-100 | High-voltage switchgear and controlgear - Part 100: High-voltage alternating current circuit breakers.  |
| 62271-102 | High-voltage switchgear and controlgear - Part 102: High-voltage alternating current disconnectors and earthing switches.   |
| 61869-2   | Instrument transformers - Part 1: Current transformers.   |
| 61869-3   | Instrument transformers - Part 2: Voltage transformers.   |
| 60044-8   | Instrument transformers - Part 8: Low Power Current Transducers.  |
| 62271-206 | High-voltage prefabricated switchgear and controlgear assemblies - Voltage presence indicating systems.   |
| 62271-304 | High-voltage switchgear and controlgear - Part 304: Design classes for indoor enclosed switchgear and controlgear for rated voltages above 1 kV up to and including 52 kV to be used in severe climatic conditions. |

## SEISMIC standards for 24kV

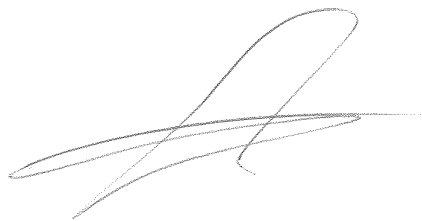
|              |  |
|--------------|--|
| IEE-693      | 2005 IEEE Recommended Practice for Seismic Design of Substations                 |
| EN600068-3-3 | 1993 Environmental testing-Part 3: guidance, Seismic test methods for equipments |

## UTE standards for 24 kV

|             |  |
|-------------|--|
| 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 for 24 kV

|            |   |
|------------|---|
| HN 64-S-41 | A.C. metal-enclosed switchgear 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.  |



ВАРНО С ОРИГИНАЛА



## Main characteristics

PM10532



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.

## Electrical characteristics

| Rated voltage   |                      | Ur                       | kV                | 7.2                      | 12 | 17.5 | 24  | 36       |
|---|----------------------|--------------------------|-------------------|--------------------------|----|------|-----|----------|
| Insulation level  |                      |                          |                   |                          |    |      |     |          |
| Insulation  | Ud                   | 50/60 Hz, 1 min (kV rms) |                   | 20                       | 28 | 38   | 50  | 70       |
| Isolation   | Ud                   | 50/60 Hz, 1 min (kV rms) |                   | 23                       | 32 | 45   | 60  | 80       |
| Insulation  | Up                   | 1.2/50 $\mu$ s (kV peak) |                   | 60                       | 75 | 95   | 125 | 170      |
| Isolation   | Up                   | 1.2/50 $\mu$ s (kV peak) |                   | 70                       | 85 | 110  | 145 | 195      |
| Breaking capacity   |                      |                          |                   |                          |    |      |     |          |
| Transformer off load                                      |                      | A                        |                   | 16                       |    |      |     |          |
| Cables off load   |                      | A                        |                   | 31.5                     |    |      |     | 50       |
| Rated current   | Ir                   | A                        |                   | 400 - 630 - 1250         |    |      |     | 630-1250 |
| Short-time withstand current                              | Ik/tk <sup>(1)</sup> | kA/1 s                   | 25                | 630 - 1250               |    |      |     | 1250     |
|   |                      |                          | 20 <sup>(2)</sup> | 630 - 1250               |    |      |     |          |
|   |                      |                          | 16                | 630 - 1250               |    |      |     |          |
|   |                      |                          | 12.5              | 400 - 630 - 1250         |    |      |     | 630-1250 |
| Making capacity (50 Hz)                                   | Ima                  | kA                       | 62.5              | 630                      |    | NA   |     |          |
|   |                      |                          | 50                | 630                      |    |      |     |          |
|   |                      |                          | 40                | 630                      |    |      |     |          |
|   |                      |                          | 31.25             | 400 - 630                |    |      |     | 630      |
| Maximum breaking capacity (Isc)                           |                      |                          |                   |                          |    |      |     |          |
| Units IM, IMC, IMB, IMM <sup>(4)</sup>                    |                      | A                        |                   | 630 - 800 <sup>(3)</sup> |    |      |     | 630      |
| NSM-cables, NSM-busbars                                   |                      | A                        |                   | 630 - 800 <sup>(3)</sup> |    |      |     | NA       |
| QM, QMC, QMB  |                      | kA                       |                   | 25                       | 20 |      | 20  |          |
| PM  |                      | kA                       |                   | 25                       |    | 20   |     |          |
| CVM   |                      | kA                       |                   | 6.3                      | NA |      |     |          |
| CVM with fuses  |                      | kA                       |                   | 25                       | NA |      |     |          |
| SF6 circuit breaker range                                 |                      |                          |                   |                          |    |      |     |          |
| DM1-A, DM1-D, DM1-W <sup>(4)</sup> , DM1-M <sup>(4)</sup> |                      | kA                       | 25                | 630-1250                 |    |      |     | 1250     |
|   |                      |                          | 20                | 630-1250                 |    |      |     |          |
| DM1-S   |                      | kA                       | 25                | 630                      |    |      |     | NA       |
| DM1-Z   |                      |                          | 25                | 1250                     |    |      |     | NA       |
| DM2   |                      | kA                       | 20                | 630                      |    |      |     |          |
|   |                      |                          | 25                | 630                      |    |      |     | 1250     |
| Vacuum circuit breaker range                              |                      |                          |                   |                          |    |      |     |          |
| DMV-A, DMV-D  |                      | kA                       | 25                | 630-1250                 |    |      |     | NA       |
| DMVL-A  |                      | kA                       | 20                | 630                      |    |      |     | NA       |
| DMVL-D  |                      | kA                       | 25                | 630                      |    |      |     | NA       |

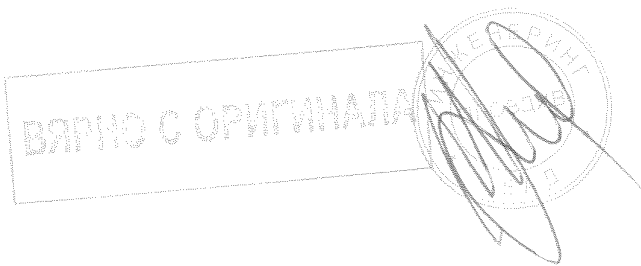
NA: Non Available

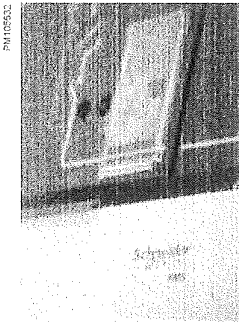
(1) 3 phases

(2) In 20 kA/3 s for SM6-24 only, consult us

(3) In 800 A, consult us.

(4) NA for SM6-36





### Endurance

| Units   | Mechanical endurance  | Electrical endurance  |
|---|---|---|
| IM, IMC, IMB, IMM, PM, QM<br>(5), QMC (5), QMB (5),<br>NSM-cables, NSM-busbars  | IEC 62271-103<br>1 000 operations<br>class M1                         | IEC 62271-103<br>100 breaks at Ir,<br>p.f. = 0.7, class E3  |
| CVM Disconnecter  | IEC 62271-102<br>1 000 operations                                     |   |
| Vacuum contactor  | IEC 60470<br>2 500 000 operations<br>250 000 with mechanical latching | IEC 60470<br>250 000 breaks at Ir   |
| <b>SF6 circuit breaker range</b>  |   |   |
| DM1-A, Disconnecter   | IEC 62271-102<br>1 000 operations                                     |   |
| DM1-D, DM1-M, DM1-W, DM1-Z, DM1-S, DM2  | SF circuit breaker<br>IEC 62271-100<br>10 000 operations<br>class M2  | IEC 62271-100<br>30 breaks at 12.5 kA for SM6-24<br>25 breaks at 25 kA for SM6-24<br>40 breaks at 16 kA for SM6-36<br>15 breaks at 25 kA for SM6-36<br>10 000 breaks at Ir,<br>p.f. = 0.7, class E2 |
| Operating sequence  |   | O - 0.3 s - CO - 15 s - CO<br>O - 0.3 s - CO - 3 mn<br>O - 3 mn - CO - 3 mn - CO  |
| <b>Vacuum circuit breaker range</b>   |   |   |
| DMV-A, Switch<br>DMV-D  | IEC 62271-103<br>1 000 operations<br>class M1                         | IEC 62271-103<br>100 breaks at Ir,<br>p.f. = 0.7, class E3  |
| Evolvis circuit breaker   | IEC 62271-100<br>10 000 operations<br>class M2                        | IEC 62271-100<br>100 breaks at 25kA for SM6-24<br>10 000 breaks at Ir,<br>p.f. = 0.7, class E2  |
| DMVL-A Disconnecter<br>DMVL-D   | IEC 62271-102<br>1 000 operations                                     |   |
| Evolvis circuit breaker   | IEC 62271-100<br>10 000 operations<br>class M2                        | IEC 62271-100<br>100 breaks at 16kA for SM6-24<br>100 breaks at 25kA for SM6-24<br>10 000 breaks at Ir,<br>p.f. = 0.7, class E2   |
| <i>(5) As per recommendation IEC 62271-105, three breakings at p.f. = 0.2<br/>800 A under 36 kV; 1400 A under 24 kV; 1730 A under 12 kV; 2600 A under 5.5 kV.</i> |   |   |
| <b>Internal arc withstand (in accordance with IEC 62271-200):</b>   |   |   |
| • SM6-24:   |   |   |
| Basic   | <input type="checkbox"/> 12.5 kA 1 s, IAC: A-FL                       |   |
| Advance   | <input type="checkbox"/> 12.5 kA 1 s, IAC: A-FLR                      |   |
|   | <input type="checkbox"/> 16 kA 1 s, IAC: A-FLR & IAC: A-FL            |   |
|   | <input type="checkbox"/> 20 kA 1 s, IAC: A-FLR & IAC: A-FL            |   |
| • SM6-36: <input type="checkbox"/> 16 kA 1 s, IAC: A-FL   |   |   |

#### Protection index:

- Classes: PI (insulating partition)
- Loss of service continuity classes: LSC2A (LSC1 for metering GAM/GBM functions)
- Units in switchboard: IP3X
- Between compartments: IP2X for SM6-24, IP2XC for SM6-36
- Cubicle: IK08 for SM6-24, IK07 for SM6-36.

#### Electro-magnetic compatibility:

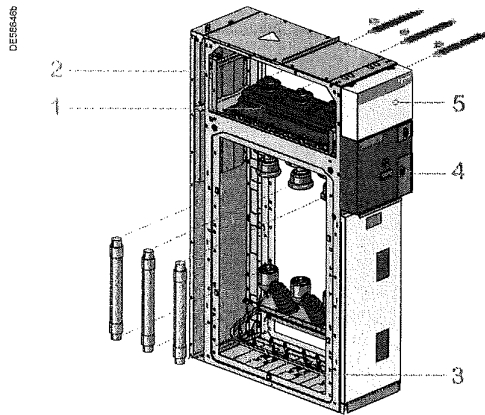
- Relays: 4 kV withstand capacity, as per recommendation IEC 60801.4
- Compartments:
  - electrical field:
    - 40 dB attenuation at 100 MHz
    - 20 dB attenuation at 200 MHz
  - magnetic field: 20 dB attenuation below 30 MHz.
- 3) According to standards IEEE-693/2005 and EN 60068-3/1993
- for 36 kV (please contact us).

#### 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.
  - Seismic:
    - for 24 kV (option):
      - 1) Up to 0.5 g (horizontal) and 0.4 g (vertical)
      - 2) Class 2

# Factory-built cubicles description

## Switch and fuse protection cubicles



**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.

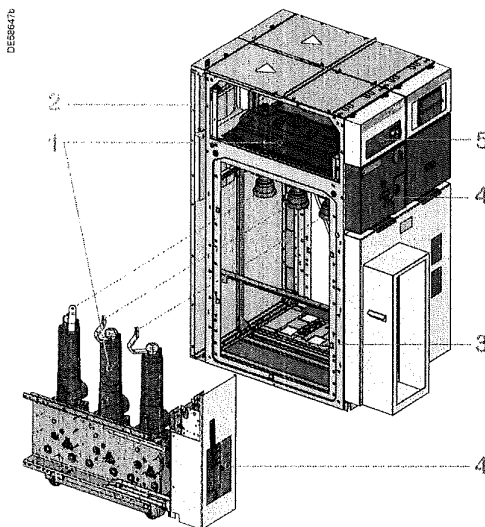
**3 connection:** accessible through front, connection to the lower switch-disconnector and earthing switch terminals (IM cubicles) or the lower fuse-holders (PM and QM cubicles). This compartment is also equipped with an earthing switch downstream from the MV fuses for the protection units.

**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.

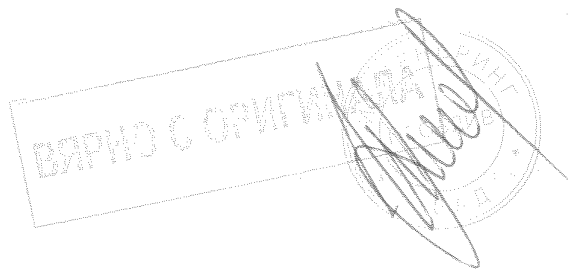
Two circuit breaker offers are possible:

- 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.

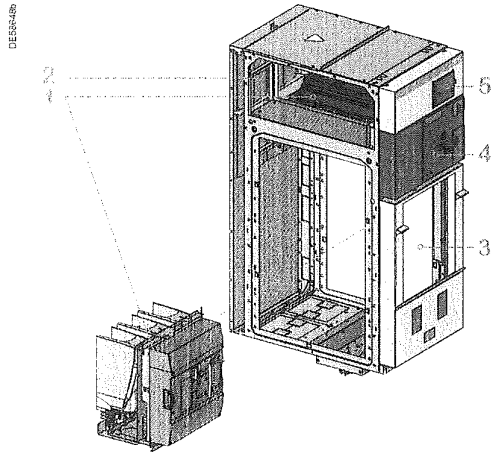
**5 low voltage:** installation of compact relay devices (Statimax) and test terminal boxes. If more space is required, an additional enclosure may be added on top of the cubicle.

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



# Factory-built cubicles description

## 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.

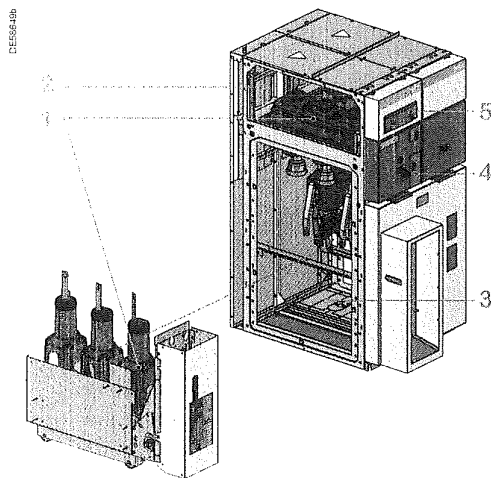
- Evolis: device associated with an electronic relay and standard sensors (with or without auxiliary source).

**4 operating mechanism:** contains the elements used to operate the disconnecter(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:** disconnecter(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.

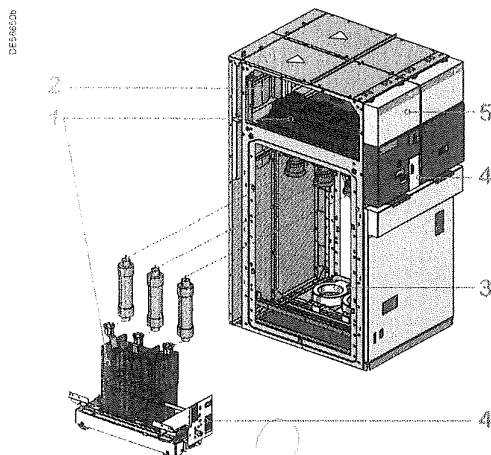
- Evolis: device associated with an electronic relay and standard sensors (with or without auxiliary source).

**4 operating mechanism:** contains the elements used to operate the disconnecter(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".

## Contactors cubicles



**1 switchgear:** disconnecter 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.

It is also equipped with an earthing switch downstream. The contactor may be equipped with fuses. 2 types may be used:

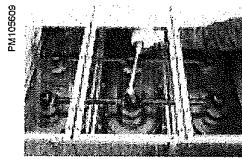
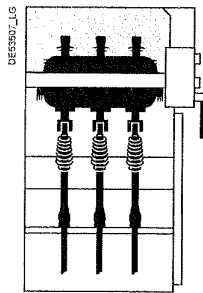
- Vacuum with magnetic holding
- Vacuum with mechanical latching.

**4 operating mechanism:** contains the elements used to operate the disconnecter(s), the contactor 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.

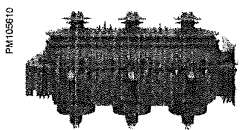
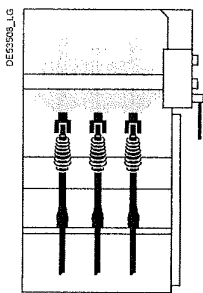
**Options:** please, refer to the chapter "Characteristics of the functional units".

# Compartments and devices description



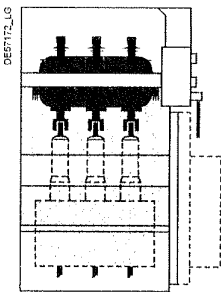
## Busbar compartment

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 (for SM6-24 only) - 630 - 1250 A.

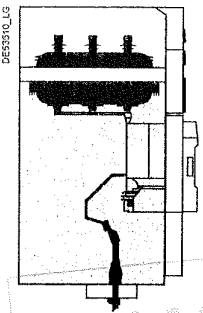


## Switching device

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



SF6 and vacuum lateral type circuit breaker



Frontal vacuum type circuit breaker

## Connection 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<sup>2</sup> or 2 x 400 mm<sup>2</sup> for 1250 A incoming or outgoing units
- 240 mm<sup>2</sup> or 2 x 240 mm<sup>2</sup> for incoming or outgoing units 400 - 630 A
- 95 mm<sup>2</sup> for transformer protection cubicles incorporating fuses.

See in functional 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.

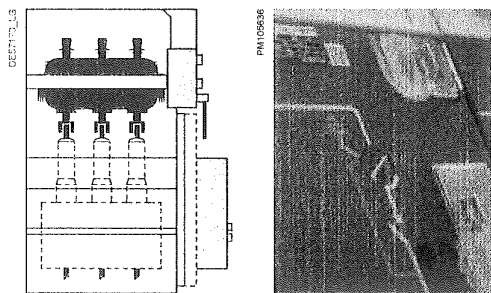
A stud incorporated in the field distributor makes it possible to position and secure the cable-end lug with a single hand.

КОПИЯ С ОРИГИНАЛА



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# Compartments and devices description



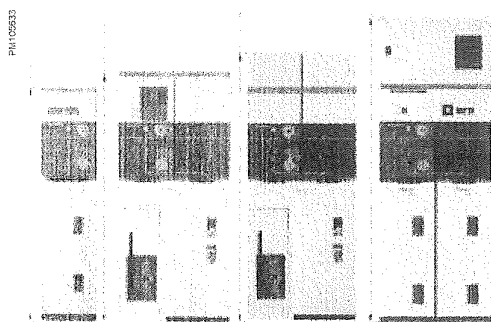
## Operating-mechanism cover

These covers contain the various operating functions for the:

- switch and earthing switch
- disconnecter(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 for SM6-24

It enables the cubicle to be equipped with low voltage switchgear providing protection, control, status indication and data transmission.

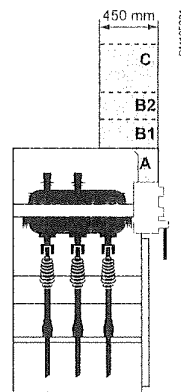
According to the volume, it is available in 3 versions: cover, wiring duct and cabinet.

**A - LV cover:** enables a very simple low voltage section to be installed such as indication buttons, push buttons or protection relays.

**B1 - 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.

**B2 - LV wiring duct and cabinet (240mm):** enables a large majority of low voltage to be installed. It also takes the thermal monitoring, VAMP121.

**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 60 or series 80, converters; control and monitoring units, regulating transformers or dual secondary transformers.



| LV cover           | LV wiring duct | LV wiring duct | LV control cabinet |
|--------------------|----------------|----------------|--------------------|
| 1600               | 1690           | 1840           | 2050               |
| Low Voltage option |                |                |                    |
|                    | 90             | 240            | 450                |

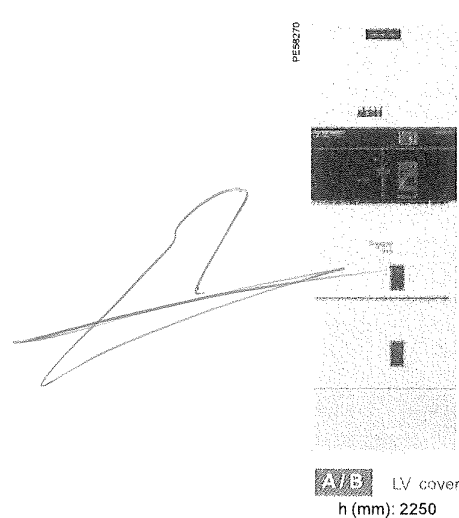
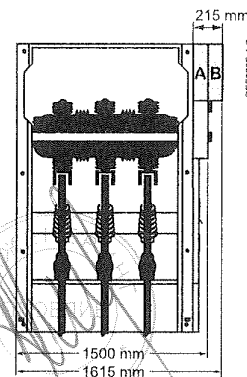
In all cases, these volumes are accessible, with cables and busbars energised, without de-energising the substation.

## Low-voltage monitoring control cabinet for SM6-36

**A - LV cover:** enables a very simple low voltage section to be installed such as indication buttons, push buttons or protection relays. The total height of the cubicle is then 2250 mm.

**B - LV control cabinet:** this can be used for larger low voltage accessories or those with a depth greater than 100 mm or complex equipment, such as Sepam series 60 or series 80, converters, control and monitoring units, regulating transformers or dual secondary transformers.

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

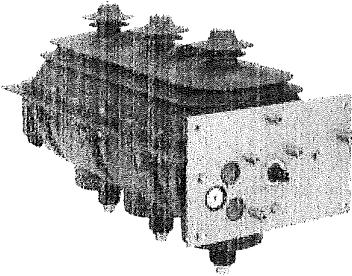


**A/B** LV cover  
h (mm): 2250

# Safety of people

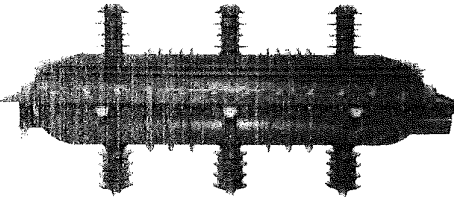
## By switchgear

PN102611



Switch-disconnector for 24 kV

PE57206



Switch-disconnector for 36 kV

### Switch or disconnector and earthing switch

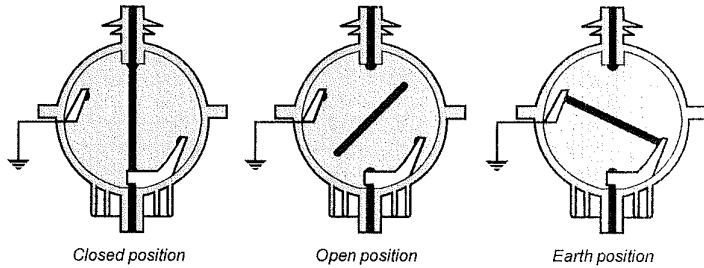
• **Gas tightness**

The three rotating contacts are placed in an enclosure filled with gas to a relative pressure of 0.4 bar (400 hPa) for SM6-24 and 1 bar (1000 hPa) for SM6-36. 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.

M730184\_LG



• **Insensitivity to the environment**

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

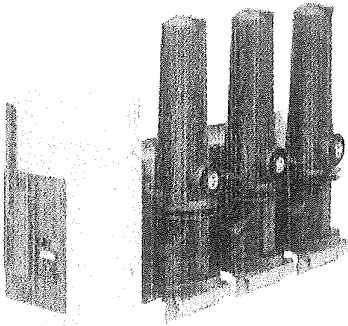
ВЕРНО С ОРИГИНАЛОМ



# Safety of people

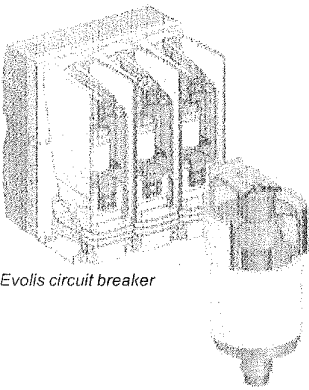
## By switchgear

PM10512



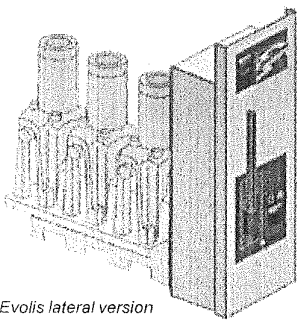
SF1 circuit breaker

PM10513



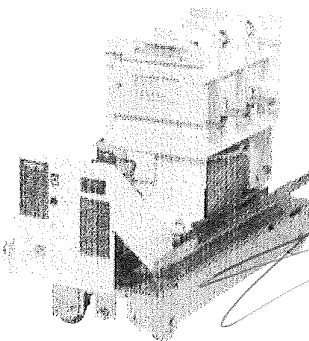
Evolis circuit breaker

PE50739



Evolis lateral version

PE57841



Vacuum type contactor

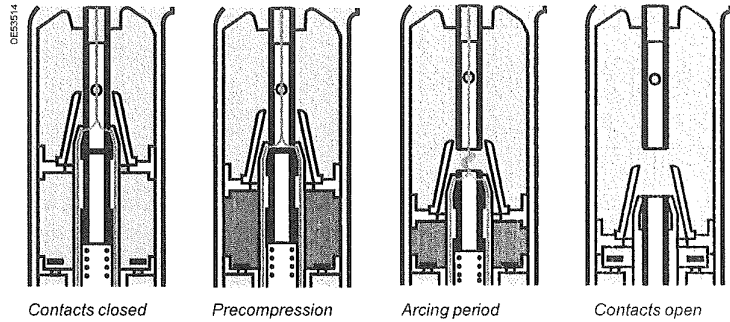
### SF6 circuit breaker: SF1

• **Gas tightness**

The SF1 circuit breaker is made up of three separate poles mounted on a structure supporting the operating mechanism. Each pole-unit houses the active elements in an insulating enclosure filled with gas to a relative pressure of 1.5 bar (0,15 mPa) for 24 kV and 2 bar (0,2 mPa) for 36 kV. 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.



### Vacuum type circuit breaker: Evolis

• **Vacuum 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 vacuum 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.

### Vacuum type contactor

• **Vacuum tightness**

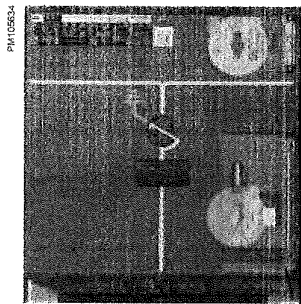
Vacuum contactor comprises three separate poles fixed on a structure supporting the control mechanism. Each pole encloses all of the active parts in an insulating enclosure under vacuum and its vacuum tightness is checked in the factory.

ВЕРНО С ОРИГИНАЛА

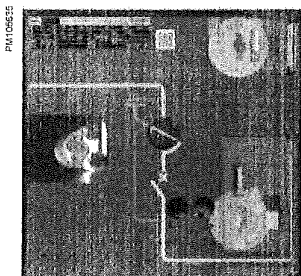


# Safety of people

By operating mechanism safety

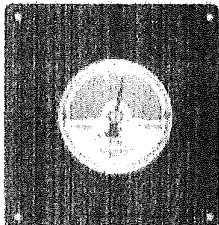


Visibility of main contacts

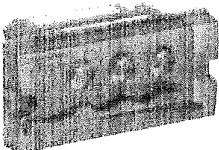


PMT05835

PE57166



PE52366



## 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 Indicating System

VPIS complies with 62271-206 standard allowing to indicate the voltage presence on each phase with LEDs. Designed for severe environments so that to guarantee high reliability in MV/LV substations worldwide.

Exits in Voltage Output version to provide voltage presence information to VD23 voltage presence relay.

ВЯРКО С ОРИГИНАЛА

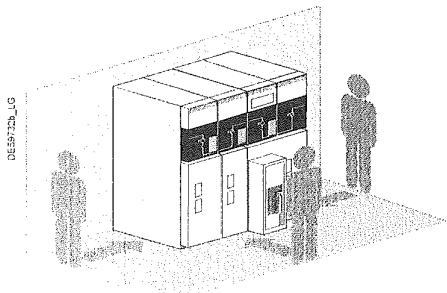


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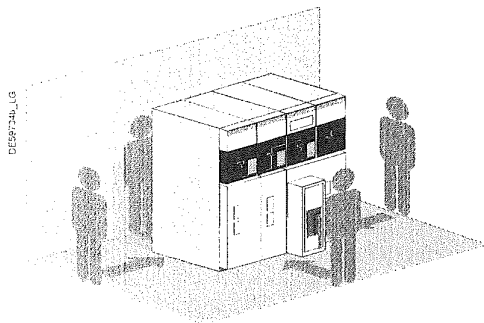
# Safety of people

## By internal arc protection

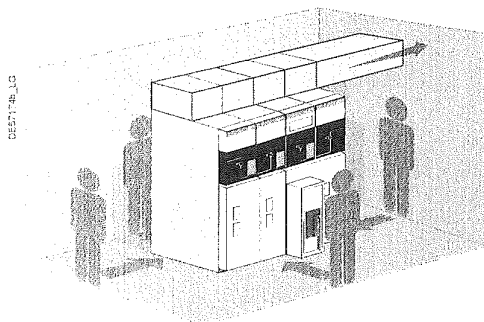
Standard IEC 62271-200 appendix A indicates a method for testing switchgear in metal enclosures under internal arc conditions. The aim of this test is to show that an operator situated in front of a switchboard would be protected against the effects of an internal fault.



Example of installation of an SM6 switchboard installed against the wall downwards exhaust 12.5 kA 1 s and 16 kA 1 s, IAC: A-FL: 3-sides internal arc protection



Example of installation of an SM6-24 switchboard installed in the middle of a room downwards exhaust 16 kA 1 s, IAC: A-FLR: 4-sides internal arc protection



Example of installation of an SM6-24 switchboard installed in the middle of a room upwards exhaust 16 kA 1 s and 20 kA 1 s, IAC: A-FLR: 4-sides internal arc protection

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 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 operating safety:**
  - voltage presence indicator on the front face,
  - natural reliable interlocking,
  - locking using keys or padlocks.

## Internal arc withstand (in conformity with IEC 62271-200)

• **3 versions are available for SM6-24:**

**Basic:**

- 12.5 kA 1 s, IAC: A-FL

**Advance:**

- 12.5 kA 1 s, IAC: A-FLR
- 16 kA 1 s, IAC: A-FL & IAC: A-FLR
- 20 kA 1 s, IAC: A-FL & IAC: A-FR

• **1 version is available for SM6-36:**

- 16 kA 1 s, IAC: A-FL.

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

In all internal arc versions, the SM6 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 is designed.

The thermal and mechanical forces that an internal arc can produce are perfectly absorbed by the enclosure.

An operator situated in front of the SM6 switchboard during an internal fault will not be exposed to the effects of arcing.

## SM6 proposes several options to install a standard internal arc withstand switchboard

• **3-sides internal arc protection IAC: A-FL,**

12.5 kA 1 s, 16 kA 1 s and 20 kA 1 s for SM6-24 and 16 kA 1 s for SM6-36.

SM6 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,**

12.5 kA 1 s, 16 kA 1 s and 20 kA 1 s for SM6-24.

For SM6 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:**

(Installation requirements manual to be considered)

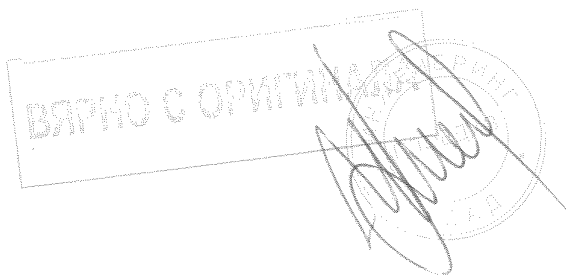
- **downwards exhaust**

Civil engineering with an adequate volume is necessary.

- **upwards exhaust for SM6-24**

A ceiling height greater or equal than 2 150 mm is necessary, duct at the right or left side of the cubicle (not supplied).

# Characteristics of the functional units



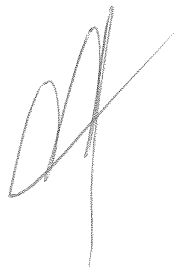
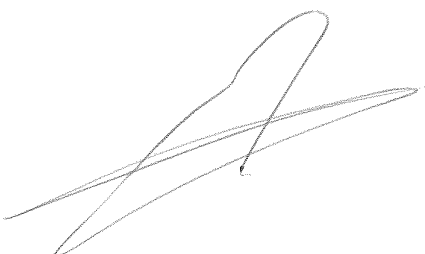
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# Characteristics of the functional units

## Contents

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|  |           |
|--|-----------|
| <b>Functional units selection</b>      | <b>44</b> |
| Switching                              | 44        |
| Protection                             | 46        |
| Metering                               | 54        |
| Other functions                        | 56        |
| <b>Operating mechanisms</b>            | <b>60</b> |
| <b>Auxiliaries</b>                     | <b>63</b> |
| <b>Current transformers for SM6-24</b> | <b>65</b> |
| <b>Current transformers for SM6-36</b> | <b>67</b> |
| <b>Voltage transformers for SM6-24</b> | <b>68</b> |
| <b>Voltage transformers for SM6-36</b> | <b>70</b> |
| <b>Motors protection units</b>         | <b>71</b> |
| <b>Protection of transformers</b>      | <b>72</b> |
| <b>Interlocks</b>                      | <b>74</b> |



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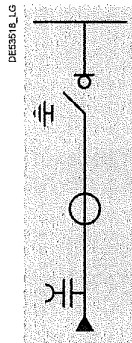
# Functional units selection

## Switching

**IM**  
Switch unit



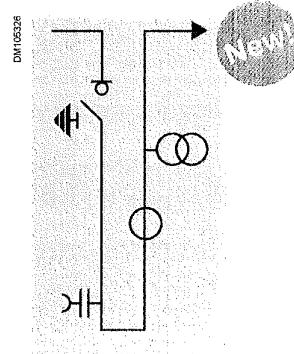
**IMC**  
Switch unit



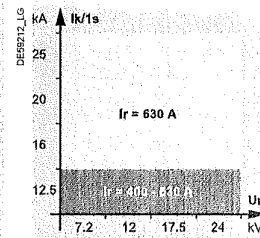
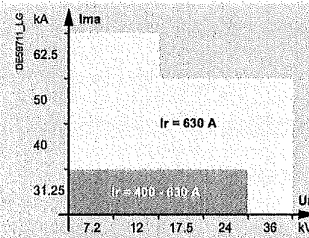
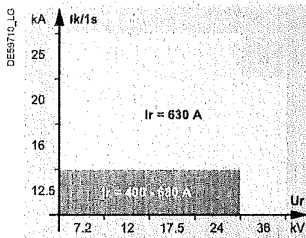
**IMB**  
Switch unit **with** earthing switch, right or left outgoing



**IMM**  
Switch and measurement unit, right or left outgoing line



### Electrical characteristics



### Basic equipment:

- switch and earthing switch
- three-phase busbars
- CIT operating mechanism
- connection pads for dry-type cables
- voltage presence indicator
- 150 W heating element for SM6-36
- LSC2A
- three-phase bottom busbars for outgoing lines (right or left)

- one to three CTs for SM6-24
- three CTs for SM6-36

- Three CT's

### Versions:

- CI2 operating mechanism
- CI1 operating mechanism
- CI1 operating mechanism for SM6-36
- CI1 operating mechanism
- in 800 A version for SM6-24, consult us

### Option:

- motor for operating mechanism
- motor with severe and communication conditions for SM6-24
- auxiliary contacts
- key-type interlocks
- release units (coil)
- operation counter
- 1250 A three-phase upper busbars
- earth fault indicators
- connection pads for two dry-type single-core cables for 36 kV
- digital ammeter
- surge arresters (for SM6-36 and for SM6-24 in 500 mm width cubicle)
- 630 A busbars earthing switch cabinet for SM6-24 (not available for internal arc IEC62271-200)
- arc detection
- thermal monitoring
- 630 A three-phase upper busbars for severe operating conditions for SM6-24
- visibility of main contacts
- pressure indicator device
- enlarged low-voltage control cabinet for SM6-24
- 50 W heating element for SM6-24
- arc detection
- thermal monitoring
- 630 A cable connection by the top (no internal arc withstand if selected)
- protection using Sepam programmable electronic unit
- three voltage transformers
- key-type interlocks
- arc detection
- thermal monitoring

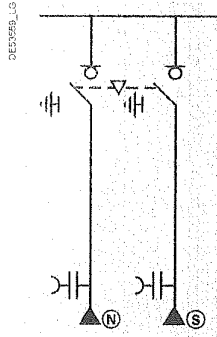
## Functional units selection

## Switching

## Automatic Transfer System for SM6-24

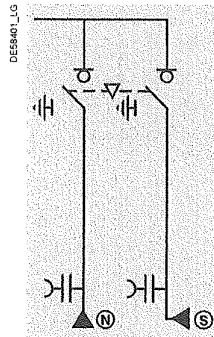
## NSM-cables

Cables power supply for  
main incoming line (N)  
and standby line (S)



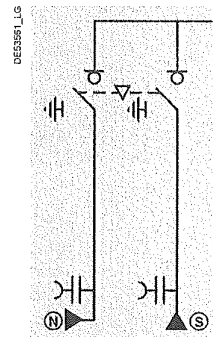
## NSM-busbars

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

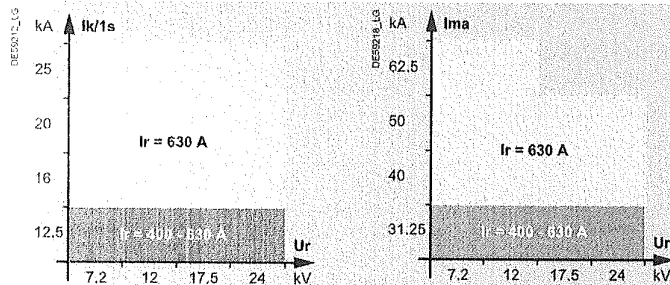


## NSM-busbars

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)
- LSC2A

## Option:

- auxiliary contacts
- key-type interlocks
- 50 W heating element
- control and monitoring
- visibility of main contacts
- pressure indicator device
- 1250 A three-phase upper busbars
- 630 A three-phase upper busbars for severe operating conditions

ВЕРНО С ОРИГИНАЛА



# Functional units selection

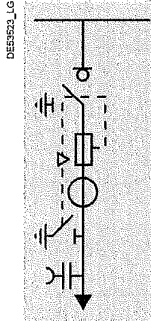
Protection

Fuse-switch

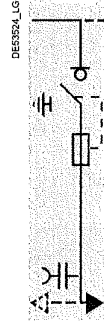
**QIM**  
Fuse-switch combination unit



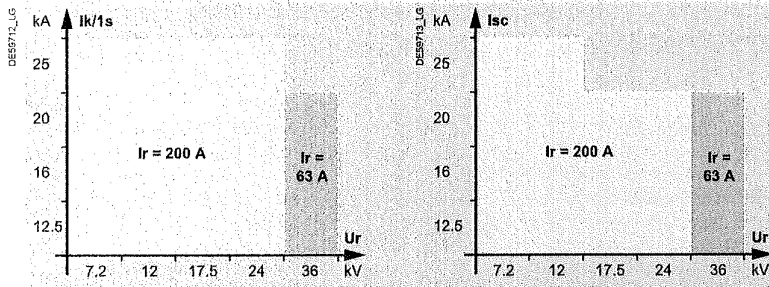
**QMC**  
Fuse-switch combination unit



**QMB**  
Fuse-switch combination unit  
Outgoing line right or left



## Electrical characteristics



### Basic equipment:

- switch and earthing switch
- three-phase busbars
- CI1 operating mechanism
- voltage presence indicator
- equipment for three DIN striker fuses
- mechanical indication system for blown fuses
- 150 W heating element for SM6-36
- LSC2A
- connection pads for dry-type cables
- downstream earthing switch 2 kA rms making capacity
- three-phase bottom busbars for outgoing lines (right or left)
- one to three CTs for SM6-24
- three CTs for SM6-36

### Version:

- equipment for three UTE striker fuses for SM6-24
- CI2 operating mechanism
- CI2 operating mechanism for SM6-36

### Option:

- motor for operating mechanism
- motor with severe and communication
- auxiliary contacts
- key-type interlocks
- auxiliary contact for blown fuses
- DIN striker fuses
- release units (coil)
- digital ammeter
- thermal monitoring
- arc detection
- 1250 A three-phase upper busbars
- 630 A cable connection by the top (no internal arc withstand if selected)
- visibility of main contacts
- pressure indicator device
- upper busbars for severe operating conditions for SM6-24
- control cabinet for SM6-24
- cabinet for SM6-24

На основании чл.36а ал.3 от  
ЗОП