Ring Main Unit

RM6 24 kV

Catalogue 2009

Schneider Electric
### Contents

**The RM6 range**

Presentation
- Applications 2
- Range advantages 4
- Experience of a world leader 6
- Protecting the environment 7
- Quality - Standards 8

The RM6 range
- RM6 switchgear description 9
- Medium voltage metering - **NEW FEATURE 2007** 10
- Safety of people 11
- A wide choice of functions 13

Unit characteristics
- Main characteristics 14
- Detailed characteristics for each function 15
- Line protection by a 630 A circuit breaker 23
- Transformer protection by a 200 A circuit breaker 25
- Transformer protection by fuse-switches 26

Network remote control
- The Easergy interface 27
- Switch and circuit breaker motorization 29

Accessories
- Indication and tripping 30
- Fault current indicator 31
- Voltage presence indicator 32
- Key locking 33

MV connection
- Selecting bushings and connectors 34
- Connections proposed in the offer 35
- Other types of compatible connections 36

Installation
- Dimensions and installation conditions 38
- Civil works 42

Order form
- Available functions 43
- Basic unit and options 44
- Options and accessories 45
The RM6 can be adapted to meet all Medium Voltage power distribution needs, up to 24 kV.

The RM6 is a compact unit combining all MV functional units to enable connection, supply and protection of one or two transformers on an open ring or radial network:
- by a fuse-switch combination, up to 2000 kVA
- by a circuit breaker with self-powered protection unit, up to 3000 kVA.

The switchgear and busbars are enclosed in a gas-tight chamber, filled with SF6 and sealed for life.
A complete range, enabling you to equip MV network points, and enhance electrical power dependability.

Operating a distribution network sometimes requires switching points in addition to the HV/MV substations, in order to limit the effect of a fault on the network.

The RM6 offers a choice of solutions to make 2, 3 or 4 directional connections:
- with line protection by 630 A circuit breakers
- with network switching by switch disconnectors
- with integrated power supply telecontrol devices.
The choice for your peace mind

The new RM6 generation benefits from the accumulated experience acquired from the 850,000 functional units that equip electrical networks in more than 50 countries in Africa, America, Asia, Europe and Australasia.

With 20 local production units around the world, Schneider Electric offer products can be made available to you in the shortest possible time.

Ring Main Unit, long experience

1983: marketing launch of the first RM6 compact with integrated insulation.
1987: creation of the circuit breaker version, with integrated protection unit needing no auxiliary power supply.
1990: creation of the RM6 1 functional unit.
1994: creation of the Network Point, integrating the RM6 and telecontrol.
1998: creation of the 630 A line protection integrated relay circuit breaker and launch of an RM6 range that is extensible on site.
2007: creation of the MV metering offer and associated functions (metering module, busbar coupling module, cable connection module).

Advantages of a proven design

RM6 switchgear

- Ensures personal safety:
  - internal arc withstand in conformity with IEC 62271-200
  - visible earthing
  - 3 position switchgear for natural interlocking
  - dependable position indicating devices.

- Is insensitive to the environment:
  - stainless steel tank, degree of protection IP67
  - disconnectable, sealed, metallized fuse chambers.

- Is of approved quality:
  - conforms to national and international standards
  - design and production are certified to ISO 9000 (version 2000)
  - benefits from the experience accumulated from 850,000 functional units installed world-wide.

- Respects the environment:
  - end-of-life gas recovery possible
  - ISO 14001 approved production site.

- Is simple and rapid to install:
  - front cable connections at the same height
  - easily fixed to the floor with 4 bolts.

- Is economical:
  - from 1 to 4 functional units, integrated within the same metal enclosure for which insulation and breaking take place in SF6 gas
  - lifetime of 30 years.

- Has maintenance free live parts:
  - in conformity with IEC 60694, pressure system, sealed for life.
Compact and scalable, the RM6 range covers all of your requirements

**Compact**

RM6 Medium Voltage switchgear cubicles are perfectly suited for very simple configuration of 1 to 4 functions.
- Choice of “all in one” units integrated in a single metal enclosure
- Cubicles insensitive to climatic conditions
- Optimized dimensions
- Quick installation through floor fixing with four bolts and front cable connection.

**Extensible**

Just as compact and insensitive to climatic conditions the extensible RM6 is modular to suit your requirements.

The addition of functional unit modules allows you to build the Medium Voltage switchboard suited to your requirements.

*Your organization develops, you build a new building - RM6 adapts with you.*

It can be extended on site without handling gases or requiring any special floor preparation to develop your installation simply and in complete safety.

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**Circuit breakers,**

for greater safety and lower costs

The RM6 range offers 200 A and 630 A circuit breakers to protect both transformers and lines. They are associated with independent protection relays that are self-powered via current sensors.

- **Greater operating staff safety and improved continuity of service**
  - increased protection device co-ordination with the source substation, circuit breaker and the LV fuses
  - rated current is normally high, allowing use of a circuit breaker to provide disconnection
  - the isolating system is insensitive to the environment.
- **Simplified switching operations and remote control**
- **Reduction of losses**
  - thanks to the low value of $R_I$ (the fuse switches of a 1000 kVA transformer feeder can dissipate 100 W).
- **Reduced maintenance costs.**
  - no work in progress to replace fuses.
Experience of a world leader

RM6, a world-wide product

Main references

Asia/Middle East
- BSED, Bahrein
- DEWA, Dubai
- WED, Abu Dhabi
- Tianjin Taifeng Industrial Park, China
- TNB, Malaysia
- China Steel Corporation, Taiwan
- TPC, Taiwan
- SCECO, Saudi Arabia
- PSB, China

Europe
- EDF, France
- Channel tunnel, France
- Iberdrola, Spain
- Compagnie Vaudoise d’électricité
- SEIC, Switzerland
- Electrabel, Belgium
- Union Fenosa, Spain
- ENHER, Spain
- Oslo Energie, Norway
- STOEN, Poland
- Bayernwerke, Germany
- London Electricity, United Kingdom
- Mosenergo, Russia

Africa
- Electricité de Mayotte
- EDF Reunion
- Total, Libya
- SONEL, Cameroon
- South Africa

South America/Pacific
- CELES, Santa Catarina, Brazil
- PETROBRAS, Rio de Janeiro, Brazil
- Guarulhos International Airport, Sao Paulo, Brazil
- CEMIG, Minas Gerais, Brazil

Australasia
- Eau et Electricité de Calédonie
- New-Caledonia
- Enercal, New-Caledonia
- United Energy, Australia
Schneider Electric’s recycling procedure for SF6 based products is subject to rigorous management, and allows each device to be traced through to its final destruction documentation.

Schneider Electric is committed to a long term environmental approach. As part of this, the RM6 range has been designed to be environmentally friendly, notably in terms of the product’s recycleability.

The materials used, both conductors and insulators, are identified and easily separable. At the end of its life, RM6 can be processed, recycled and its materials recovered in conformity with the draft European regulations on the end-of-life of electronic and electrical products, and in particular without any gas being released to the atmosphere nor any polluting fluids being discharged.

<table>
<thead>
<tr>
<th>Material</th>
<th>IDI</th>
<th>IQI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ferrous metal</td>
<td>78.5%</td>
<td>72.5%</td>
</tr>
<tr>
<td>Non-ferrous metal</td>
<td>13.3%</td>
<td>11.3%</td>
</tr>
<tr>
<td>Thermohardening</td>
<td>4.7%</td>
<td>11.3%</td>
</tr>
<tr>
<td>Thermoplastics</td>
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<td>4.1%</td>
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<td>Fluids</td>
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<tr>
<td>Electronic</td>
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<td>0%</td>
</tr>
<tr>
<td>Other</td>
<td>0.4%</td>
<td>0.4%</td>
</tr>
</tbody>
</table>

The environmental management system adopted by Schneider Electric production sites that produce the RM6 have been assessed and judged to be in conformity with requirements in the ISO 14001 standard.
IEC standards
RM6 is designed in accordance with the following standards:

General operation conditions for indoor switchgears
IEC 60694 (common specifications for high voltage switchgear and controlgear)
- Ambient temperature: class –25°C indoor
- lower than or equal to 40°C without derating
- lower than or equal to 35°C on 24 hours average without derating
- greater than or equal to –25°C.
- Altitude:
  - lower than or equal to 1000 m
  - above 1000 m, and up to 2000 m with directed field connectors
  - greater than 2000 m: please consult us for specific precaution.
IEC 62271-200 (replacing IEC 60298): A.C. metal enclosed switchgear and controlgear for rated voltage above 1 kV and up to 52 kV)
- Switchgear classification: PM class (metallic partitioning)
- Loss of service continuity class: LSC2A
- Internal arc classification: class AF AL up to 20 kA / 1 s on request
  (access restricted to authorized personnel only, for front and lateral access).

Switch disconnectors
IEC 60265-1 (high voltage switches for rated voltage above 1 kV and up to 52 kV)
- Class M1/E3
- 100 CO cycles at rated current and 0.7 p.f.
- 1000 mechanical opening operations.

Circuit breakers: 200 A feeder or 630 A line protection
IEC 62271-100 (replacing IEC 60056: high voltage alternating current circuit breakers)
- Class M1/E2
- 2000 mechanical opening operations
- O-3 min.-CO-3 min.-CO cycle at rated short circuit current.

Other applicable standards
- Switch-fuse feeder: IEC 62271-105 (replacing IEC 60420): alternating current switch-fuse combination
- Earthing switch: IEC 62271-102 (replacing IEC 60129): alternating current disconnectors and earthing switches
- Electrical relays: IEC 60255.

A major plus point
Schneider Electric has integrated a functional organization into each of its units, the main purpose of which is to check quality and ensure the adherence to standards. This procedure is:
- the same throughout the different departments
- recognized by numerous approved customers and organizations.
Above all, it is our strict application of this functional organization that has enabled us to obtain the recognition of an independent organization, the French Association for Quality Assurance (Association Française pour l’Assurance Qualité, or (AFAQ).
The RM6 design and production quality system has been certified as being in conformity with the requirements of the ISO 9001: 2000 quality assurance model.

Rigorous, systematic checks
During the manufacture of each RM6, it undergoes systematic routine tests, the aim of which is to check quality and conformity:
- tightness check
- filling pressure check
- opening and closing speed measurement
- operating torque measurement
- partial discharge check
- dielectric check
- conformity with drawings and diagrams.
The quality control department records and signs the results obtained on the test certificate for each device.
The RM6 range

RM6 switchgear description

RM6 switchgear comprises 1 to 4 integrated, low dimension functional units. This self-contained, totally insulated unit comprises:

- a stainless steel, gas-tight metal enclosure, sealed for life, which groups together the live parts, switch-disconnector, earthing switch, fuse switch or the circuit breaker
- one to four cable compartments with interfaces for connection to the network or to the transformer
- a low voltage cabinet
- an electrical operating mechanism cabinet
- a fuse chamber compartment for fused switch-disconnectors or fuse switches.

The performance characteristics obtained by the RM6 meet the definition of a “sealed pressure system” laid down in the IEC recommendations. The switch-disconnector and the earthing switch offer the operator all necessary usage guarantees:

Tightness
The enclosure is filled with SF6 at a 0.2 bar gauge pressure. It is sealed for life after filling. Its tightness, which is systematically checked at the factory, gives the switchgear an expected lifetime of 30 years. No maintenance of live parts is necessary with the RM6 breaking.

Switch disconnector
Electrical arc extinction is obtained using the SF6 puffer technique.

Circuit breaker
Electrical arc extinction is obtained using the rotating arc technique plus SF6 auto-expansion, allowing breaking of all currents up to the short-circuit current.

A range that is extensible on site
When harsh climatic conditions or environmental restrictions make it necessary to use compact switchgear, but the foreseeable evolution of the power distribution network makes it necessary to provide for future changes, RM6 offers a range of extensible switchgear.

The addition of one or more functional units can be carried out by simply adding modules that are connected to each other at busbar level by directed field bushings. This very simple operation can be carried out on-site:

- without handling any gas
- without any special tooling
- without any particular preparation of the floor.

The only technical limitation to the evolution of an extensible RM6 switchboard is therefore the rated current acceptable by the busbar: 630 A at 40°C.

Insensitivity to the environment
Complete insulation

- A metal enclosure made of stainless steel, which is unpainted and gas-tight (IP67), contains the live parts of the switchgear and the busbars.
- Three sealed fuse chambers, which are disconnectable and metallized on the outside, insulate the fuses from dust, humidity...
- Metallization of the fuse chambers and directed field terminal connectors confines the electrical field in the solid insulation.

Taken together, the above elements provide the RM6 with genuine total insulation which makes the switchgear completely insensitive to environmental conditions, dust, extreme humidity, temporary soaking.

(IP67: immersion for 30 minutes, as laid down in IEC standard 60529, § 14.2.7).
The RM6 range

Medium Voltage metering

The RM6 is boosted by the DE-Mt module

This air-insulated cubicle is fitted with conventional current transformers and voltage transformers enabling invoicing of MV power. It has an internal arc withstand and is integrated in the RM6 unit by a direct connection to the adjacent busbars.

Increased environmental insensitivity

- By eliminating risks related to MV cables (incorrect connection, non-compliance with radius of curvature between two adjacent cubicles, etc.)
- Completely closed module (no opening to the bottom, no ventilation grid)
- Factory tested module.

A clear separation between MV and LV

Everything is done to avoid having to act on the MV compartment. The secondary of CT and VT’s are cabled to the customer terminal in an LV compartment. This LV compartment enables:

- connection to a remote power meter (in another room)
- or
- connection to the LV unit mounted on the LV compartment (option).

An LV unit adapted to your requirements

This unit allows the installation of active power meters, a reactive power meter, and all auxiliaries for monitoring current, voltage and consumed power.
Switchgear
Switch-disconnectors and circuit breakers have similar architecture:

- A moving contact assembly with 3 stable positions (closed, open and earthed) moves vertically (see sketch). Its design makes simultaneous closing of the switch or circuit breaker and the earthing switch impossible.
- The earthing switch has a short-circuit making capacity, as required by the standards.
- The RM6 combines both the isolating and interrupting function.
- The earth collector has the correct dimensions for the network.
- Access to the cable compartment can be interlocked with the earthing switch and/or the switch or circuit breaker.

Reliable operating mechanisms
The electrical and mechanical operating mechanisms are located behind a front plate displaying the mimic diagram of the switchgear status (closed, open, earthed):

- Closing: the moving contact assembly is manipulated by means of a fast-acting operating mechanism. Outside these manipulations, no energy is stored.
  
  For the circuit breaker and the fuse-switch combination, the opening mechanism is charged in the same movement as the closing of the contacts.
- Opening: opening of the switch is carried out using the same fast-acting mechanism, manipulated in the opposite direction.
  
  For the circuit breaker and fuse-switch combination, opening is actuated by:
  
  - a pushbutton
  - a fault.
- Earthing: a specific operating shaft closes and opens the earthing contacts.
  
  The hole providing access to the shaft is blocked by a cover which can be opened if the switch or circuit breaker is open, and remains locked when it is closed.
- Switchgear status indicators: are placed directly on the moving contact assembly operating shafts. They give a definite indication of the position of the switchgear (attachment A of IEC standard 62271-102).
- Operating lever: this is designed with an anti-reflex device which prevents any attempt to immediately reopen the switch-disconnector or the earthing switch after closing.
- Padlocking facilities: 1 to 3 padlocks can be used to prevent:
  
  - Access to the switch or circuit breaker operating shaft
  - Access to the earthing switch operating shaft
  - Operation of the opening pushbutton.

Earthing display
Earthing switch closed position indicators: these are located on the upper part of the RM6. They can be seen through the transparent earthing covers, when the earthing switch is closed.

Internal arc withstand
The robust, reliable and environmentally insensitive design of the RM6 makes it highly improbable that a fault will appear inside the switchgear.

Nevertheless, in order to ensure maximum personal safety, the RM6 is designed to withstand an internal arc supplied by a rated short-circuit current for 1 second, without any danger to the operator.

Accidental overpressure due to an internal arc is limited by the opening of the safety valve, at the bottom of the metal enclosure.

The gas is released to the rear or to the bottom of the RM6 without affecting conditions in the front. After type testing carried out for 16 kA 1 s and 20 kA 1 s, the device meets all the criteria of IAC class AF AL, as defined by IEC 62271-200 standard, appendix A.
Operating safety

Cable insulation test
In order to test cable insulation or look for faults, it is possible to inject a direct current of up to 42 kVdc for 15 minutes through the cables via the RM6, without disconnecting the connecting devices. The earthing switch is closed and the moving earthing connection is opened in order to inject the voltage via the “earthing covers”. This system, a built-in feature of the RM6, requires the use of injection fingers (supplied as an option).

Voltage indicator lamps
A device (supplied as an option) on all functional units makes it possible to check the presence (or absence) of voltage in the cables. Two types of indicator can be proposed according to network operating habits:
- a device with built-lamps, of the VPIS type (Voltage Presence Indicating System) complying with standard IEC 61958.
- or a system with separate luminous modules, of the VDS type (Voltage Detection System) complying with standard IEC 61243-5.
**The RM6 range**

A wide choice of functions

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**RM6 range functions**

The RM6 range brings together all of the MV functions enabling:
- connection, power supply and protection of transformers on a radial or open-ring network via 200 A circuit breakers with an independent protection chain or via combined fuse-switches
- protection of lines by a 630 A circuit breaker
- and now production of private MV/LV substations with MV metering.

<table>
<thead>
<tr>
<th>Network switch</th>
<th>Line feeder</th>
<th>Transformer feeder</th>
<th>Transformer feeder</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Network switch" /></td>
<td><img src="image2" alt="Line feeder" /></td>
<td><img src="image3" alt="Transformer feeder" /></td>
<td><img src="image4" alt="Transformer feeder" /></td>
</tr>
<tr>
<td>I</td>
<td>B</td>
<td>D</td>
<td>Q</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Network coupling</th>
<th>Network coupling</th>
<th>Cable connection</th>
<th>MV metering</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image5" alt="Network coupling" /></td>
<td><img src="image6" alt="Network coupling" /></td>
<td><img src="image7" alt="Cable connection" /></td>
<td><img src="image8" alt="MV metering" /></td>
</tr>
<tr>
<td>IC</td>
<td>BC</td>
<td>O</td>
<td>Mt</td>
</tr>
</tbody>
</table>

**Device designation**

<table>
<thead>
<tr>
<th>Type of tank</th>
<th>Multifunction configurations</th>
<th>Unit configurations</th>
</tr>
</thead>
<tbody>
<tr>
<td>NE: non-extendible</td>
<td></td>
<td>I</td>
</tr>
<tr>
<td>RE: extendible to the right</td>
<td></td>
<td>B</td>
</tr>
<tr>
<td>LE: extendible to the left</td>
<td></td>
<td>D</td>
</tr>
<tr>
<td>DE: extendible module to the right or left (one function)</td>
<td></td>
<td>Q</td>
</tr>
<tr>
<td></td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td></td>
<td>no. 4</td>
<td>no. 3</td>
</tr>
</tbody>
</table>

**Examples of designations**

- RM6 NE-DIDI
- RM6 RE-IDI
- RM6 NE-IQI

(*) Refer to the table on page 43 for the choice of different combinations
**Unit characteristics**

**Main characteristics**

<table>
<thead>
<tr>
<th>Electrical characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rated voltage (kV)</strong></td>
</tr>
<tr>
<td><strong>Insulation level</strong></td>
</tr>
<tr>
<td>Industrial frequency</td>
</tr>
<tr>
<td>Impulse</td>
</tr>
<tr>
<td>Tank internal arc withstand</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Climatic conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RM6 temperature (°C)</strong></td>
</tr>
<tr>
<td>Maximum rated current (A)</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

**Global options**
- Manometer
- Additional earth busbar in cable compartment
- Internal arc cable box 20 kA 1 s for I and D or B functions.

**Option for operation**
- Voltage indicator:
  - VPIS
  - VDS.

**Accessories**
- Raising plinth
- Set of 3 MV fuses Fusarc CF
- Phase comparator
- Test box for circuit breaker relay (VAP6)
- Additional operating handle.

**Additional instructions:**
Installation and civil Engineering instructions.

**Connectors and adapters for RM6**
- Connectors for 630 A (1 set = 1 function)
- Connectors for 400 A (1 set = 1 function)
- Connectors for 250 A (1 set = 1 function).

**Protection index**
IP3X on front face.
Network points with switch disconnector (I function)

<table>
<thead>
<tr>
<th>Rated voltage (kV)</th>
<th>12</th>
<th>17.5</th>
<th>24</th>
<th>24</th>
<th>24</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-time withstand current (kA rms)</td>
<td>25</td>
<td>21</td>
<td>12.5</td>
<td>16</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td>Duration (s)</td>
<td>1</td>
<td>1 or 3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1 or 3</td>
</tr>
</tbody>
</table>

Network switch (I function)

<table>
<thead>
<tr>
<th>Rated current (A)</th>
<th>630</th>
<th>630</th>
<th>400</th>
<th>400</th>
<th>630</th>
<th>630</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breaking capacity (A)</td>
<td>Charging current</td>
<td>630</td>
<td>630</td>
<td>400</td>
<td>400</td>
<td>630</td>
</tr>
<tr>
<td></td>
<td>Earth leakage fault</td>
<td>95</td>
<td>95</td>
<td>95</td>
<td>95</td>
<td>95</td>
</tr>
<tr>
<td></td>
<td>No-load cable</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Making capacity of switch and earthing switches (kA peak)</td>
<td>62.5</td>
<td>52.5</td>
<td>31.25</td>
<td>40</td>
<td>40</td>
<td>50</td>
</tr>
<tr>
<td>Bushing</td>
<td>C</td>
<td>C</td>
<td>B or C</td>
<td>B or C</td>
<td>C</td>
<td>C</td>
</tr>
</tbody>
</table>

Non-extensible switchgear

Accessories and options

Remote operation
Motor mechanism and auxiliary contacts LBSw 2 NO - 2 NC and ESw 1 O/C.

Auxiliary contacts alone
For main switch position indication 2 NO - 2 NC and ESw 1 O/C (this option is included in remote operation option).

Front door of cable connection compartment
- Bolted
- Removable with ESw interlocking
- Removable with ESw interlocking and LBSw interlocking.

Self-powered fault passage indicators
- Flair 21D
- Flair 21DT
- Flair 22D.

Key locking devices
- Type R1
- Type R2.
Network points with 630 A circuit breaker (B function)

<table>
<thead>
<tr>
<th></th>
<th>12</th>
<th>17.5</th>
<th>24</th>
<th>24</th>
</tr>
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<tbody>
<tr>
<td>Rated voltage (kV)</td>
<td></td>
<td></td>
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<td>Short-time withstand current (kA rms)</td>
<td>25</td>
<td>21</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td>Duration (s)</td>
<td>1</td>
<td>1 or 3</td>
<td>1</td>
<td>1 or 3</td>
</tr>
</tbody>
</table>

Network switch (I function)

<table>
<thead>
<tr>
<th></th>
<th>630</th>
<th>630</th>
<th>630</th>
<th>630</th>
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<tr>
<td>Rated current (A)</td>
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<tr>
<td>Breaking capacity (A)</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Earth leakage fault</td>
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<tr>
<td>No-load cable</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Making capacity of switch and earthing switches (kA peak)</td>
<td>62.5</td>
<td>52.5</td>
<td>40</td>
<td>50</td>
</tr>
<tr>
<td>Bushing</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
</tbody>
</table>

Line protection feeder (B function)

<table>
<thead>
<tr>
<th></th>
<th>630</th>
<th>630</th>
<th>630</th>
<th>630</th>
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<tbody>
<tr>
<td>Rated current (A)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short-circuit breaking capacity (kA)</td>
<td>25</td>
<td>21</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td>Making capacity (kA peak)</td>
<td>62.5</td>
<td>52.5</td>
<td>40</td>
<td>50</td>
</tr>
<tr>
<td>Bushing</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
</tbody>
</table>

Non-extensible switchgear

Extensible switchgear to the right

Accessories and options

Remote operation
Motor mechanism and auxiliary contacts CB
2 NO - 2 NC and ESw 1 O/C
(including shunt trip coil).

Auxiliary contacts alone
For main switch position indication
2 NO - 2 NC and ESw 1 O/C
(this option is included in remote operation option).

Front door of cable connection compartment
Bolted
Removable with ESw interlocking
Removable with ESw interlocking and CB interlocking.

Shunt trip coil for external tripping
24 Vdc
48/60 Vdc
120 Vdc
110/125 Vdc - 220 Vac
220 Vdc/380 Vac.

Undervoltage coil
24 Vdc
48 Vdc
125 Vdc
110–230 Vac.

Protection relay for CB transformer protection (only one VIP type per unit)
Forbidden closing under fault 1 NC
Auxiliary contact D or B tripping

Key locking devices
Type R1
Type R2.
**Unit characteristics**

**Transformer feeder 200 A with circuit breaker (D function)**

<table>
<thead>
<tr>
<th>Rated voltage (kV)</th>
<th>12</th>
<th>17.5</th>
<th>24</th>
<th>24</th>
<th>24</th>
<th>24</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-time withstand current (kA rms)</td>
<td>25</td>
<td>21</td>
<td>12.5</td>
<td>16</td>
<td>12.5</td>
<td>16</td>
<td>20</td>
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<tr>
<td>Duration (s)</td>
<td>1</td>
<td>1 or 3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1 or 3</td>
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<table>
<thead>
<tr>
<th>Network switch (I function)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated current (A)</td>
</tr>
<tr>
<td>Breaker capacity (A)</td>
</tr>
<tr>
<td>Earth leakage fault</td>
</tr>
<tr>
<td>Non-load cable</td>
</tr>
<tr>
<td>Making capacity of switch and earthing switches (kA peak)</td>
</tr>
<tr>
<td>Bushing</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Transformer feeder by circuit breaker (D function)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated current (A)</td>
</tr>
<tr>
<td>Off-load transformer laking capacity (A)</td>
</tr>
<tr>
<td>Short-circuit breaking capacity (kA)</td>
</tr>
<tr>
<td>Making capacity (kA peak)</td>
</tr>
<tr>
<td>Bushing</td>
</tr>
</tbody>
</table>

**Non-extensible switchgear**

- NE-D
- NE-DI
- NE-IDII
- NE-IDII
- NE-DIDI

**Extensible switchgear to the right**

- RE-IDII
- RE-IDII
- RE-DIDI

**Accessories and options**

**Remote operation**
- Motor mechanism and auxiliary contacts CB
- 2 NO - 2 NC and ESw 1 O/C (including shunt trip coil).

**Auxiliary contacts alone**
- For main switch position indication
- 2 NO - 2 NC and ESw 1 O/C
- This option is included in remote operation option.

**Front door of cable connection compartment**
- Bolted
- Removable with ESw interlocking
- Removable with ESw interlocking and CB interlocking.

**Shunt trip coil for external tripping**
- 24 Vdc
- 48/60 Vdc
- 120 Vac
- 110/125 Vdc - 220 Vac
- 220 Vdc/380 Vac.

**Undervoltage coil**
- 24 Vdc
- 48 Vdc
- 125 Vdc
- 110–230 Vac.

**Protection relay for CB transformer protection** (only one VIP type per unit)
- Forbidden closing under fault 1 NC

**Auxiliary contact D or B tripping**

**Key locking devices**
- Type R6
- Type R7
- Type RB.
Transformer feeder with fuse-switch combinations (Q function)

<table>
<thead>
<tr>
<th>Rated voltage (kV)</th>
<th>12</th>
<th>12</th>
<th>17.5</th>
<th>24</th>
<th>24</th>
<th>24</th>
<th>24</th>
</tr>
</thead>
</table>

Network switch (I function)

<table>
<thead>
<tr>
<th>Rated current (A)</th>
<th>630</th>
<th>630</th>
<th>630</th>
<th>400</th>
<th>400</th>
<th>630</th>
<th>630</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breaking capacity (A)</td>
<td>Charging current</td>
<td>630</td>
<td>630</td>
<td>630</td>
<td>400</td>
<td>400</td>
<td>630</td>
</tr>
<tr>
<td></td>
<td>Earth leakage fault</td>
<td>95</td>
<td>95</td>
<td>95</td>
<td>95</td>
<td>95</td>
<td>95</td>
</tr>
<tr>
<td></td>
<td>No-load cable</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Short-time withstand current (kA rms)</td>
<td>21</td>
<td>25</td>
<td>21</td>
<td>12.5</td>
<td>16</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Duration (s)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1 or 3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Making capacity of switch and earthing switches (kA peak)</td>
<td>52.5</td>
<td>62.5</td>
<td>52.5</td>
<td>31.25</td>
<td>40</td>
<td>40</td>
<td>50</td>
</tr>
<tr>
<td>Bushing</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>B or C</td>
<td>B or C</td>
<td>C</td>
<td>C</td>
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</table>

Transformer feeder with fuse-switch protection (Q function)

<table>
<thead>
<tr>
<th>Rated current (A)</th>
<th>200</th>
<th>200</th>
<th>200</th>
<th>200</th>
<th>200</th>
<th>200</th>
<th>200</th>
<th>200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off-load transformer laking capacity (A)</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Short-circuit breaking capacity (kA)</td>
<td>21</td>
<td>25</td>
<td>21</td>
<td>12.5</td>
<td>16</td>
<td>16</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Making capacity (kA peak)</td>
<td>52.5</td>
<td>62.5</td>
<td>52.5</td>
<td>31.25</td>
<td>40</td>
<td>40</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Bushing</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
</tbody>
</table>

Non-extensible switchgear

- NE-QI
- NE-IQI
- NE-IIQI
- NE-QIQI

Extensible switchgear to the right

- RE-IQI
- RE-IIQI
- RE-QIQI

Accessories and options

Auxiliary contacts alone
For main switch position indication 2 NO - 2 NC and ESw 1 O/C (this option is included in remote operation option).

Auxiliary contact for fuses blown
- Shunt trip coil for external tripping
  - 24 Vdc
  - 48/60 Vdc
  - 120 Vac
  - 110/125 Vdc - 220 Vac
  - 220 Vdc/380 Vac.

- Undervoltage coil
  - 24 Vdc
  - 48 Vdc
  - 125 Vdc
  - 110-230 Vac.

Key locking devices
- Type R6
- Type R7
- Type R8.
### Extensible modules (DE-I function)

<table>
<thead>
<tr>
<th>Unit characteristics</th>
<th>(kV)</th>
<th>12</th>
<th>17.5</th>
<th>24</th>
<th>24</th>
<th>24</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rated voltage</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Short-time withstand current</strong></td>
<td>(kA rms)</td>
<td>25</td>
<td>21</td>
<td>12.5</td>
<td>16</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td><strong>Duration (s)</strong></td>
<td></td>
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<td>1 or 3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1 or 3</td>
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</table>

<table>
<thead>
<tr>
<th>Network switch (DE-I function)</th>
<th>(A)</th>
<th>630</th>
<th>630</th>
<th>400</th>
<th>400</th>
<th>630</th>
<th>630</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rated current (busbar 630 A)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Breaking capacity (A)</strong></td>
<td></td>
<td>630</td>
<td>630</td>
<td>400</td>
<td>400</td>
<td>630</td>
<td>630</td>
</tr>
<tr>
<td><strong>Earth leakage fault</strong></td>
<td></td>
<td>95</td>
<td>95</td>
<td>95</td>
<td>95</td>
<td>95</td>
<td>95</td>
</tr>
<tr>
<td><strong>No-load cable</strong></td>
<td></td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td><strong>Making capacity of switch and earthing switches</strong></td>
<td>(kA peak)</td>
<td>62.5</td>
<td>52.5</td>
<td>31.25</td>
<td>40</td>
<td>40</td>
<td>50</td>
</tr>
<tr>
<td><strong>Bushing</strong></td>
<td></td>
<td>C</td>
<td>C</td>
<td>B or C</td>
<td>B or C</td>
<td>C</td>
<td>C</td>
</tr>
</tbody>
</table>

### Network points with 630 A circuit breaker (DE-B function)

<table>
<thead>
<tr>
<th>Unit characteristics</th>
<th>(kV)</th>
<th>12</th>
<th>17.5</th>
<th>24</th>
<th>24</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rated voltage</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Short-time withstand current</strong></td>
<td>(kA rms)</td>
<td>25</td>
<td>21</td>
<td>16</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td><strong>Duration (s)</strong></td>
<td></td>
<td>1</td>
<td>1 or 3</td>
<td>1</td>
<td>1</td>
<td>1 or 3</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Network circuit breaker (DE-B function)</th>
<th>(A)</th>
<th>630</th>
<th>630</th>
<th>630</th>
<th>630</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rated current (busbar 630 A)</strong></td>
<td></td>
<td>630</td>
<td>630</td>
<td>630</td>
<td>630</td>
</tr>
<tr>
<td><strong>Short-circuit breaking capacity</strong></td>
<td>(kA)</td>
<td>25</td>
<td>21</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td><strong>Making capacity</strong></td>
<td>(kA peak)</td>
<td>62.5</td>
<td>52.5</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td><strong>Bushing</strong></td>
<td></td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
</tbody>
</table>

### Accessories and options

**Remote operation**
- Motor mechanism and auxiliary contacts LBSw
  - 2 NO - 2 NC and ESw 1 O/C
**Auxiliary contacts alone**
- For main switch position indication
  - 2 NO - 2 NC and ESw 1 O/C
  - (this option is included in remote operation option).
**Front door of cable connection compartment**
- Bolted
- Removable with ESw interlocking
- Removable with ESw interlocking and LBSw interlocking.

**Self-powered fault passage indicators**
- Flair 21D
- Flair 21DT
- Flair 22D.

**Arc short-circuiting device**
- Type R1
- Type R2.

**Protection relay for CB transformer protection**
- (only one VIP type per unit)

**Forbidden closing under fault 1 NC**
- Auxiliary contact D or B tripping
- Key locking devices
  - Type R1
  - Type R2.

**Undervoltage coil**
- 24 Vdc
- 48 Vdc
- 125 Vdc
- 110-230 Vac.

**Protection relay for CB transformer protection**
- (only one VIP type per unit)

**Forbidden closing under fault 1 NC**
- Auxiliary contact D or B tripping
- Key locking devices
  - Type R1
  - Type R2.

**Shunt trip coil for external tripping**
- 24 Vdc
- 48/60 Vdc
- 120 Vac
- 110/125 Vdc - 220 Vac
- 220 Vdc/380 Vac.
### Transformer feeder 200 A with circuit breaker (DE-D function)

<table>
<thead>
<tr>
<th>Rated voltage (kV)</th>
<th>12</th>
<th>17.5</th>
<th>24</th>
<th>24</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-time withstand current (kA rms)</td>
<td>25</td>
<td>21</td>
<td>12.5</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td>Duration (s)</td>
<td>1</td>
<td>1 or 3</td>
<td>1</td>
<td>1</td>
<td>1 or 3</td>
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</tbody>
</table>

#### Transformer feeder 200 A with circuit breaker (DE-D function)

<table>
<thead>
<tr>
<th>Rated current (busbar 630 A) (A)</th>
<th>200</th>
<th>200</th>
<th>200</th>
<th>200</th>
<th>200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off-load transformer laking capacity (A)</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Short-circuit breaking capacity (kA)</td>
<td>25</td>
<td>25</td>
<td>12.5</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td>Making capacity (kA peak)</td>
<td>62.5</td>
<td>52.5</td>
<td>31.25</td>
<td>40</td>
<td>50</td>
</tr>
<tr>
<td>Bushing</td>
<td>C</td>
<td>C</td>
<td>A</td>
<td>B or C</td>
<td>C</td>
</tr>
</tbody>
</table>

#### Accessories and options

- Remote operation
- Motor mechanism and auxiliary contacts
- CB 2 NO - 2 NC and ESw 1 O/C (including shunt trip coil).
- Auxiliary contacts alone
- For main switch position indication
- 2 NO - 2 NC and ESw 1 O/C (this option is included in remote operation option).
- Front door of cable connection compartment
- Bolted
- Removable with ESw interlocking
- Removable with ESw interlocking and CB interlocking.
- Shunt trip coil for external tripping
  - 24 Vdc
  - 48/60 Vdc
  - 120 Vac
  - 110/125 Vdc - 220 Vac
  - 220 Vdc/380 Vac.
- Undervoltage coil
  - 24 Vdc
  - 48 Vdc
  - 125 Vdc
  - 110–230 Vac.
- Protection relay for CB transformer protection (only one VIP type per unit)
- Forbidden closing under fault 1NC
- Auxiliary contact D or B tripping
- Key locking devices
  - Type R6
  - Type R7
  - Type R8.

### Extensible modules (DE-Q function)

<table>
<thead>
<tr>
<th>Rated voltage (kV)</th>
<th>12</th>
<th>12</th>
<th>17.5</th>
<th>24</th>
<th>24</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuses (DE-Q function)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated current (busbar 630 A) (A)</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>Off-load transformer laking capacity (A)</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Short-circuit breaking capacity (kA)</td>
<td>21</td>
<td>25</td>
<td>21</td>
<td>12.5</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td>Making capacity (kA peak)</td>
<td>52.5</td>
<td>62.5</td>
<td>52.5</td>
<td>31.25</td>
<td>40</td>
<td>50</td>
</tr>
<tr>
<td>Bushing</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
</tbody>
</table>

#### Accessories and options

- Auxiliary contacts alone
  - For main switch position indication
  - 2 NO - 2 NC and ESw 1 O/C (this option is included in remote operation option).
- Auxiliary contact for fuses blown
- Shunt trip coil for external tripping
  - 24 Vdc
  - 48/60 Vdc
  - 120 Vac
  - 110/125 Vdc - 220 Vac
  - 220 Vdc/380 Vac.
- Undervoltage coil
  - 24 Vdc
  - 48 Vdc
  - 125 Vdc
  - 110–230 Vac.
- Protection relay for CB transformer protection (only one VIP type per unit)
- Forbidden closing under fault 1NC
- Auxiliary contact D or B tripping
- Key locking devices
  - Type R6
  - Type R7
  - Type R8.
### Bus sectionalizer by load-break switch (DE-IC function)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>12</th>
<th>17.5</th>
<th>24</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage (kV)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short-time withstand current (kA rms)</td>
<td>25</td>
<td>21</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td>Duration (s)</td>
<td>1</td>
<td>1 or 3</td>
<td>1</td>
<td>1 or 3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Network switch (DE-IC function)</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated current (A)</td>
<td>630</td>
<td>630</td>
<td>630</td>
<td>630</td>
</tr>
<tr>
<td>Breaking capacity (A)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Charging current</td>
<td>630</td>
<td>630</td>
<td>630</td>
<td>630</td>
</tr>
<tr>
<td>Earth leakage fault</td>
<td>95</td>
<td>95</td>
<td>95</td>
<td>95</td>
</tr>
<tr>
<td>No-load cable</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Making capacity of switch and earthing switches (kA peak)</td>
<td>62.5</td>
<td>52.5</td>
<td>40</td>
<td>50</td>
</tr>
</tbody>
</table>

**Accessories and options**

- **Remote operation**
  - Motor mechanism and auxiliary contacts LBSw
  - 2 NO - 2 NC and ESw 1 O/C
- **Auxiliary contacts alone**
  - For main switch position indication
  - 2 NO - 2 NC and ESw 1 O/C
  - (this option is included in remote operation option).
- **Front access door for current sensors**
  - Bolted
  - Removable with ESw interlocking
  - Removable with ESw interlocking and LBSw interlocking.

### Bus sectionalizer by 630 A circuit breaker (DE-BC function function coupling)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>12</th>
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</thead>
<tbody>
<tr>
<td>Rated voltage (kV)</td>
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</tr>
<tr>
<td>Short-time withstand current (kA rms)</td>
<td>25</td>
<td>17.5</td>
<td>16</td>
<td>24</td>
</tr>
<tr>
<td>Duration (s)</td>
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<table>
<thead>
<tr>
<th>Bus sectionalizer circuit breaker (DE-BC function coupling)</th>
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<td>Rated current (A)</td>
<td>630</td>
<td>630</td>
<td>630</td>
<td>630</td>
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<tr>
<td>Short-circuit breaking capacity (kA)</td>
<td>25</td>
<td>21</td>
<td>16</td>
<td>20</td>
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<tr>
<td>Making capacity (kA peak)</td>
<td>62.5</td>
<td>52.5</td>
<td>40</td>
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</tr>
</tbody>
</table>

**Accessories and options**

- **Remote operation**
  - Motor mechanism and auxiliary contacts CB
  - 2 NO - 2 NC and ESw 1 O/C
  - (including shunt trip coil).
- **Auxiliary contacts alone**
  - For main switch position indication
  - 2 NO - 2 NC and ESw 1 O/C
  - (this option is included in remote operation option).
- **Front door of cable connection compartment**
  - Bolted
  - Removable with ESw interlocking
  - Removable with ESw interlocking and CB interlocking.
  - Shunt trip coil for external tripping
    - 24 Vdc
    - 48/60 Vdc
    - 120 Vac
    - 110/125 Vdc - 220 Vac
    - 220 Vdc/380 Vac.

- **Arc short-circuiting device**
  - Without earthing switch
  - Key locking devices
    - Type R1
    - Type R2.

- **Undervoltage coil**
  - 24 Vdc
  - 48 Vdc
  - 125 Vdc
  - 110-230 Vac.

- **Protection relay for CB transformer protection**
  - (only one VIP type per unit)
- **Forbidden closing under fault 1 NC**
- **Auxiliary contact D or B tripping**
- **Without earthing switch**
- **Key locking devices**
  - Type R1
  - Type R2.
Cable connection cubicles LE-O, RE-O, DE-O

<table>
<thead>
<tr>
<th>Rated voltage (kV)</th>
<th>12</th>
<th>12</th>
<th>17.5</th>
<th>17.5</th>
<th>24</th>
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**Cable connection (O function)**

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<tbody>
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<td>21</td>
<td>21</td>
<td>16</td>
<td>16</td>
<td>20</td>
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<tr>
<td>Short-time withstand current (kA rms)</td>
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<td>21</td>
<td>21</td>
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<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1 or 3</td>
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</tbody>
</table>

**Making capacity (kA peak)**

| 62.5 | 62.5 | 52.5 | 52.5 | 40 | 40 | 50 |

**Bushing**

| C | C | C | C | C | C | C | C |

**Metering module DE-Mt**

<table>
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</table>

**MV metering (DE-Mt function)**

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<th>630</th>
<th>630</th>
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<tbody>
<tr>
<td>Short-time withstand current (kA rms)</td>
<td>25</td>
<td>21</td>
<td>16</td>
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<tr>
<td>Duration (s)</td>
<td>1</td>
<td>1 or 3</td>
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</table>

**Cubicle internal arc withstand**

16 kA 1s

**Voltage transformers configuration**

Schneider Electric models or DIN 42600 type section 9
2 phase-phase VT, 2 phase-earth VT, 3 phase-earth VT
Fitted right or left of the CT’s
Optional fuse protection.

**Current transformers configuration**

Schneider Electric models or DIN 42600 type section 8
2 CT or 3 CT.

**Accessories and options**

Additional low voltage unit
Door key locking devices
Type R7.
Line protection by a 630 A circuit breaker

The 630 A circuit breaker has been designed to protect Medium Voltage feeders as near to the fault as possible. The protection unit is identical to that of the 200 A circuit breaker, with a VIP 300 relay adapted to network protection.

VIP 300 self-powered protection relay
- VIP 300 protects against phase to phase faults and earth faults. The choice of tripping curves, and the multiplicity of settings enable it to be used with a wide variety of discrimination plans.
- VIP 300 is a self-powered relay which obtains its power supply from current sensors. It does not need an auxiliary power supply. It actuates a release.

Description
The operating principle of the protection unit is the same as for the VIP 30 and VIP 35 relays.

Phase protection
Phase protection has two independently adjustable set points:
- either an IDMT or definite low set point can be selected. The IDMT curves are in conformity with the IEC 60255-3 standard. They are of the inverse, very inverse and extremely inverse type
- the high set point is a definite time one.

Earth protection
- Earth fault protection operates with measurement of the residual current carried out using the sum of the secondary currents of the sensors.
- As with phase protection, earth protection has two independently adjustable set points.

Indication
- Two indicators show the origin of tripping (phase or earth). They remain in position after the relay power supply is cut off.
- Two LED indicators (phase and earth) indicate that the low set point has been exceeded and its time delay is in progress.
The curves in this chapter indicate the low set IDMT tripping times for time delay settings $t >$ (or to $>$).

The phase protection and earth protection curves are identical.
In contrast to fuses, the circuit breaker has no minimum breaking current, which means that it is particularly well-adapted to transformer protection.

### Protection system

The protection system operates without an auxiliary power supply, and includes:
- 3 transformers with integrated toroids on the transformer feeder bushings
- 1 VIP 30 or VIP 35 electronic relay
- 1 release
- 1 test connector to check whether the protection unit is operating correctly, using the VAP 6 unit.

### VIP 30 and VIP 35 self-powered protection relays

- VIP 30 and VIP 35 are self-powered relays, requiring no auxiliary power supply, which are fed by current sensors, activating a MITOP release.
- VIP 30 protects against phase to phase faults.
- VIP 35 protects against phase to phase faults and earth faults.

### Description

- The relays are assembled in a housing, and the front faces are protected by a transparent cover. The whole assembly has a degree of protection of IP54.
- Settings are made on the front, using rotary switches.
- The phase operating current is adjusted directly according to the transformer rating and the operating voltage.
- The earth current set point is adjusted according to the network characteristics.

### Phase protection

- Phase protection is provided by an IDMT set point which operates as of 1.2 times the operating current (Is). VIP 30 and VIP 35 phase protections are identical.

### Earth protection

- Earth fault protection operates with measurement of the residual current carried out using the sum of the secondary currents of the sensors.
- Earth protection operates in definite time: both its set point and time delay are adjustable.

### Rated protection current setting selection

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<thead>
<tr>
<th>Operating voltage (kV)</th>
<th>Transformer rating (kVA)</th>
<th>50</th>
<th>75</th>
<th>100</th>
<th>125</th>
<th>160</th>
<th>200</th>
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</tbody>
</table>

The curve represent the relay intervention time, to which 70 ms must be added to obtain the breaking time.
Transformer protection by fuse-switches

Ratings for fuses for transformer protection depend, among other points, on the following criteria:
- service voltage
- transformer rating
- thermal dissipation of the fuses
- fuse technology.

Two types of fuse may be installed:
- **Solefuse type:** according to UTE NFC 64210 standard, with or without striker,
- **Fusarc CF type:** according to IEC 60282-1 dimensional standard, with or without striker.

Example (using the selection table below) general case, for protection of a 400 kVA transformer at 10 kV, either Solefuse fuses with a rating of 63 A or Fusarc CF fuses with a rating of 50 A are chosen.

**Fuse replacement**

IEC and UTE recommendations stipulate that when a fuse has blown, all three fuses must be replaced.

**Selection operation of the RM6 is not guaranteed when using fuses from other manufacturers.**

<table>
<thead>
<tr>
<th>Fuse type</th>
<th>Operating voltage (kV)</th>
<th>Transformer rating (kVA)</th>
<th>50</th>
<th>75</th>
<th>100</th>
<th>125</th>
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</table>

(1) Siba type fuses at 160 A/12 kV reference 30-020-13
(2) In the case of an external trip system (e.g.: overcurrent relay)

A calculation must be carried out to guarantee coordination of fuse-switches – Please consult us.

For any values not included in the table, please consult us.

In the case of an overload beyond 40°C, please consult us.

**Fuse dimensions**

<table>
<thead>
<tr>
<th>Ur (kV)</th>
<th>Ir (A)</th>
<th>L (mm)</th>
<th>Ø (mm)</th>
<th>Mass (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.2</td>
<td>16 to 63</td>
<td>450</td>
<td>55</td>
<td>2</td>
</tr>
<tr>
<td>24</td>
<td>16 to 63</td>
<td>450</td>
<td>55</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ur (kV)</th>
<th>Ir (A)</th>
<th>L (mm)</th>
<th>Ø (mm)</th>
<th>Mass (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>10 to 20</td>
<td>292</td>
<td>50.5</td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td>25 to 40</td>
<td>292</td>
<td>57</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td>50 to 100</td>
<td>292</td>
<td>78.5</td>
<td>2.8</td>
</tr>
<tr>
<td>24</td>
<td>10 to 20</td>
<td>442</td>
<td>50.5</td>
<td>1.6</td>
</tr>
<tr>
<td></td>
<td>25 to 40</td>
<td>442</td>
<td>57</td>
<td>2.2</td>
</tr>
<tr>
<td></td>
<td>50 to 63</td>
<td>442</td>
<td>78.5</td>
<td>4.1</td>
</tr>
<tr>
<td></td>
<td>80 to 100</td>
<td>442</td>
<td>88</td>
<td>5.3</td>
</tr>
</tbody>
</table>
Network remote control

The Easergy interface

Continuity of service guaranteed by an overall telecontrol offer

Schneider Electric offers you a complete solution, including:
- the Easergy T200 I telecontrol interface
- MV switchgear that is adapted for telecontrol.

Position of the RM6

RM6 switchgear is perfectly adapted to the telecontrol context, thanks to options such as:
- Easergy T200 I telecontrol interface
- electrical rating mechanism
- auxiliary fault and position indication contacts
- current sensors for fault detection.
Easergy T200 I: an interface designed for telecontrol of MV networks

Easergy T200 I is a “plug and play” or multifunction interface that integrates all the functional units necessary for remote supervision and control of the RM6:
- acquisition of the different types of information: switch position, fault detectors, current values...
- transmission of switch open/close orders
- exchanges with the control center.

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

Functional unit designed for the Medium Voltage network

- Easergy T200 I is designed to be connected directly to the MV switchgear, without requiring a special converter.
- It has a simple front plate for local operation, which allows management of electrical rating mechanisms (local/remote switch) and display of information concerning switchgear status.
- It has an integrated MV network fault current detection system (overcurrent and zero sequence) with detection set points that can be configured channel by channel (current value and fault current duration).

Medium Voltage switchgear operating guarantee

- Easergy T200 I has undergone severe MV electrical stress withstand tests.
- It is a backed up power supply which guarantees continuity of service for several hours in case of loss of the auxiliary source, and supplies power to the Easergy T200 I and the MV switchgear motor mechanisms.
- Ready to plug
  - Easergy T200 I is delivered with a kit that makes it easy to connect the motor mechanisms and collect measurements.
  - the telecontrol cabinet connectors are polarized to avoid any errors during installation or maintenance interventions.
  - current measurement acquisition sensors are of the split type, to facilitate their installation.
  - works with 24 Vdc and 48 Vdc motor units.
Network remote control

Switch and circuit breaker motorization

Motor mechanism

Switch operating mechanism

- The switch operating mechanism includes a space that is reserved for the installation of a geared motor. This can be installed at the factory, but it can also be installed on-site, by the customer, without de-energizing the unit, and without dismantling the operating mechanism.
- An electrical interlocking assembly prohibits any false operations. Once motorized, the RM6 integrates perfectly into a telecontrol system.

Circuit breaker operating mechanism

- Circuit breaker protection functional units can be equipped with a geared motor. This can be installed at the factory, but it can also be installed on-site, by the customer, without de-energizing the unit, and without dismantling the operating mechanism.
- Electrical locking prohibits any false operations, with, as an option, closing after an unacknowledged fault. Once motorized, the RM6 integrates perfectly into a telecontrol system. This option becomes particularly useful in the context of the protection of a secondary ring, with supervision by a telecontrol system.

Motor option for switch-units and circuit breakers

The operating mechanism I, D and B functions may be motorised

<table>
<thead>
<tr>
<th>Un power supply (V)</th>
<th>DC 24</th>
<th>48</th>
<th>60</th>
<th>110</th>
<th>125</th>
<th>220</th>
<th>120</th>
<th>230</th>
<th>AC (50 Hz)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power (W)</td>
<td>240</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>280</td>
</tr>
<tr>
<td>(VA)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arming time (s)</td>
<td>4 to 7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4 to 7</td>
</tr>
</tbody>
</table>

(*) Please consult us for other frequencies.
Auxiliary contacts
Each switch or circuit breaker can be fitted with 4 auxiliary contacts with the following positions: 2 NO and 2 NC. Each earthing switch can be fitted with 1 auxiliary contact with the following position: (opening/closing). Each circuit breaker can be fitted with 1 fault indication auxiliary contact. Each fuse-switch combination can be fitted with 1 blown fuse indication auxiliary contact.

Opening release
Each circuit breaker or fuse-switch combination can be fitted a switch-on opening release (shunt trip).

Opening release option for each circuit breaker or fuse-switch combination

<table>
<thead>
<tr>
<th>Un power supply (V)</th>
<th>DC 24 48 60 110 125 220 120 230</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power (W)</td>
<td>200 250 250 300 300 300 400 750</td>
</tr>
<tr>
<td>Power (VA)</td>
<td></td>
</tr>
<tr>
<td>Response time (ms)</td>
<td>35 35</td>
</tr>
</tbody>
</table>

(*) Please consult us for other frequencies.

Undervoltage coil
Available on the circuit breaker function and on the combined fuse-switch, this trip unit causes opening when its supply voltage drops below a value under 35% of its rated voltage.

<table>
<thead>
<tr>
<th>Und power supply (V)</th>
<th>DC 24 48 60 110 125 220 120 230</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Excitation (W or VA)</td>
<td>200 (during 200 ms) 200</td>
</tr>
<tr>
<td>Latched (W or VA)</td>
<td>4.5 4.5</td>
</tr>
<tr>
<td>Threshold Opening</td>
<td>0.35 to 0.7 Un 0.35 to 0.7</td>
</tr>
<tr>
<td>Closing</td>
<td>0.85 Un 0.85</td>
</tr>
</tbody>
</table>

(*) Please consult us for other frequencies.
## Fault current indicator

RM6 switchboard integrate fault passage indicators, on every switch function: Flair 21D, Flair 21DT, Flair 22D (*). These FPI are self-powered by the sensors and comprise a digital display. They provide:
- Earth fault indication
- Phase fault indication
- Load current display (Ampermeter).

(*) RM6 can also be provided with Alpha M or Alpha E (Hortzmann) type short circuit indicators.

### Accessories

- Flair 21D and 21 DT
- Flair 22 D

### Connection

<table>
<thead>
<tr>
<th></th>
<th>21D</th>
<th>21DT</th>
<th>22D</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fault detection</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Earth fault</td>
<td>20 to 160 A</td>
<td>20 to 160 A</td>
<td>20 to 160 A</td>
</tr>
<tr>
<td>Phase fault</td>
<td>20 to 160 A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reset</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCADA interface</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Display unit</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Display</td>
<td>2 digits</td>
<td>2 digits</td>
<td>4 digits</td>
</tr>
<tr>
<td>Load current</td>
<td>10 A</td>
<td>10 A</td>
<td>1 A</td>
</tr>
<tr>
<td>Accuracy</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>Settings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faulty phase</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak demand current</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load current demand</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Others</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dual-powered (sensor and battery)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>External light</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Flair 21D and Flair 21DT operate with a load current more than 3 A. Due to a lithium battery, Flair 22D operates with no load current (setting display, reset temporisation > 4 h).
Accessories

Voltage presence indicator
There is a voltage indicator device on network switches, circuit breakers and fuse-switch combinations, which makes it possible to check whether or not there is a voltage across the cables.
Two devices are offered:
- VDS: Voltage Detecting System
- VPIS: Voltage Presence Indication System.

Phase concordance unit
This unit is used to check phase concordance.
It can be connected to any voltage indicator lamp device.

Protection relay test
The portable VAP 6 unit is connected to the circuit breaker protection relay:
- injecting an electrical stimulus, two pushbuttons are used to check that the short-circuit and zero sequence fault current protection devices are operating
- an extra pushbutton may be provided to inhibit tripping of the circuit breaker.

Options for cable compartment
Standard equipment:
- a closing panel
- cable binding
- connection of cable earthing.
Optional equipment:
- panel with hood to display liquid type overcurrent indicators installed around the cables
- deeper panel to enable to adding of a lightning arrester
- interlocking to prohibit access to the connection compartment when the earthing switch is open
- interlocking to prohibit closing of the switch or circuit breaker when the connection compartment panel is open
- compartment base for single-core or three-core cables (compulsory for non-directive field connections)
- internal arc withstand for the cable compartment up to 20 kA 1s.
The markings (O, S, and X) are engraved on the keys and the locks. They are given here only as an aid to understanding of the diagrams.

**On network switches or 630 A circuit breaker feeder**

**Type R1 diagram**

- **Semi-crossed locking**
  - Prohibits the closing of the earthing switch of the downstream switchgear unless the upstream switchgear is locked in the “open” position.

**Type R2 diagram**

- **Crossed locking**
  - Prohibits closing of the earthing switches unless the upstream and downstream switchgear is locked in the “open” position.

**On transformer feeders**

**Type R7 diagram**

- **RM6/transformer**
  - Prohibits access to the transformer unless the earthing switch has been locked in the “closed” position.

**Type R6 diagram**

- **RM6/low voltage**
  - Prohibits closing of the earthing switch and access to any protection unit fuses unless the main LV circuit breaker has been locked in the “open” or “disconnected” position.

**Type R8 diagram**

- **RM6/transformer/low voltage**
  - Prohibits closing of the earthing switch and access to any protection unit fuses unless the main LV circuit breaker has been locked in the “open” or “disconnected” position.
  - Prohibits access to the transformer unless the earthing switch has already been “closed”.

**Legend:**
- absent key
- free key
- captive key
Selecting bushings and connectors

General
- The profiles, contacts and dimensions of the RM6 connection interfaces are defined by the IEC 60137 standard.
- 100% of the epoxy resin interfaces undergo dielectric testing at power frequency and partial discharge tests.

Appropriateness for use
The bushings carry the electrical current from the outside to the inside of the enclosure, which is filled with SF6 gas, ensuring insulation between the live conductors and the frame.
There are 3 types of bushing, which are defined by their short-time withstand current:
- Type A: 200 A: 12.5 kA 1 s and 31.5 kA peak (plug-in)
- Type B: 400 A: 16 kA 1 s and 40 kA peak (plug-in)
- Type C: 630 A: 25 kA 1 s, 20 kA 3 s and 62.5 kA peak (disconnectable M16).

How to define the connection interface
The connection interfaces depend on specific criteria, such as:

Installation
- Current rating of the connected equipment: 200, 400, 630 A
- Short-time withstand current for 12.5 kA, 16 kA, 25 kA switch and circuit breaker functions
- For the fuse-switch combination function, as the short-circuit current is limited by the fuse, the connection interface will be of type A (200 A)
- Minimum phase expansion length
- Connection type:
  - plug in: multicontact ring
  - disconnectable: bolted.
- Output position: straight, elbow.

Cable
- Specified voltage:
  - of the cable
  - of the network.
- Type of conductor:
  - aluminium
  - copper.
- Cross section in mm²
- Insulation diameter
- Cable composition:
  - single-core
  - 3-core.
- Insulation type:
  - dry
  - paper impregnated (non-draining type).
- Type of screen
- Armature.

This information must be specified for better definition of the connection interfaces.
Schneider Electric offers the following nkt cable connectors in its offer.

### Type A bushing
**Directed field plug-in connector**
**Dry single-core cable**

<table>
<thead>
<tr>
<th>Performance</th>
<th>Connection</th>
<th>Supplier</th>
<th>Reference</th>
<th>Cross section</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.2 to 17.5 kV</td>
<td>Plug-in</td>
<td>nkt cables GmbH</td>
<td>EASW 12/250 A</td>
<td>25 to 95</td>
<td>Shaped elbow</td>
</tr>
<tr>
<td>200 A-95 kV impulse</td>
<td>Plug-in</td>
<td>nkt cables GmbH</td>
<td>EASG 12/250 A</td>
<td>25 to 95</td>
<td></td>
</tr>
<tr>
<td>24 kV</td>
<td>Plug-in</td>
<td>nkt cables GmbH</td>
<td>EASW 20/250 A</td>
<td>25 to 95</td>
<td>Shaped elbow</td>
</tr>
<tr>
<td>200 A-125 kV impulse</td>
<td>Plug-in</td>
<td>nkt cables GmbH</td>
<td>EASG 20/250 A</td>
<td>25 to 95</td>
<td></td>
</tr>
</tbody>
</table>

### Type B bushing
**Directed field plug-in connector**
**Dry single-core cable**

<table>
<thead>
<tr>
<th>Performance</th>
<th>Connection</th>
<th>Supplier</th>
<th>Reference</th>
<th>Cross section</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.2 to 17.5 kV</td>
<td>Plug-in</td>
<td>nkt cables GmbH</td>
<td>CE 12-400</td>
<td>25 to 300</td>
<td></td>
</tr>
<tr>
<td>400 A-95 kV impulse</td>
<td>Plug-in</td>
<td>nkt cables GmbH</td>
<td>CE 24-400</td>
<td>25 to 300</td>
<td></td>
</tr>
</tbody>
</table>

### Type C bushing
**Directed field disconnectable connector**
**Dry single-core cable**

<table>
<thead>
<tr>
<th>Performance</th>
<th>Connection</th>
<th>Supplier</th>
<th>Reference</th>
<th>Cross section</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.2 to 17.5 kV</td>
<td>Disconnectable</td>
<td>nkt cables GmbH</td>
<td>CB 12-630</td>
<td>25 to 300</td>
<td></td>
</tr>
<tr>
<td>630 A-95 kV impulse</td>
<td>Disconnectable</td>
<td>nkt cables GmbH</td>
<td>CB 24-630</td>
<td>25 to 300</td>
<td></td>
</tr>
</tbody>
</table>

## Non-directed field disconnectable connector
**Dry single and three-core cable**

<table>
<thead>
<tr>
<th>Performance</th>
<th>Connection</th>
<th>Supplier</th>
<th>Reference</th>
<th>Cross section</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.2 to 17.5 kV</td>
<td>Disconnectable</td>
<td>nkt cables GmbH</td>
<td>AB 12-630</td>
<td>25 to 300 (+ ATS)</td>
<td>For 3-core cable</td>
</tr>
</tbody>
</table>
### MV connection

#### Other types of compatible connections

<table>
<thead>
<tr>
<th>Performance</th>
<th>Connection</th>
<th>Supplier</th>
<th>Reference</th>
<th>Cross section</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.2 to 10 kV 200 A-95 kV impulse</td>
<td>Plug-in</td>
<td>Elastimold</td>
<td>158LR</td>
<td>16 to 120</td>
<td>T-shaped elbow</td>
</tr>
<tr>
<td>7.2 to 24 kV 200 A-125 kV impulse</td>
<td>Plug-in</td>
<td>Elastimold</td>
<td>K158LR</td>
<td>16 to 95</td>
<td>T-shaped elbow</td>
</tr>
<tr>
<td>7.2 to 17.5 kV 200 A-95 kV impulse</td>
<td>Heat shrinkable</td>
<td>Raychem</td>
<td>EPKT+EAKT</td>
<td>16 to 150</td>
<td></td>
</tr>
<tr>
<td>24 kV 400 A-125 kV impulse</td>
<td>Plug-in</td>
<td>Pirelli</td>
<td>FMCE 400</td>
<td>70 to 300</td>
<td></td>
</tr>
<tr>
<td>7.2 to 10 kV 400 A-95 kV impulse</td>
<td>Plug-in</td>
<td>Elastimold</td>
<td>400 LR</td>
<td>70 to 240</td>
<td>Limited to Us = 10 kV</td>
</tr>
<tr>
<td>24 kV 400 A-125 kV impulse</td>
<td>Plug-in</td>
<td>Pirelli</td>
<td>FMCE 400</td>
<td>70 to 300</td>
<td></td>
</tr>
<tr>
<td>7.2 to 10 kV 630 A-95 kV impulse</td>
<td>Disconnectable</td>
<td>Elastimold</td>
<td>440 TB</td>
<td>70 to 240</td>
<td></td>
</tr>
<tr>
<td>7.2 to 24 kV 630 A-125 kV impulse</td>
<td>Disconnectable</td>
<td>Pirelli</td>
<td>FMCTs 400</td>
<td>70 to 300</td>
<td></td>
</tr>
<tr>
<td>7.2 to 17.5 kV 630 A-95 kV impulse</td>
<td>Heat shrinkable</td>
<td>Raychem</td>
<td>EPKT+EAKT</td>
<td>16 to 300</td>
<td></td>
</tr>
<tr>
<td>24 kV 630 A-125 kV impulse</td>
<td>Simplified disconnectable</td>
<td>Raychem</td>
<td>RICS - EPKT</td>
<td>25 to 300</td>
<td>Limited to Us = 12 kV</td>
</tr>
</tbody>
</table>

(*) 520 mm plinth must be used

---

### Type A bushing

**Directed field plug-in connector**

**Dry single-core cable**

<table>
<thead>
<tr>
<th>Performance</th>
<th>Connection</th>
<th>Supplier</th>
<th>Reference</th>
<th>Cross section</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.2 to 10 kV 200 A-95 kV impulse</td>
<td>Plug-in</td>
<td>Elastimold</td>
<td>158LR</td>
<td>16 to 120</td>
<td>T-shaped elbow</td>
</tr>
<tr>
<td>7.2 to 24 kV 200 A-125 kV impulse</td>
<td>Plug-in</td>
<td>Elastimold</td>
<td>K158LR</td>
<td>16 to 95</td>
<td>T-shaped elbow</td>
</tr>
</tbody>
</table>

---

### Type A/M8 bushing

**Non-directed field disconnectable connector (*)**

**Dry single and three-core cable**

<table>
<thead>
<tr>
<th>Performance</th>
<th>Connection</th>
<th>Supplier</th>
<th>Reference</th>
<th>Cross section</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.2 to 17.5 kV 200 A-95 kV impulse</td>
<td>Heat shrinkable</td>
<td>Raychem</td>
<td>EPKT+EAKT</td>
<td>16 to 150</td>
<td></td>
</tr>
<tr>
<td>24 kV 400 A-125 kV impulse</td>
<td>Plug-in</td>
<td>Pirelli</td>
<td>FMCE 400</td>
<td>70 to 300</td>
<td></td>
</tr>
</tbody>
</table>

---

### Type B bushing

**Directed field plug-in connector**

**Dry single-core cable**

<table>
<thead>
<tr>
<th>Performance</th>
<th>Connection</th>
<th>Supplier</th>
<th>Reference</th>
<th>Cross section</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.2 to 10 kV 400 A-95 kV impulse</td>
<td>Plug-in</td>
<td>Elastimold</td>
<td>400 LR</td>
<td>70 to 240</td>
<td>Limited to Us = 10 kV</td>
</tr>
<tr>
<td>24 kV 400 A-125 kV impulse</td>
<td>Plug-in</td>
<td>Pirelli</td>
<td>FMCE 400</td>
<td>70 to 300</td>
<td></td>
</tr>
</tbody>
</table>

---

### Type C bushing

**Directed field disconnectable connector**

**Dry single-core cable**

<table>
<thead>
<tr>
<th>Performance</th>
<th>Connection</th>
<th>Supplier</th>
<th>Reference</th>
<th>Cross section</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.2 to 10 kV 630 A-95 kV impulse</td>
<td>Disconnectable</td>
<td>Elastimold</td>
<td>440 TB</td>
<td>70 to 240</td>
<td></td>
</tr>
<tr>
<td>7.2 to 24 kV 630 A-125 kV impulse</td>
<td>Disconnectable</td>
<td>Pirelli</td>
<td>FMCTs 400</td>
<td>70 to 300</td>
<td></td>
</tr>
</tbody>
</table>

---

### Non-directed field disconnectable connector

**Dry single and three-core cable**

<table>
<thead>
<tr>
<th>Performance</th>
<th>Connection</th>
<th>Supplier</th>
<th>Reference</th>
<th>Cross section</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.2 to 17.5 kV 630 A-95 kV impulse</td>
<td>Heat shrinkable</td>
<td>Raychem</td>
<td>EPKT+EAKT</td>
<td>16 to 300</td>
<td></td>
</tr>
<tr>
<td>24 kV 630 A-125 kV impulse</td>
<td>Simplified disconnectable</td>
<td>Raychem</td>
<td>RICS - EPKT</td>
<td>25 to 300</td>
<td>Limited to Us = 12 kV</td>
</tr>
</tbody>
</table>

Pirelli ELPB12 50 to 300 Limited to 75 kV impulse
### Type C bushing (cont.)
Non-directed field disconnectable connector
Single-core cable, paper impregnated, non-draining type

<table>
<thead>
<tr>
<th>Performance</th>
<th>Connection</th>
<th>Supplier</th>
<th>Reference</th>
<th>Cross section</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.2 to 17.5 kV 630 A-95 kV impulse</td>
<td>Disconnectable</td>
<td>Pirelli</td>
<td>FM Cp 400</td>
<td>95 to 300</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Insulating boots</td>
<td>Kabeldon</td>
<td>SOC</td>
<td>25 to 300</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pirelli</td>
<td>EL PB 12</td>
<td>50 to 300</td>
<td>Limited to 75 kV impulse</td>
</tr>
<tr>
<td></td>
<td>Simplified disconnectable</td>
<td>Raychem</td>
<td>RICS - EP KT</td>
<td>25 to 300</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heat shrinkable</td>
<td>Raychem</td>
<td>EP KT + E AKT</td>
<td>95 to 300</td>
<td></td>
</tr>
<tr>
<td>24 kV 630 A-125 kV impulse</td>
<td>Disconnectable</td>
<td>Pirelli</td>
<td>FM Cp 1c</td>
<td>95 to 300</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Simplified disconnectable</td>
<td>Raychem</td>
<td>RICS - EP KT</td>
<td>25 to 300</td>
<td></td>
</tr>
</tbody>
</table>

### Non-directed field disconnectable connector
Three-core cable, paper impregnated, non-draining type

<table>
<thead>
<tr>
<th>Performance</th>
<th>Connection</th>
<th>Supplier</th>
<th>Reference</th>
<th>Cross section</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.2 to 17.5 kV 630 A-95 kV impulse</td>
<td>Insulating boots</td>
<td>Kabeldon</td>
<td>SOC 630</td>
<td>25 to 300</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pirelli</td>
<td>EL PB 12</td>
<td>50 to 300</td>
<td>Limited to 75 kV impulse</td>
</tr>
<tr>
<td></td>
<td>Simplified disconnectable</td>
<td>Raychem</td>
<td>RICS - EP KT</td>
<td>25 to 300</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heat shrinkable</td>
<td>Raychem</td>
<td>EP KT + E AKT</td>
<td>16 to 300</td>
<td></td>
</tr>
<tr>
<td>24 kV 630 A-125 kV impulse</td>
<td>Simplified disconnectable</td>
<td>Raychem</td>
<td>RICS - EP KT</td>
<td>25 to 300</td>
<td></td>
</tr>
</tbody>
</table>

### Connectors with lightning arrestors
Disconnectable connector
Single-core dry cable and lightning arrestor

<table>
<thead>
<tr>
<th>Performance</th>
<th>Connection</th>
<th>Supplier</th>
<th>Reference</th>
<th>Cross section</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.2 to 17.5 kV 630 A-95 kV impulse</td>
<td>Disconnectable</td>
<td>nkt cables GmbH</td>
<td>AB 12-630 + ASA 12 (5 or 10 kA)</td>
<td>25 to 300</td>
<td>Non-directed field</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>CB 24-630 + CSA 24 (5 or 10 kA)</td>
<td>25 to 300</td>
<td>Directed field</td>
</tr>
<tr>
<td>24 kV 630 A-125 kV impulse</td>
<td>Disconnectable</td>
<td>nkt cables GmbH</td>
<td>AB 12-630 + ASA 12 (5 or 10 kA)</td>
<td>25 to 300</td>
<td>Non-directed field</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>CB 24-630 + CSA 24 (5 or 10 kA)</td>
<td>25 to 300</td>
<td>Directed field</td>
</tr>
<tr>
<td>7.2 to 17.5 kV 630 A-95 kV impulse</td>
<td>Disconnectable</td>
<td>Raychem</td>
<td>RICS+EP KT RDA 12 or 18</td>
<td>25 to 300</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Disconnectable</td>
<td>Elastimold</td>
<td>K 400 TB + K 400 RT PA + K 156 SA</td>
<td>35 to 300</td>
<td>Panel with enlarged RM6</td>
</tr>
<tr>
<td>24 kV 630 A-125 kV impulse</td>
<td>Disconnectable</td>
<td>Raychem</td>
<td>RICS + EP KT RDA 24</td>
<td>25 to 300</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Disconnectable</td>
<td>Elastimold</td>
<td>K 440 TB + K 400 RT PA + K 156 SA</td>
<td>35 to 300</td>
<td>Panel with enlarged RM6</td>
</tr>
</tbody>
</table>
Dimensions and installation conditions

**Dimensions of non-extensible RM6s**

- **RM6 4 functional units**: 1619
- **RM6 3 functional units**: 1142
- **RM6 2 functional units**: 829
- **RM6 1 functional unit switch**: 572
- **RM6 1 functional unit circuit breaker**: 572

**Dimensions of 2, 3 and 4 function RM6 REs that are extensible on the right**

- **RM6 4 functional units**: 1649
- **RM6 3 functional units**: 1216
- **RM6 2 functional units**: 859
Dimensions and installation conditions (cont.)

Dimensions of stand-alone RM6 modules cables connections that are extensible

Dimensions of stand-alone RM6 modules that are extensible on both sides
With two bushing protection covers for extensibility

Dimensions of the RM6 metering module
**Dimensions of RM6 REs with an extension module**

- RM6 RE 3 functional units with switch DE module: $A = 1731$ mm
- RM6 RE 4 functional units with switch DE module: $A = 2164$ mm
- RM6 RE 3 functional units with circuit breaker DE module: $A = 1831$ mm
- RM6 RE 3 functional units with circuit breaker DE module: $A = 2264$ mm

(*) Dimensions necessary on the right of the RM6 in order to install an extension.

---

**Layout**

**Floor mounting**

The RM6 is supported by 2 metal feet with holes for mounting:
- on a flat floor fitted with trenches, passages or ducts
- on concrete footing
- on studs
- on metal rails
- etc.

**Wall mounting**

There are two holes allowing the unit to be fixed on the wall as well as mounted on the floor.

**Additional raising plinth**

As an option, the RM6 can be fitted with a 260 or 520 mm raising plinth. This addition, which simplifies civil engineering works, results in trenches of a smaller depth, or even in their complete elimination when the bending radius of the cables allows it.

The plinth is mounted directly on the floor.
Installation of the substation for internal arc withstand
When there is a requirement for installations with protection against internal arc faults, refer to the following diagrams.

Gas removal to the rear of the substation

Gas removal to the upstream compartment

N.B.: parts for guiding the gases to vent openings and cooling walls are not part of the switchgear supply. These must be adapted to each specific case.
### Installation

#### Civil works

For connection to “network” or “transformer” via circuit breaker

The “network” cables can be run either:
- through trenches, passages, ducts
- through the left or the right side.

**Trench depth** P or RM6 without plinth

Note: trench depths can be reduced and sometimes eliminated by adding a plinth.

<table>
<thead>
<tr>
<th>Cable insulation</th>
<th>Cable</th>
<th>Cross-section (mm²)</th>
<th>Bending radius</th>
<th>Plug-in P</th>
<th>Disconnectable P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry insulation</td>
<td>Single</td>
<td>&lt; 150</td>
<td>500</td>
<td>400</td>
<td>400</td>
</tr>
<tr>
<td></td>
<td></td>
<td>185 to 300</td>
<td>600</td>
<td>520</td>
<td>520</td>
</tr>
<tr>
<td></td>
<td>Three</td>
<td>y 150</td>
<td>550</td>
<td>660</td>
<td>660</td>
</tr>
<tr>
<td></td>
<td></td>
<td>185</td>
<td>650</td>
<td>770</td>
<td>770</td>
</tr>
<tr>
<td>Paper impregnated non-draining type</td>
<td>Single</td>
<td>y 150</td>
<td>500</td>
<td>580</td>
<td>580</td>
</tr>
<tr>
<td></td>
<td></td>
<td>185 to 300</td>
<td>675</td>
<td>800</td>
<td>800</td>
</tr>
<tr>
<td></td>
<td>Three</td>
<td>y 95</td>
<td>635</td>
<td>750</td>
<td>750</td>
</tr>
<tr>
<td></td>
<td></td>
<td>150 to 300</td>
<td>835</td>
<td>970</td>
<td>970</td>
</tr>
</tbody>
</table>

For “transformer” connection via fuse-switch

The cross-sections of “transformer” cables are generally smaller than those of the “network” cables. All the cables are then run through the same space. When straight MV connectors are used, the depth P indicated below can be greater than that of the “network” cables.

<table>
<thead>
<tr>
<th>Cable insulation</th>
<th>Cable</th>
<th>Cross-section (mm²)</th>
<th>Bending radius</th>
<th>Plug-in Elbow connector</th>
<th>Plug-in Straight connector</th>
<th>Disconnectable P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry insulation</td>
<td>Single</td>
<td>16 to 35</td>
<td>335</td>
<td>100</td>
<td>520</td>
<td>335</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50 to 70</td>
<td>400</td>
<td>100</td>
<td>520</td>
<td>440</td>
</tr>
<tr>
<td></td>
<td></td>
<td>95 to 120</td>
<td>440</td>
<td>100</td>
<td>550</td>
<td>440</td>
</tr>
<tr>
<td></td>
<td>Three</td>
<td>35</td>
<td>435</td>
<td>520</td>
<td>725</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>50 to 70</td>
<td>500</td>
<td>520</td>
<td>800</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>95</td>
<td>545</td>
<td>550</td>
<td>860</td>
<td></td>
</tr>
</tbody>
</table>

(1) Leave a clearance of 100 mm  
(2) 520 mm plinth must be used
## Basic unit characteristics

### Rated voltage (kV)

| 12 | 12 | 12 | 12 | 12.5 | 12.5 | 12.5 | 17.5 | 17.5 | 17.5 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 |

### Short-time withstand current (kA rms)

| 21 | 21 | 25 | 25 | 21 | 21 | 21 | 12.5 | 12.5 | 12.5 | 16 | 16 | 16 | 20 | 20 | 20 | 20 |

| Duration (s) | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 3 |

### Rated current (A)

| 200 | 630 | 200 | 630 | 200 | 200 | 630 | 630 | 200 | 400 | 630 | 200 | 400 | 630 | 200 | 200 | 630 | 630 |

### Extensions Functions

<table>
<thead>
<tr>
<th>NE</th>
<th>I</th>
<th>D</th>
<th>B</th>
<th>QI</th>
<th>DI</th>
<th>BI</th>
<th>II</th>
<th>IQI</th>
<th>IIQI</th>
<th>QIQI</th>
<th>IDI</th>
<th>IID</th>
<th>DID</th>
<th>III</th>
<th>II</th>
<th>IIII</th>
<th>IBI</th>
<th>IIBI</th>
<th>BIBI</th>
</tr>
</thead>
<tbody>
<tr>
<td>RE</td>
<td>O</td>
<td>I</td>
<td>IQ</td>
<td>II</td>
<td>IQI</td>
<td>ID</td>
<td>IID</td>
<td>III</td>
<td>IIII</td>
<td>IIB</td>
<td>IIIB</td>
<td>BIB</td>
<td>BII</td>
<td>IIBI</td>
<td>BIBI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LE</td>
<td>O</td>
<td>I</td>
<td>BC</td>
<td>IC</td>
<td>O</td>
<td>Q</td>
<td>D</td>
<td>B</td>
<td>Mt</td>
<td>Mt</td>
<td>Mt</td>
<td>Mt</td>
<td>Mt</td>
<td>Mt</td>
<td>Mt</td>
<td>Mt</td>
<td>Mt</td>
<td>Mt</td>
<td>Mt</td>
</tr>
</tbody>
</table>

**N.B.:** D and Q functions limited to 200 A

**NE:** non-extensible, **RE:** extensible to the right, **LE:** extensible to the left, **DE:** double extensible.
### Order form

**Basic unit and options**

---

**Basic unit configuration**

<table>
<thead>
<tr>
<th>Configuration (one function per box, fill in from the right)</th>
<th>4th function</th>
<th>3rd function</th>
<th>2nd function</th>
<th>1st function</th>
<th>Quantity</th>
</tr>
</thead>
</table>

**Option for I, D, B, Q functions**

**Auxiliary contacts alone**

For main switch position indication 2 NO - 2 NC and ESw 1 O/C (this option is included in remote operation option)

**Option for I function (Load-Break Switch “LBSw”)**

<table>
<thead>
<tr>
<th>Arc short-circuiting device</th>
<th>Front door of cable connection compartment</th>
<th>Self-powered fault passage indicators</th>
<th>Remote operation on I function</th>
<th>Option for D or B function (Circuit Breaker “C.B.”)</th>
</tr>
</thead>
</table>

**Protection relay for C.B. transformer protection (only one VIP type per unit)**

| Relay VIP30 (over current) | Relay VIP35 (over current and earth fault) | Relay VIP300 (over current & earth fault/multi curve in accordance with IEC 255-3) | Forbidden closing under fault TNC | Auxilary contact D or B tripping | Shunt trip coil for external tripping | Remote operation on D or B function | Option for Q function (fuse combination) | Option for D, B, Q functions | Option for operation |
|---------------------------|-------------------------------------------|---------------------------------------------|-------------------------------|-------------------------------|---------------------|---------------------------------|--------------------------------------|---------------------------------|---------------------------------|----------------------|

**Option for Q function (fuse combination)**

**Auxiliary contact for fuses blown**

<table>
<thead>
<tr>
<th>Shunt trip coil for external tripping</th>
<th>Undervoltage coil</th>
<th>Voltage indicator</th>
<th>Key locking devices</th>
</tr>
</thead>
</table>

**Remote operation on D or B function**

Motor mechanism and auxiliary contacts LBSw 2 NO - 2 NC and ESw 1 O/C (including shunt trip coil)

**Option for Q function (fuse combination)**

**Auxiliary contact for fuses blown**

<table>
<thead>
<tr>
<th>Shunt trip coil for external tripping</th>
<th>Undervoltage coil</th>
<th>Voltage indicator</th>
<th>Key locking devices</th>
</tr>
</thead>
</table>

**Option for operation**

Voltage indicator | Network service voltage | Key locking devices | Type R1 (on I and B functions) | Type R2 (on I and B functions) | Type R6 (on Q or D functions) | Type R7 (on Q or D functions) | Type R8 (on Q or D functions) |

---

Only one of the boxes (ticked \(\times\) or filled \(\_\) by the needed value) have to be considered between each horizontal line. Orange box \(\times\) corresponds to none priced functions.
# Options and accessories

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

## Specific option for one function

**Bushing for I function**
- Plug in 400 A type B
- Bolted M16 screw type C (compulsory with 17.5 or 24 kV-630 A)
- Bolted 5/8” ANSI

**Bushing for D function**
- Plug in 200 A type A (limited to 12.5 kA 1 s)
- Plug in 400 A type B (limited to 16 kA 1 s)
- Bolted M16 screw type C (compulsory with 17.5 or 24 kV-630 A)
- Bushing well ANSI (limited to 12.5 kA 1 s)

**Bushing for B function**
- Bolted M16 type C
- Bolted 5/8” ANSI

**Bushing for Q function**
- Plug in 200 A
- Heat shrinkable terminal for fuse chamber

**Cable type for I function**
- Single core
- Three-core
- Bottom plate in cable compartment (compulsory in case of three-core cable)

**Cable type for D or B function**
- Single core
- Three-core
- Bottom plate in cable compartment (compulsory in case of three-core cable)

**In and fuse type for Q function**
- 6 kV
- 10 kV
- 12/24 kV  & 10/100 A
- (fuses to be procured separately)

## Global option

- **Manometer**: Without Arabic Standard Scandinavian
- **Lightning arrester on incoming functions**: (unable to coexist with internal arc cable box and only Elastimold)
- **Additional earth busbar in cable compartment**: (compulsory if earth fault > 6 kA 1 s)
- **Internal arc cable box 20 kA 1 s for I and D or B functions**: (unable to coexist with short-circuit indicator liquid type)

## Accessories

- **Raising plinth**: h = 260 mm  h = 520 mm
- **Set of 3 MV fuses Fusarc CF**
- **Phase comparator**
- **Test box for circuit breaker relay (VAP 6)**
- **Additional operating handle**
- **Additional instructions**
- **Installation and civil engineering instructions**

## Connectors and adaptaters for RM6

### Connectors for 630 A (1 set = 1 function)
- **Directed field disconnectable connector**
  - CB 24–630 A
  - CB 24–630 A with CC–630 A (coupling connection)
- **Non-directed field disconnectable connector**
  - AB 15–630 A
  - AB 15–630 A with AC 15–630 A (coupling connection)

### Connectors for 400 A (1 set = 1 function)
- **Directed field plug-in connector**
  - CE 24–400 A

### Connectors for 250 A (1 set = 1 function)
- **Elbow connector**
  - EASW 20–250 A
- **Straight connector**
  - EASG 20–250 A