

Catalogue 2015



# RM6

Gas Insulated Ring Main Unit  
Up to 24 kV

Medium Voltage Distribution



180 years improving  
our customers' quality of life  
with simple, reliable  
and flexible solutions

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# Your needs

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Reliability



Simplicity



Safety



The RM6 is a compact unit combining all MV functional units to enable the connection, supply and protection of transformers on an open ring or radial network. It is a complete solution to meet the needs of the energy, infrastructure and building industries.

- **An incomparable field-proven experience:** more than 1 800 000 functions installed worldwide.
- **High Quality:** thanks to the stringent application of the standards of ISO quality 9001 and ISO 9002 during the Conception, Manufacture, and rigorous Tests and Control of the product.
- **An assurance of maintain of continuity of service:** the design of RM6 confers it a real complete insulation which ensures to the switchgear a total resistance against severe environments, whether it is the dust, or humidity.

- **A simple and limited maintenance:** with a periodicity from 5 to 10 years
- **Easy to install:** due to its compact dimensions and quick settle. If your installation evolves, RM6 adapts itself to respond to your growing needs: on-site extensibility without manipulation of gas nor particular preparation of the ground allow you to develop your installation simply and safely.

- **Operate safely:** The safety of the person is for us a major commitment.  
RM6 guarantees a total safety thanks to the internal arc proof.
  - Contact of earthing is clearly visible.
  - The voltage indicators are located on the front face.
  - Ultra-reliable device and a natural interlocking ensured by a simple to understand overview diagram on the front side.
- **Safety for operator:** the real position of the contact on earth position before working on the cubicle. The moving contacts of the earthing switch are visible in the closed position through transparent windows.
- **Transformer protection with a circuit breaker:** offering adjustable tripping curve, overload protection, earth fault protection always ready, and avoiding fuse replacement, and stock.  
In addition it allows immediate reclosing possibility even remotely.

# General presentation

<b>Introduction</b>	<b>6</b>
<b>RM6 at a glance</b>	<b>10</b>
<b>Applications</b>	<b>14</b>
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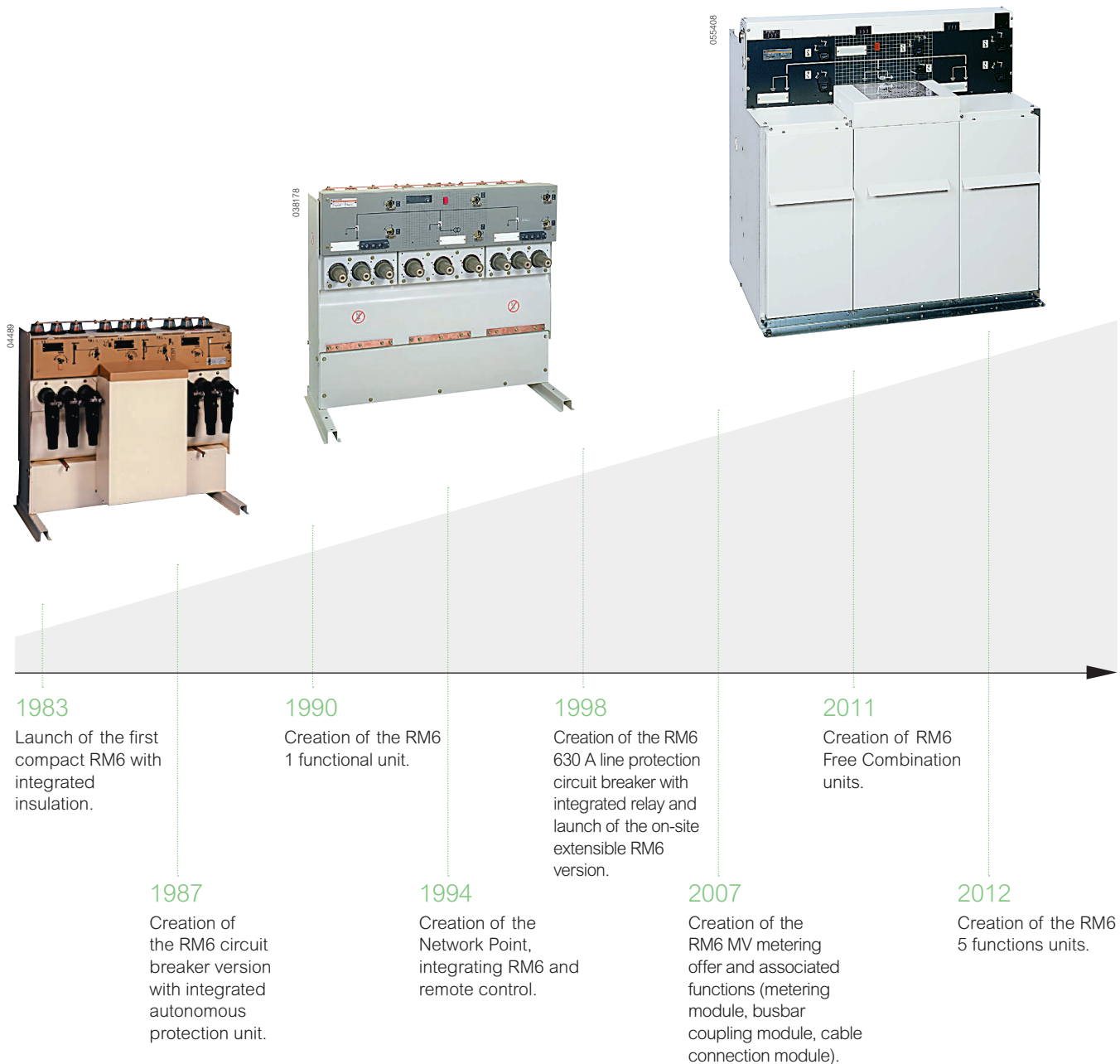
By choosing RM6, benefit from the experience of a world leader in the design of Ring Main Units

## Peace of mind

The latest RM6 generation benefits from the accumulated experience acquired over 30 years of design and with more than 1,8m functions installed in more than 50 countries in the world.

RM6 is produced and customized in 20 local production units to fit closer to requirements in the shortest possible time.

## Unrivalled experience in Ring Main Unit design





## Quality management, a major benefit

Schneider Electric has systematically integrated a functional Quality organization into each of its departments, the main purpose of which being to ensure quality and adherence to standards.

Our Quality management procedures are the same throughout different departments and recognized by numerous customers and organizations.

The strict application of this functional organization and procedures has been recognized by an independent organization, the French Association for Quality Assurance (Association Française pour l'Assurance Qualité, or (AFAQ)).

The RM6 design and production quality systems have been certified as being in conformity with the requirements of the ISO 9001: 2008 quality assurance model.

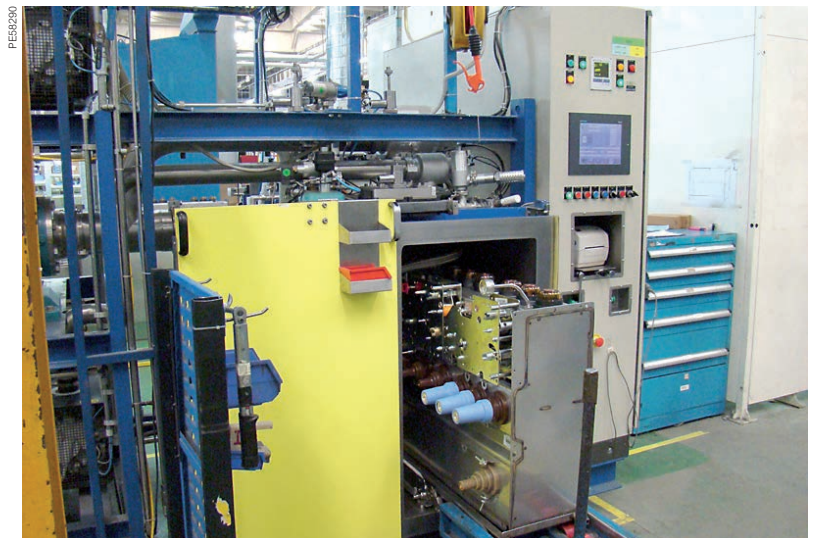
## Rigorous and systematic industrial checks

During its manufacturing, RM6 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.

There is "zero" SF6 emission during the gas filling and tightness control process.



RM6 test platform

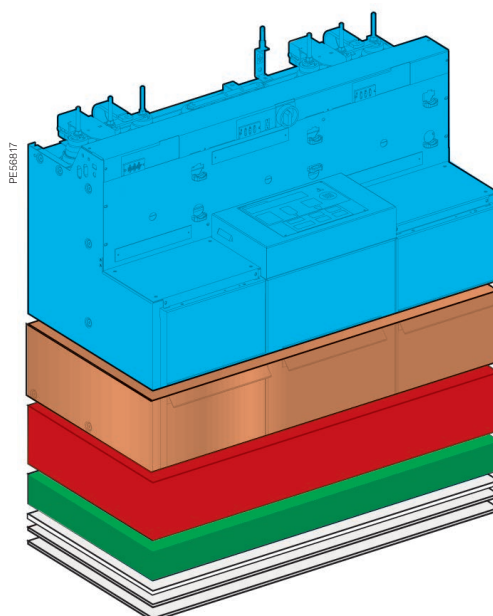
## Environmental performance

Schneider Electric is committed to a long term environmental approach. The Schneider Electric's recycling procedure for SF6 based products is subject to rigorous management to allow each device to be traced through to its final destruction.

As part of this, the RM6 range has been designed to be environmentally friendly, notably in terms of the product's recyclability.

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.



	IDI	IQI
Ferrous metal	78.5%	72.5%
Non-ferrous metal	13.3%	11.3%
Thermohardening	4.7%	11.3%
Thermoplastics	2%	4.1%
Fluids	0.5%	0.4%
Electronic	0.7%	0%
Other	0.4%	0.4%



RM6 production sites follow the environmental management system of Schneider Electric and are in conformity with ISO 14001 standard.

## RM6, a world-wide product



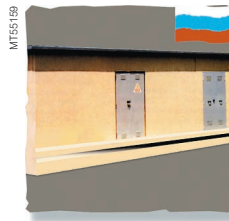
Spain



Norway



Sweden



Russia



Australia



South Africa



Saudi Arabia

## 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/SEC, Saudi Arabia
- PSB, China

### Africa

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

### South America/Pacific

- CELESC,
- Santa Catarina, Brazil
- PETROBRAS, Rio de Janeiro, Brazil
- Guarulhos International Airport
- Sao Paulo, Brazil
- CEMIG, Minas Gerais, Brazil
- EDF, French Guiana
- Tahiti Electricity
- Métró de Mexico, Mexico

### 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

### Oceania

- Eau et Electricité de Calédonie
- New-Caledonia
- Enercal, New-Caledonia
- United Energy, Australia

RM6 is an indoor gas-insulated switchgear up to 24kV for secondary distribution networks.



### Electrical characteristics

Rated voltage	Ur (kV)	12	17.5	24	
Frequency	f (Hz)	50 or 60			
Insulation level					
Industrial frequency 50 Hz 1 mn	Insulation(1)	Ud (kV rms)	28	38	50
	Isolation(2)	Ud (kV rms)	32	45	60
Impulse 1.2/50 μs	Insulation(1)	Up (kV peak)	75	95	125
	Isolation(2)	Up (kV peak)	85	110	145
Tank internal arc withstand			20kA 1s		

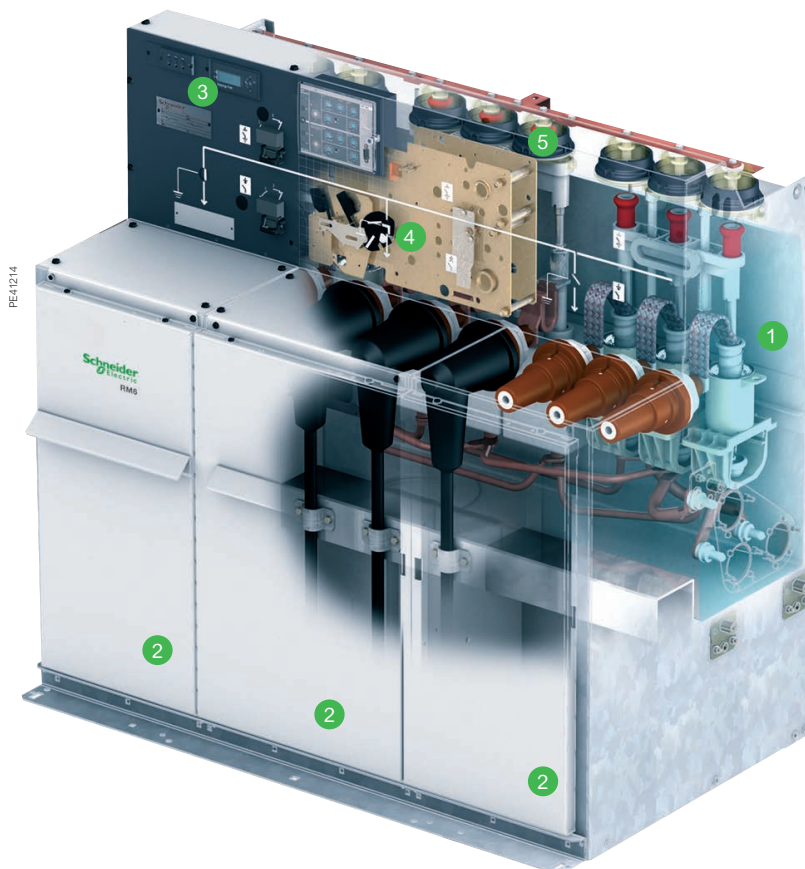
(1) Phase-to-phase, phase-to-earth

(2) Across the isolating distance

RM6 meets the definition of a "sealed pressure system" as laid out by the IEC standard.

RM6 is made up of the following elements:

- 1 a stainless steel tank filled with SF6 gas (at 0.2bar gauge pressure), sealed for life and containing the busbar and all live switching components such as the switch-disconnector, the earthing switch, the fuse switch combination or the circuit breaker
- 2 one to five cable compartments with interfaces to connect to the network or the transformer
- 3 user interface with single line diagram, actuators and LV components
- 4 manual or motorized operating mechanism compartments
- 5 earthing circuit with visible earthing contacts.

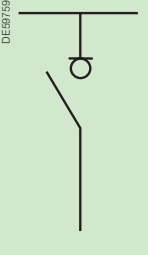
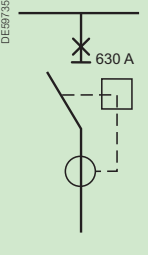
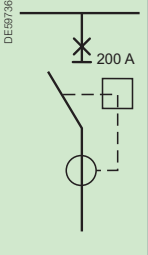
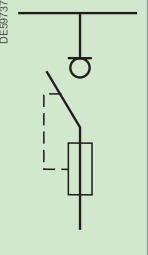
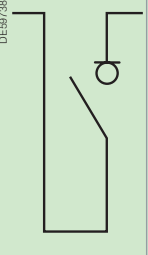
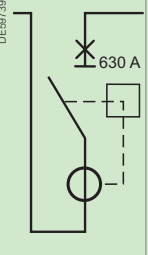
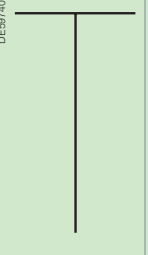
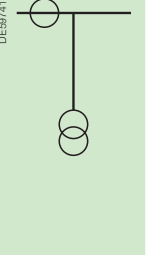


## A wide choice of RM6 functions

RM6 benefits from a wide choice of MV functions enabling:

- the connection, power supply and protection of transformers on a radial or opening network via 200 A circuit breakers with an independent protection chain or via combined fuse-switches
- the protection of lines by a 630 A circuit breaker
- and the MV Metering of private MV/LV substations.

The RM6 functions are described in the table below and the available function combinations on page 13.

Function	Network switch	Line feeder	Transformer feeder		Network coupling		Cable connection	MV metering
Functional unit	I	B	D	Q	IC	BC	O	Mt
Device	Circuit breaker	630 A circuit breaker	200 A circuit breaker	Combined fuse-switch	Switch	630 A circuit breaker		
Single line diagrams								

## Scalability of RM6

To support the evolution of your distribution network, RM6 can be extended with a range of functions making it a truly scalable system.

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.

There are different types of extensible RM6:

- extensible to the right (-RE type)
- extensible to the left (-LE type)
- extensible on both sides (-DE type)
- non-extensible (-NE type)
- Please see available configurations on page 12.



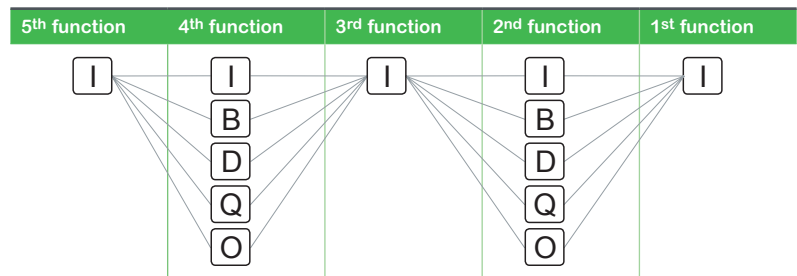
## Flexibility of RM6

To further meet your installation requirements, RM6 also provides you with a higher configuration flexibility thanks to its 5 Functions range and its Free Combination range:

- Free choice of functions and options
- Compatible with standard RM6 offer in all extensibility types
- More economical than multiple single extension functions in line.

## 5 Functions range

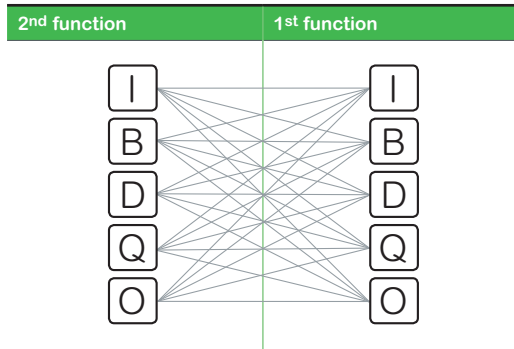
Possible combinations for RM6 five functions tanks:



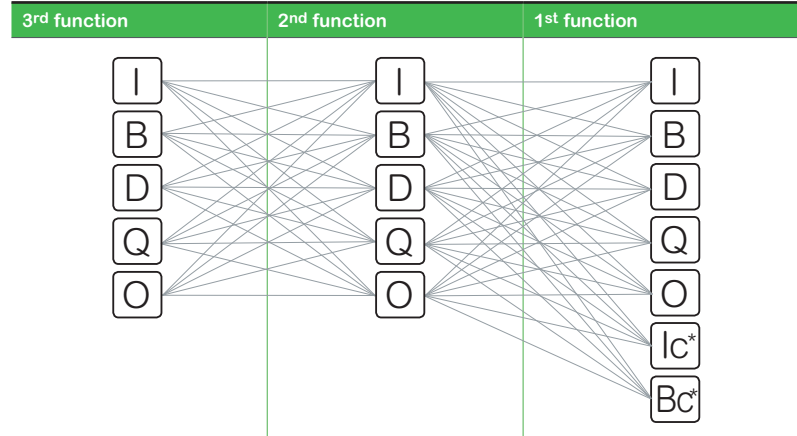
## Free Combination range

700 possible combinations for RM6 2 or 3 functions tanks.

Possible combinations of RM6 2 functions

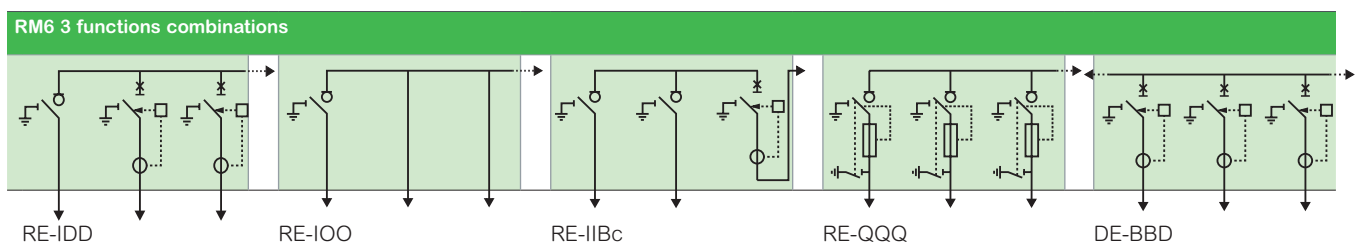
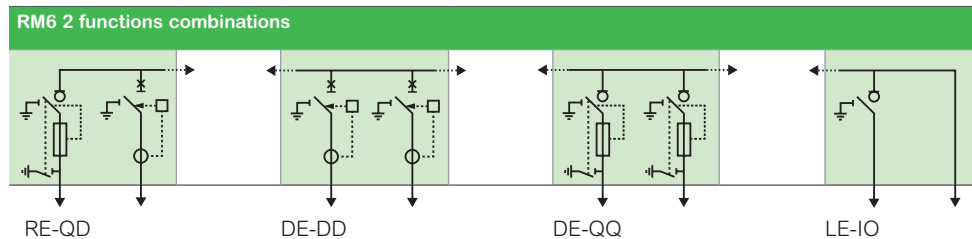


Possible combinations of RM6 3 functions



\* Possible only when RM6 is RE or DE.

## Examples



## Complete board configuration table

Cubicle	Width (mm)	Depth (mm)	Height (mm)	Weight (kg)
NE-I	472	670	1142	135
NE-B	572	670	1142	135
NE-D	572	670	1142	135
DE-I	532	670	1142	135
DE-B	632	670	1142	135
DE-D	632	670	1142	135
DE-Q	632	670	1142	185
DE-Ic	632	670	1142	145
DE-Bc	632	670	1142	145
DE-Mt	1106	840	1142	420
DE-O	532	670	1142	135
LE-O	502	670	1142	135
RE-O	502	670	1142	135
NE-II	829	670	1142	155
NE-BI	829	670	1142	180
NE-DI	829	670	1142	180
NE-QI	829	670	1142	180
RE-II	859	670	1142	155
NE-III	1186	670	1142	240
NE-IBI	1186	670	1142	250
NE-IDI	1186	670	1142	240
NE-IQI	1186	670	1142	275
RE-III	1216	670	1142	240
RE-IBI	1216	670	1142	250
RE-IDI	1216	670	1142	240
RE-IQI	1216	670	1142	275
DE-III	1246	670	1142	240
DE-IBI	1246	670	1142	250
DE-IDI	1246	670	1142	240
DE-IQI	1246	670	1142	275
NE-III	1619	670	1142	320
NE-IIBI	1619	670	1142	330
NE-BIBI	1619	670	1142	340
NE-IIDI	1619	670	1142	330
NE-DIDI	1619	670	1142	340
NE-IIQI	1619	670	1142	355
NE-QIQI	1619	670	1142	390
RE-III	1649	670	1142	320
RE-IIBI	1649	670	1142	330
RE-IIDI	1649	670	1142	330
RE-BIBI	1649	670	1142	340
RE-DIDI	1649	670	1142	340
RE-IIQI	1649	670	1142	355
RE-QIQI	1649	670	1142	390
DE-III	1679	670	1142	320
DE-IIBI	1679	670	1142	330
DE-IIDI	1679	670	1142	330
DE-IIQI	1679	670	1142	355
NE-I_I_I(1)	2000	670	1142	450 to 530(2)
RE-/LE-I_I_I(1)	2030	670	1142	455 to 535(2)
DE-I_I_I(1)	2060	670	1142	460 to 540(2)

(1) 5 functions tanks

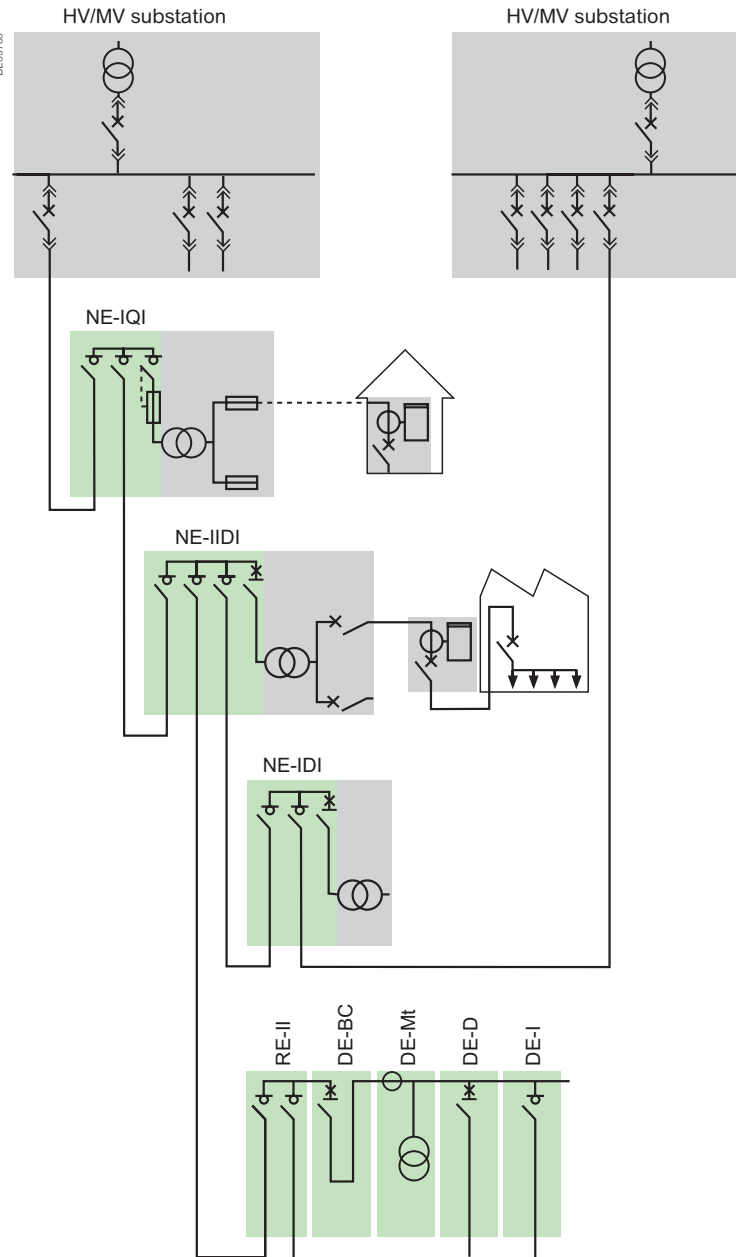
(2) Weight depend on the choice of function

RM6 meets all medium voltage secondary distribution needs up to 24kV

RM6 is a gas-insulated switchboard combining all medium voltage functions to enable the connection, supply and protection of transformers for open ring or radial networks.

Transformer protection can be achieved either:

- by a fuse-switch combination for transformers up to 2000 kVA,
- by a circuit breaker with protection relay for transformers up to 8000 kVA.

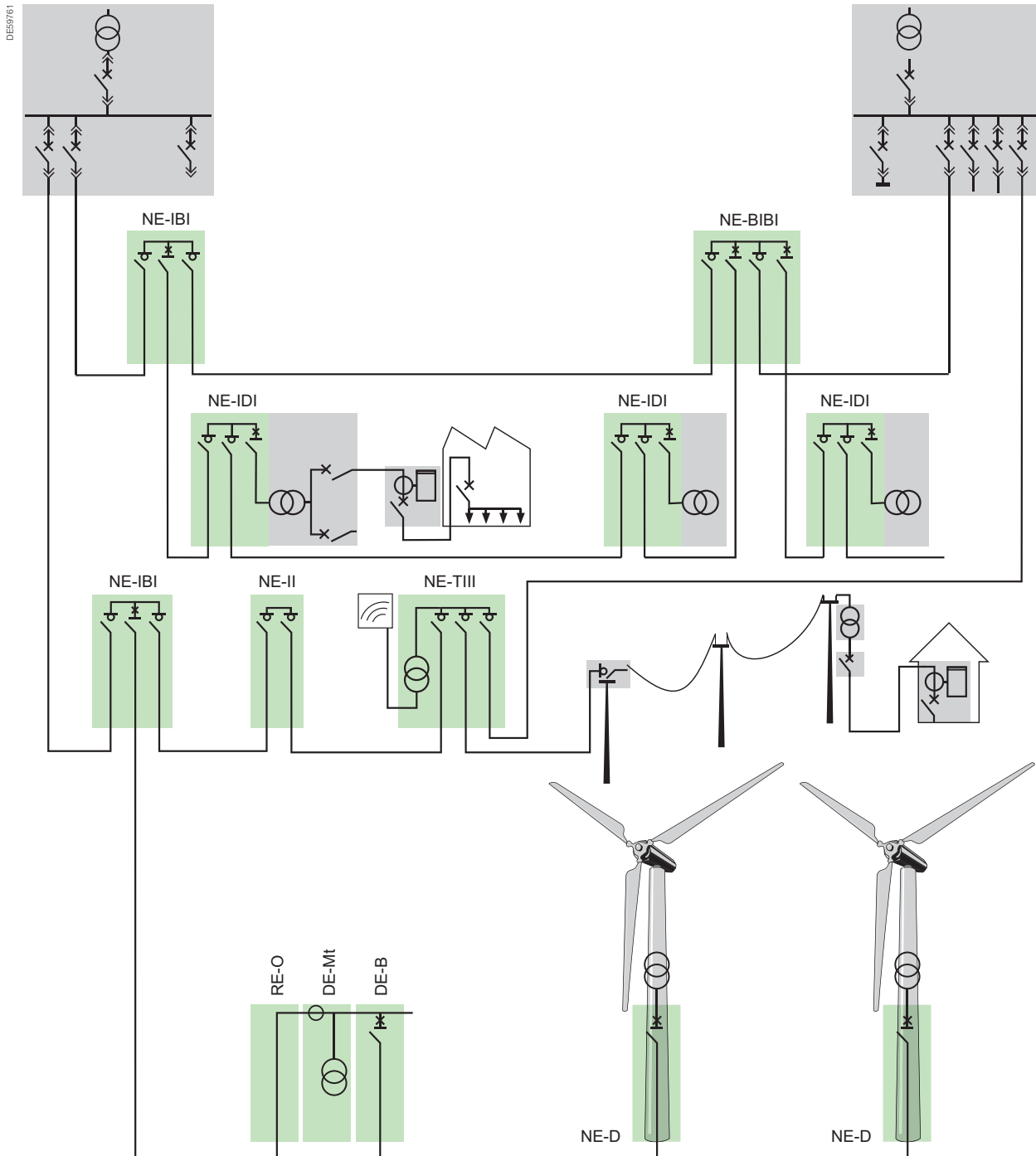




RM6 meets all medium voltage secondary distribution needs in more complex networks configurations where renewable energy supply sources are involved

Operating a distribution network sometimes requires several switching points in addition to the HV/MV substations in order to limit the effects of a fault on the network. RM6 offers solutions for up to five network connections thanks to:

- line protection with 630A circuit breakers
- network switching by switch-disconnectors
- integrated power supply remote control devices.

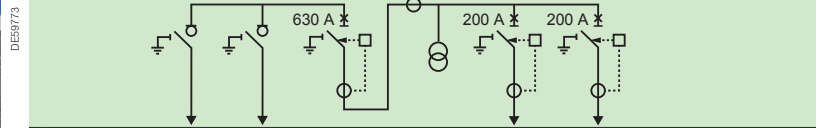


## Examples of typical applications (free combination tank)



PE90160

### Private metering

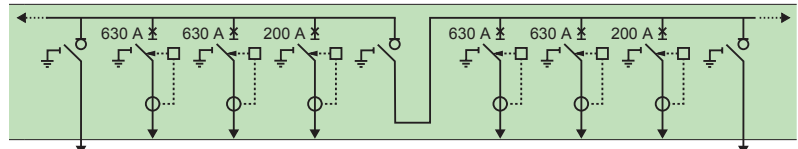


Possible configuration with Free Combination: RE-IIBc; DE-Mt; LE-DD



PE90075

### Switching large site



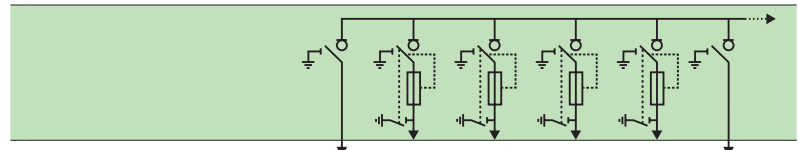
Connection to MV network

Possible configuration with Free Combination: DE-BB; DE-IDi; DE-BB; DE-DI



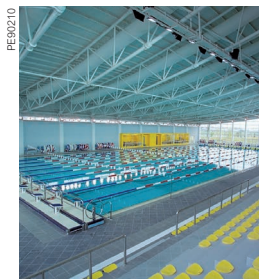
PE90076

### Large transformer substation



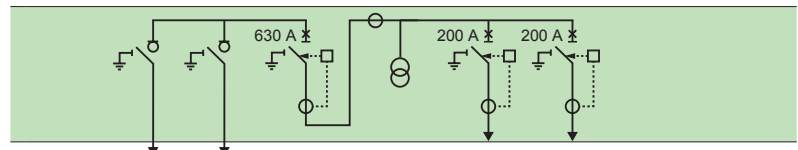
Connection to MV network

Possible configuration with Free Combination: RE-QIQI; DE-QQ



PE90210

### Separate MV consumer substation



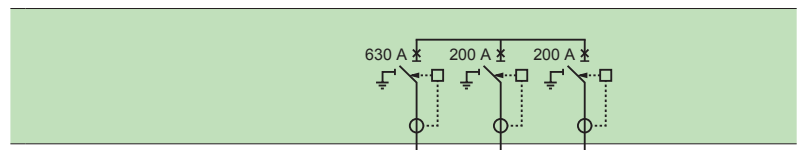
Connection to the open ring

Possible configuration with Free Combination: RE-IIBc; DE-Mt; LE-DD



PE90159

### Satellite MV consumer substation



Cable connection to utility network

Possible configuration with Free Combination: NE-BDD

PE300959



## RM6 for marine applications

RM6 is compliant with IACS standards and DNV and is approved for Marine applications. Thanks to RM6 a loop network configuration can be used onboard ships with significant advantages:

- Main medium voltage switchboard is smaller (only two functions to feed a MV loop)
- Length of medium voltage cables is reduced (> 30% typically)
- The maintainability and availability of the network are improved as:
  - a failed cable section on the MV loop can be disconnected,
  - an automatic reconfiguration of the MV loop after a fault detection can be achieved.

### Onboard safety

If RM6 is equipped with special "filter" LRU (internal arc Reduction Unit), internal arc classification is AFLR 20 kA 1 s as per IEC 62271-200.

### Resistance to vibrations

- Conform to IACS marine standards
- RM6 has a very low centre of gravity.

### Resistance to harsh environment

Live parts are contained in a sealed-for-life tank.

### Some Marine references

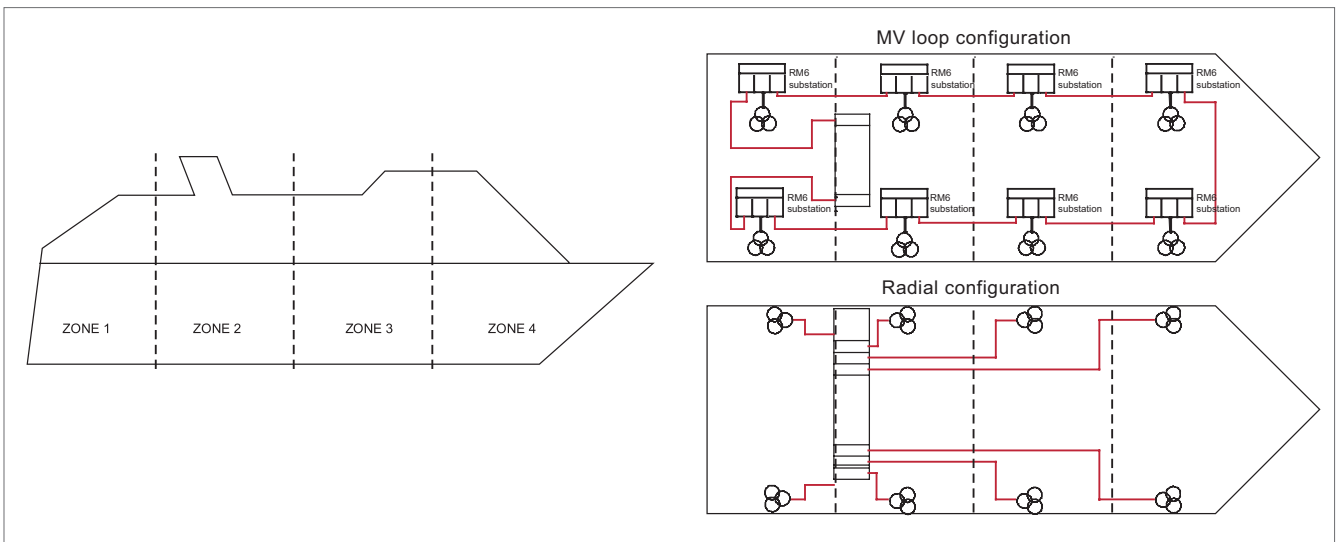
- Aker Yards:
  - NCL Cruise Liner
  - Genesis 1 & 2.
- Meyer Werft:
  - Aida ships
  - Norwegian Gem
  - Norwegian Pearl
  - Pride of Hawaiï,
  - Norwegian Jewel
  - Jewel of the seas...

PE300956\_2



### Example of a cruise liner architecture

DE57984EN



## Advantages of a proven design

RM6 switchgear proven design delivers several promises:

- Enhanced personnel safety:
  - internal arc withstand in conformity with IEC 62271-200
  - visible earthing contacts
  - 3 position switchgear for natural interlocking
  - dependable position indicating devices.
- Insensitive to the environment:
  - stainless steel sealed tank
  - disconnectable, sealed, metallized fuse chambers.
- Approved quality:
  - conforms to national and international standards
  - design and production are certified to ISO 9000 (version 2008)
  - field experience with over 1,800,000 functional units installed world-wide.
- Environmental approach
  - end-of-life gas recovery possible
  - ISO 14001 approved production site.
- Ease of installation:
  - front cable connections at the same height
  - easily fixed to the floor with 4 bolts.
- Is economical:
  - from 1 to 5 functional units, integrated within the same metal enclosure for which insulation and breaking take place in SF6 gas
  - lifetime of 30 years.
- Maintenance-free live parts:
  - in conformity with IEC 62271-1, sealed-for-life pressure system.

## RM6 circuit breaker for greater safety and lower operating costs

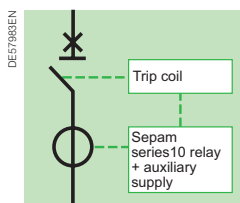
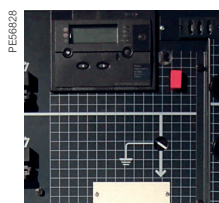
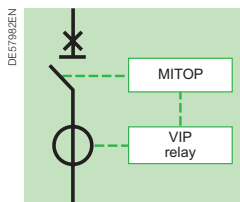
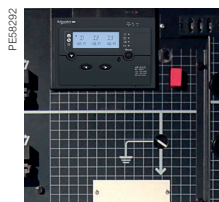
The RM6 range offers 200 A and 630 A circuit breakers to protect both transformers and lines. They are associated with autonomous protection relays (VIP4x series) that are self-powered via current sensors or with auxiliary supply protection relays (Sepam 10 series).

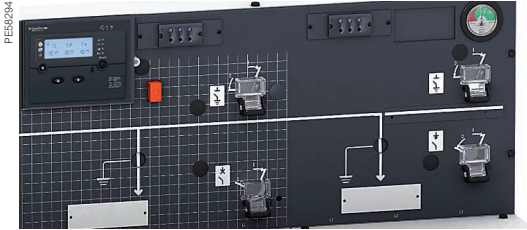
RM6 circuit breaker provides :

- Greater operating staff safety and improved continuity of service
- increased protection device co-ordination between the source substation, circuit breaker and 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 RI2 (the fuse-switches of a 100kVA transformer feeder can dissipate 100 W).
- Reduced maintenance costs with no need for fuse replacement.

## RM6 visible earthing contacts for enhanced peace of mind

Operators can visually validate that the earthing switch is in Closed position thanks to the transparent earthing covers located at the top of the RM6 showing the position of the earthing contacts.

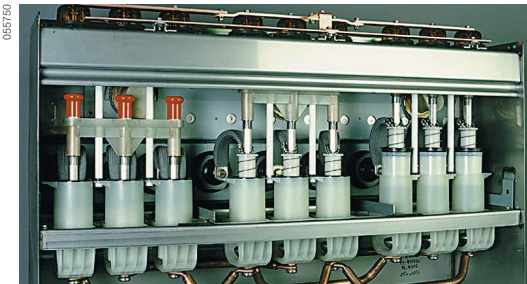




## Reliable operating mechanisms

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 antireflex 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.

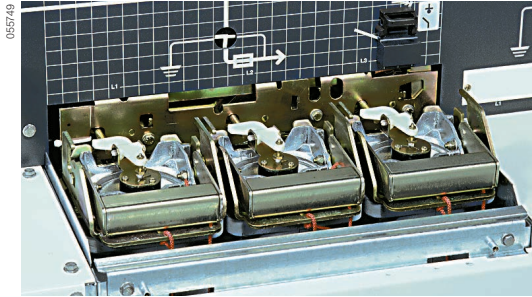


## Safe switchgear design

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.

For the switch-disconnector, the extinction of the electric arc is obtained thanks to the puffer design in SF<sub>6</sub>, whilst for the circuit breaker the electric arc extinction is done thanks to a rotating arc technique combined with SF<sub>6</sub> auto-expansion, allowing the breaking of all currents up to the short-circuit current.



## Insensitivity to the environment

RM6 benefits from complete insulation:

- its stainless steel enclosure is unpainted and gas-tight (IP67), and contains the live parts of the switchgear and the busbars.
- its three sealed fuse chambers are disconnectable and metallized on the outside to insulate the fuses from dust, humidity...
- the metallization of its fuse chambers and the use of directed field terminal connectors confine the electrical field in the solid insulation.

Taken together, the above elements provide RM6 with genuine total insulation which makes the switchgear completely insensitive to environmental conditions, dust, extreme humidity or temporary soaking.  
(IP67: immersion for 30 minutes, as laid down in IEC standard 60529, § 14.2.7).



## Extension on site

RM6 can easily be extended on site

The extension of your RM6 with 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.



## Safe cable insulation test

In order to test cable insulation or look for faults, RM6 offers a unique way to inject a direct voltage of up to 42 kVdc for 15 minutes through the cables via the RM6, without disconnecting the connecting devices.

The operator does not need to access the cable compartment.

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). The moving contacts of the earthing switch shall be visible in the closed position through transparent covers.

## 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 personnel 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 internal arc withstand of the tank is of 20 kA 1 s.

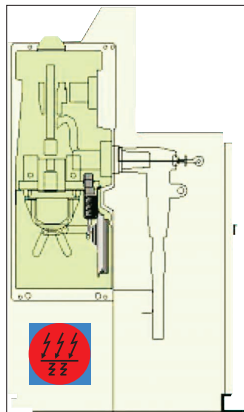
With the option of the internal arc in cable compartment, the RM6 cubicle has an internal arc withstand up to 20 kA 1 s, which meets all the criteria of IAC class A-FL as defined by IEC 62271-200 standard, appendix A.

The gas is released to the rear or to the bottom of the RM6 without affecting conditions in the front. When the gas is exhausted to the rear, the maximum internal arc withstand is of 16 kA 1 s. In case the gas is exhausted to the bottom, the internal arc withstand is up to 20 kA 1 s.

## Arc short-circuiting

In addition an option of an arc short-circuiting device is available on RM6. This 'arc killer' device transforms an internal arc in the tank into short-circuit and prevents the overpressure inside the gas tank in case of internal arc fault (resulting in no gas outside the tank).

The option is only available on switch function (I) and in non-extensible RM6 or not on a side of extension.



# Detailed characteristics



<b>Main characteristics</b>	<b>24</b>
<b>Functions</b>	<b>25</b>
I, Ic functions	25
B, D, BC functions	26
Q function	27
O function	28
DE-Mt function	29



RM6 performances meet the definition of a "sealed pressure system" as laid down in the IEC recommendations.

RM6 tank is filled with SF6 at a 0.2 bar gauge pressure and 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.

RM6 is designed in accordance with the following IEC standards used for general operation conditions for indoor switchgears:

IEC 62271-1 (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.

DE-Mt needs voltage derating after 1 000m.

Please consider altitude and temperature when selecting Q function fuses.

### Climatic conditions

	(°C)	40	45	50	55	60
Busbars 630 A	Ir (A)	630	575	515	460	425
Busbars 400 A	Ir (A)	400	400	400	355	
Functions: I, O, B (with bushing type C)	(A)	630	575	515	460	425
Function D (with bushing type B or C)	(A)	200	200	200	200	200
Function Q	(A)	(3)	(4)	(4)	(4)	(4)

(3) Depends on fuse selection

(4) Please consult us



IEC 62271-200 (A.C. metal enclosed switchgear and controlgear for rated voltage above 1 kV and up to and including 52 kV)

- Switchgear classification: PM class (metallic partitioning)
- Loss of service continuity: LSC2 class as per IEC 2011 latest edition
- Internal arc classification: class A-FL up to 20 kA 1 s on request (access restricted to authorized personnel only, for front and lateral access).
- Maximum relative humidity: 95%

#### Switch-disconnectors

IEC 62271-103 (high voltage switches for rated voltage above 1 kV and less than 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 (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

IEC 62271-100 (high voltage alternating current circuit breakers)

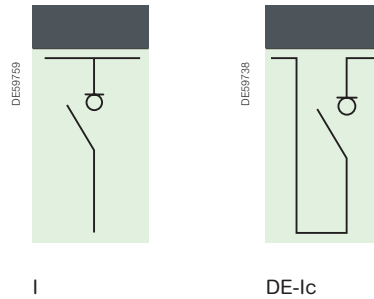
- Switch-fuse combinations: IEC 62271-105: alternating current switch-fuse combination.
- Earthing switch: IEC 62271-102: alternating current disconnectors and earthing switches.
- Electrical relays: IEC 60255.

#### RM6 Protection Index

- Tank with HV parts: IP67
- Low voltage control compartment: IP3X
- Front face + mechanism: IP3X
- Cable compartment: IP2XC
- Protection against mechanical impact: IK07.

## I, Ic functions

- I function: network points with switch-disconnector
- DE-Ic function: bus coupler by switch-disconnector

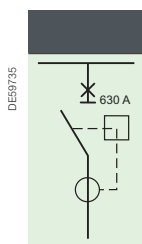


Rated voltage		Ur	kV	12	17,5	24			
Rated frequency		Fr	Hz	50 or 60	50 or 60	50 or 60			
Insulation level									
Industrial frequency 50Hz / 1min	Phase-to-phase, phase-to-earth	Ud	kV rms	28	38	50			
	Across isolating distance	Ud	kV rms	32	45	60			
Lightning impulse withstand	Phase-to-phase, phase-to-earth	Up	kV peak	75	95	125			
	Across isolating distance	Up	kV peak	85	110	145			
Rated current		Ir	A	630	630	400	630		
Rated current busbars		Ir	A	630	630	400	630		
Rated peak current		Ip	kA	62.5	52.5	31.25	40	40	50
Short-time withstand current		It	kA rms	25	21	12.5	16	16	20
		tk	s	1	1 or 3	1	1	1	1 or 3
Beaking capacity	Active load	Iload	A	630	630	400	400	630	630
	Earth fault	Ief1	A	320	320	320	320	320	320
	Cable charging	Icc	A	110	110	110	110	110	110
Making capacity of switch and earthing switches		Ima	kA peak	62.5	52.5	31.25	40	40	50
Bushing <sup>(1)</sup>		Type		C	C	B or C	B or C	C	C
Mechanical endurance	Switch-disconnector	M1	Number of openings	1000	1000	1000			
	Earthing switch	M0	Number of openings	1000	1000	1000			
Electrical endurance	Switch-disconnector	E3	Number of CO at rated current	100	100	100			
			Number of short-circuit making operations	5	5	5	2		
	Earthing switch	E2	Number of CO at rated current	100	100	100			
			Number of short-circuit making operations	5	5	5	2		

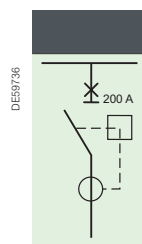
<sup>(1)</sup> No bushing for IC function

## B, D, Bc functions

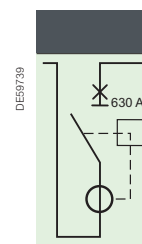
- **B function:** network points with 630A disconnecting circuit breaker (line protection feeder)
- **D function:** transformer feeder 200A with disconnecting circuit breaker
- **DE-Bc function:** bus coupler by 630 A circuit breaker



B



D



Bc

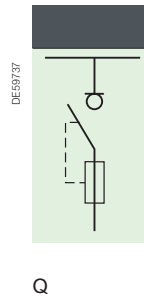
<b>Rated voltage</b>		Ur	kV	12	17,5	24					
<b>Rated frequency</b>		Fr	Hz	50 or 60	50 or 60	50 or 60					
<b>Insulation level</b>											
Industrial frequency 50Hz / 1min	Phase-to-phase, phase-to-earth	Ud	kV rms	28	38	50					
	Across isolating distance	Ud	kV rms	32	45	60					
Lightning impulse withstand	Phase-to-phase, phase-to-earth	Up	kV peak	75	95	125					
	Across isolating distance	Up	kV peak	85	110	145					
<b>Rated current</b>	Ir	A	200	630	200	630	200	630	200	200	200
<b>Rated current busbars</b>	Ir	A	630	630	630	630	630	630	400	400	630
<b>Short-time withstand current</b>	It	kA rms	25	21 <sup>(1)</sup>	16	20	12.5	16	12.5		
	tk	s	1	1 or 3	1	1 or 3	1	1	1		
<b>No-load transformer breaking capacity</b>	I3	A	-	16	-	16	-	16	16	16	16
<b>Short-circuit breaking capacity</b>	Isc	kA	25	21	16	20	12.5	16	12.5		
<b>Making capacity</b>	I <sub>ma</sub>	kA peak	62.5	52.5	40	50	31.25	40	31.25		
<b>Operating sequence</b>				O – 3min- CO – 3min - O							
<b>Bushing<sup>(2)</sup></b>		Type		C	C	C	C	A	BorC	A	
<b>Mechanical endurance</b>	Circuit breaker	M1	Number of openings	2000	2000	2000					
	Earthing switch	M0	Number of openings	1000	1000	1000					
<b>Electrical endurance</b>	Circuit breaker	E2	Number of short-circuit breaking operations	3	3	3					
			Number of short-circuit making operations	2	2	2					
	Earthing switch	E2	Number of CO at rated current	100	100	100					
			Number of short-circuit making operations	5	5	5	2	5	5	5	

(1) 17.5 kA for DE-Bc

(2) No bushing for DE-Bc function

## Q function

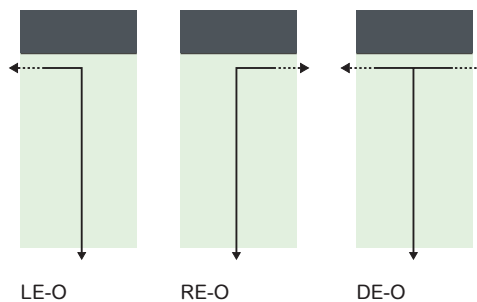
- Q function: Transformer feeder with fuse-switch protection



Rated voltage		Ur	kV	12	17,5	24				
Rated frequency		Fr	Hz	50 or 60	50 or 60	50 or 60				
Insulation level										
Industrial frequency 50Hz / 1min	Phase-to-phase, phase-to-earth	Ud	kV rms	28	38	50				
	Across isolating distance	Ud	kV rms	32	45	60				
Lightning impulse withstand	Phase-to-phase, phase-to-earth	Up	kV peak	75	95	125				
	Across isolating distance	Up	kV peak	85	110	145				
Rated current		Ir	A	200	200	200	200	200	200	
Rated current busbars		Ir	A	630	630	630	400	400	630	630
Short-time withstand current		It	kA rms	21	25	21	12.5	16	16	20
		tk	s	1	1	1 or 3	1	1	1	1 or 3
No-load transformer breaking capacity		I3	A	16	16	16	16	16	16	16
Short-circuit breaking capacity		Isc	kA	21	25	21	12.5	16	16	20
Making capacity		I <sub>ma</sub>	kA peak	52.5	62.5	52.5	31.25	40	40	50
Bushing		Type		A	A	A	A	A	A	A
Mechanical endurance		Switch-disconnector	M1	Number of openings	1000	1000	1000			
		Earthing switch	M0	Number of openings	1000	1000	1000			
Electrical endurance		Switch-disconnector	E2	Number of CO at rated current	100	100	100			
				Number of short-circuit making operations	5	5	5		2	
		Earthing switch	E2	Number of CO at rated current	100	100	100			
				Number of short-circuit making operations	5	5	5		2	

## O function

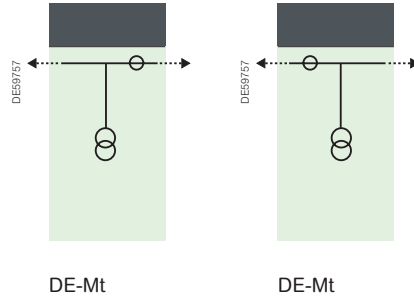
• O function: cable connection



Rated voltage	Ur	kV	12	12	17.5	17.5	24	24	24
Rated current busbars	Ir	A	630	630	630	630	630	630	630
Rated current	Ir	A	200	630	200	630	200	630	630
Short-time withstand current	Ik	kA rms	25	25	21	21	16	16	20
	tk	Duration (s)	1	1	3	3	1	1	1 or 3
Bushing			C	C	C	C	C	C	C

## DE-Mt function

- Air-insulating metering panel for MV power billing
- Internal Arc withstand
- Connected by busbar to RM6 functions



Rated voltage	Ur	kV	12	17.5	24
Rated current busbars	Ir	A	630	630	630
Rated current	Ir	A	630	630	630
Short-time withstand current	I <sub>k</sub>	kA rms	25	21	16 or 20
	t <sub>k</sub>	Duration (s)	1	1 or 3	1 or 3
Cubicle internal arc withstand			16kA 1s	16kA 1s	16kA 1s

## Voltage transformers

Schneider Electric models or DIN 42600 type section 9.  
2 phase-phase VT, 2 phase-earth VT, 3 phase-earth VT.  
Optional fuse protection.

## Current transformers

Schneider Electric models or DIN 42600 type section 8.  
2 CT or 3 CT. CTs can be right or left-fitted.

## Example



## Increased environmental insensitivity

- By eliminating risks related to MV cables (incorrect connection, noncompliance 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 to enable:

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

## Option: a LV cabinet

- placed on top of LV compartment
- allows installation of active or reactive power meters, of all auxiliaries to monitor current, voltage and consumed power
- cabinet door key locks available (R7 type).

# Components



<b>Protection relays</b>	<b>32</b>
<b>Fuses</b>	<b>39</b>
<b>Motorization</b>	<b>40</b>
<b>Tripping and position indication</b>	<b>41</b>
<b>Fault passage detectors</b>	<b>42</b>
<b>Voltage indicators and relay</b>	<b>44</b>
<b>Operating handles</b>	<b>45</b>
<b>Key locking</b>	<b>46</b>
<b>Other components</b>	<b>47</b>
<b>Cable compartment</b>	<b>48</b>
<b>Component list</b>	<b>49</b>

### VIP 40, 45, 400, 410 & Sepam series 10 selection guide relays

		VIP series				Sepam series		
		Integrated self-powered protection optimised for RM6				General		
		Transformer protection		General protection		Sepam series 10		
		VIP 40	VIP 45	VIP 400	VIP 410	B	A	
		ANSI code						
<b>Protection functions</b>								
Phase overcurrent		50-51	■	■	■	■	■	
Earth fault phase	Standard (sum of current method)	51N		■	■	□	□	
	High sensitivity (earth fault CTs)				■	□	□	
Thermal overload		49		■	■	■	■	
Logic discrimination	Blocking send	68				■	■	
	Blocking reception						■	
Cold load pick-up					■	■	■	
Other protection functions (1)						■	■	
<b>Measurement functions</b>								
Phase current			■	■	■	■	■	
Earth current				■	■	■	■	
Phase peak demand current			■	■	■	■	■	
Load histogram					■			
<b>Control and monitoring functions</b>								
CB tripping			Mitop	Mitop	Mitop	Mitop	Coil	
Trip circuit supervision		74TC	■	■	■	■	■	
Time-tagged events	Local on display (5 last trips)				■	■	■	
	Remote, via communication					■	■	
External tripping input					■	■	■	
Cumulative breaking current, number of trip orders					■			
Overcurrent and breaking profile	Number of phase and earth trips (2)			■	■	■	■	
Serial communication port	Modbus RS485				■	■	■	
Logic relay inputs (except TCS) used for:					1	0 or 2	0 or 2	
	External tripping				1	1	1	
	Local / Remote					1	1	
Logic relay ioutputs used for:					3	3 or 7	3 or 7	
	Circuit breaker closing by remote control					1	1	
	Logic discrimination (Blocking send)					1	1	
	Watchdog				By modbus	1	1	
	Customised output via setting					3	4	4
<b>Power supply</b>								
Type of supply	Self-powered or auxiliary		Self	Self	Self	DUAL Power (1)	Auxiliary	Auxiliary
	Minimum 3 phase load currents to activate the VIP		4 A	4 A	7 A (3)			

(1) The protection is self-powered. Auxiliary power is used only for communication and high sensitive earth fault protection.

(2) The number of trips is displayed in 4 levels:  
For D01 and D02: < 200 A, < 2 kA, < 8 kA, > 8 kA  
For D06 and D06H: < 630 A, < 10 kA, < 20 kA, > 20 kA.

(3) 14 A with 630 A CBs

■ Function available

□ Function availability depends on the Sepam model.

Schneider Electric recommends circuit breakers for transformer protection instead of fuses. They offer the following advantages:

- Easy to set
- Better discrimination with other MV and LV protection devices
- Improved protection performance for inrush currents, overloads, low magnitude phase faults and earth faults
- Greater harsh climate withstand
- Reduced maintenance and spare parts
- Availability of additional functions such as measurement, diagnostics and remote monitoring
- And with the recent development of low cost circuit breakers and self-powered relays, life time costs are now equivalent to those of traditional MV switch fuse solutions.

### Applications

- Entry level MV/LV transformer protection
- Dependent-time phase overcurrent tripping curve dedicated to MV/LV transformer protection
- Definite-time earth fault protection
- Phase current and peak demand current measurement.

### Main features

#### Self-powered operation

- Energised by the CTs: no auxiliary power needed.

#### Complete pre-tested protection system

- Functional block ready to be integrated.

#### Phase overcurrent protection

- Tripping curve optimised for MV/LV transformer protection
- Protection against overloads and secondary and primary short-circuits
- Second harmonic restraint filtering
- Only one setting ( $I >$ )
- Discrimination with LV circuit breakers or LV fuses
- Compliant with TFL (Time Fuse Link) operating criteria.

#### Earth fault protection

- Definite-time tripping curve
- Settings:  $I_0 >$  (phase current sum method) and  $I_0 >$
- Second harmonic restraint element.

#### Measurement

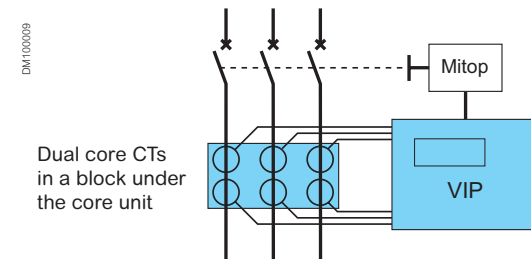
- Load current on each phase
- Peak demand current.

#### Front panel and settings

- Current measurements displayed on a 3 digit LCD
- Settings with 3 dials ( $I >$ ,  $I_0 >$ ,  $I_0 >$ ) protected by a lead-sealable cover
- Trip indication powered by dedicated integrated battery with reset by pushbutton or automatically.

#### Other features

- Complete pre-tested solution that eliminates complicated CT selection
- Complies with MV protection relay standard IEC 60255
- No PC or specific tool required for setting or commissioning
- Maximum setting possibilities consistent with circuit breaker features
- Self-powered by dual core CTs: Cuar
- Environment:  $-40^{\circ}\text{C} / +70^{\circ}\text{C}$ .



Dual core CTs: for power and for measurement

Rated protection current setting selection by VIP 40 and VIP 45

Operating voltage (kV)	Transformer rating (kVA)																					
	50	75	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	
3	10	15	20	25	36	45	55	68	80	115	140	170	200									
3.3	10	15	18	22	28	36	45	56	70	90	115	140	200									
4.2	8	12	15	18	22	28	36	45	55	70	90	115	140	200								
5.5	6	8	12	15	18	22	28	36	45	55	68	90	115	140	170							
6	5	8	10	12	18	20	25	36	45	55	68	80	115	140	170	200						
6.6	5	8	10	12	15	18	22	28	36	45	56	70	90	115	140	200						
10	5*	5	8	8	10	12	15	20	25	30	37	55	68	80	115	140	170	200				
11	5*	5*	6	8	10	12	15	18	22	28	36	45	55	68	90	115	140	170				
13.8	5*	5*	5	6	8	10	12	15	18	22	28	36	45	55	68	90	115	140	170			
15	5*	5*	5	6	8	8	10	15	18	20	25	36	45	55	68	80	115	140	170	200		
20	5*	5*	5*	5*	6	6	8	10	12	15	20	25	30	37	55	68	80	115	140	170	200	
22	5*	5*	5*	5*	5	6	8	10	12	15	18	22	28	36	45	55	68	90	115	140	170	

\* Short-circuit protection, no over-load protection

VIP 400 is a self-powered relay energised by the CTs; it does not require an auxiliary power supply to operate.

VIP 410 is a dual powered relay offering self-powered functions and additional functions powered by an AC or DC auxiliary supply.

## Applications

- MV distribution substation incomer or feeder protection relay
- MV/LV transformer protection.

## Main features

### VIP 400: Self-powered protection relay

This version is energised by the current transformers (CTs).

It does not require an auxiliary power supply to operate.

- Overcurrent and earth fault protection
- Thermal overload protection
- Current measurement functions.

### Other features

- Designed for RM6 circuit breakers
- Complete pre-tested solution that eliminates complicated CT selection
- Complies with MV protection relay standard IEC 60255
- No PC or specific tool required for setting or commissioning
- Self-powered by dual core CTs
- Environment: -40°C / +70°C.

### VIP 410: Dual powered protection relay

• Offers the same self-powered functions as the VIP 400

• In addition, the VIP 410 has an AC or DC auxiliary supply to power certain additional functions that cannot be self-powered:

- sensitive earth fault protection
- external tripping input
- cold load pick-up
- communication (Modbus RS485 port)
- signaling.

• If the auxiliary power falls during an MV short-circuit, the protection functions are maintained.

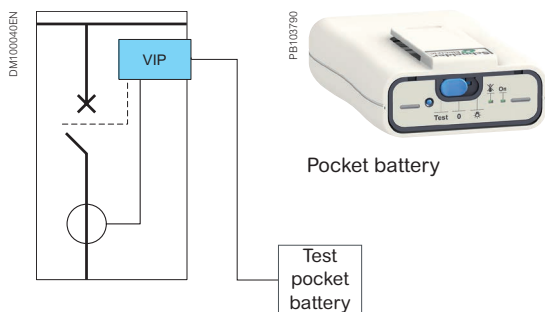
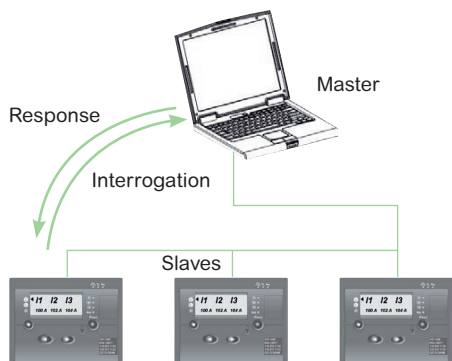
### Ready for smart grids

Dual supply for communication with

- DMS and RTUs
- Remote alarms
- Time stamped events
- Measurements of current, load history, overcurrent and breaking profile.

### Dedicated to intelligent MV loops with automation

- Remote configuration
- Setting groups selectable according to the configuration of the MV loop
- Remote asset management
- Plug and play system with Easergy RTUs (R200) to integrate all protocols IEC 60870-104, DNP3, IEC 61850) and remote web pages.



## Pocket battery for VIP4x range

This unit is used to power the VIP 40, VIP 45, VIP 400 and VIP 410 units, making it possible to operate and test the protection system.

It can also be used to power Schneider Electric LV circuit breakers.

# Protection relays

## Transformer protection by circuit breaker VIP integrated system

The VIP series is an integrated protection system:

- Dedicated sensors located under the core unit provide protection and measurement outputs
- Optional additional earth fault sensors are available
- Actuators are low power tripping coils (Mitop).



VIP4x Current Transformer

### High sensitivity sensors

#### VIP integrated protection system

The VIP integrated protection system is composed of sensors, a processing unit and an actuator, designed together to provide the highest level of reliability and sensitivity from 0.2 A to 20 In for VIP 400, VIP 410 and 5 A to 20 In for VIP 40 and VIP 45.

#### Sensors

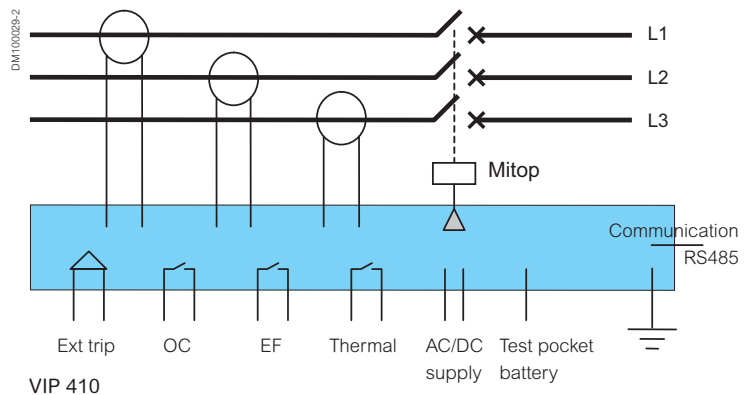
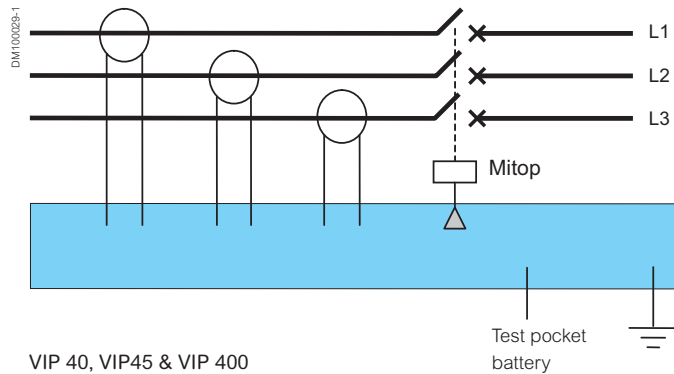
The sensors are made up of one block of three CTs with rated and insulation voltages of 0.72 kV / 3 kV - 1 min, providing both measurement and power outputs.

- The measurement sensor is based on Low Power Current Transformer (LPCT) technology as defined by standard IEC 60044-8, ensuring excellent accuracy:
  - 5P30 for protection
  - class 1 for measurement.
- The power supply winding ensures calibrated self-powering of the relay even for currents of just a few Amperes
- e.g. 7 A is sufficient for operation of the VIP 400 with a 200 A circuit breaker, up to its saturation level
- e.g. 4 A is for operation of the VIP 40 up to its saturation level.
- Optionally, the VIP 410 can be associated with an earth fault current transformer (a single zero-sequence CT) dedicated to sensitive earth fault protection with a low threshold down to 0.2A.

#### Actuators

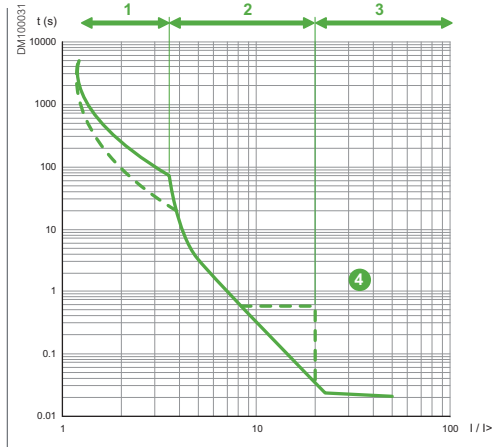
- The actuator is a dedicated low power tripping coil (Mitop) specifically designed to operate with the sensors and the processing unit with minimum energy.
- The integrity of the Mitop circuit is continuously supervised (Trip Circuit Supervision function).

### Connection diagrams



# Protection relays VIP40, VIP45, VIP400 & VIP410 tripping curves

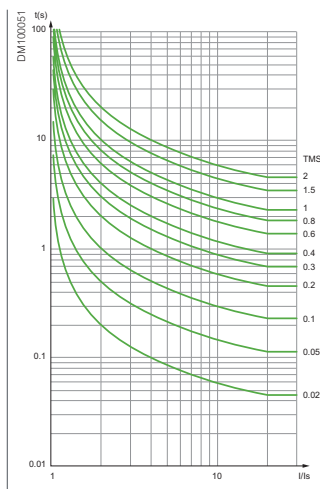
## VIP40 & VIP45



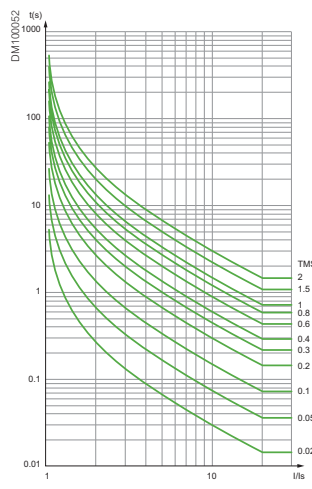
Phase overcurrent protection (ANSI 50-51)

- 1 Overload
- 2 Secondary short-circuit
- 3 Primary short-circuit
- 4 Activation of discrimination with a Low Voltage circuit breaker.

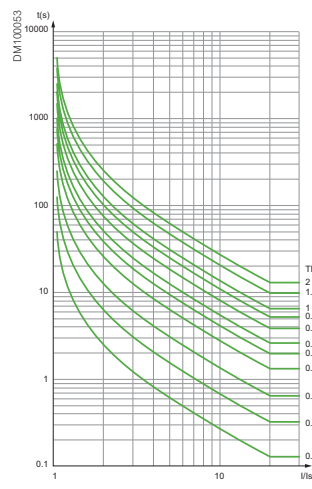
## VIP400 & VIP410



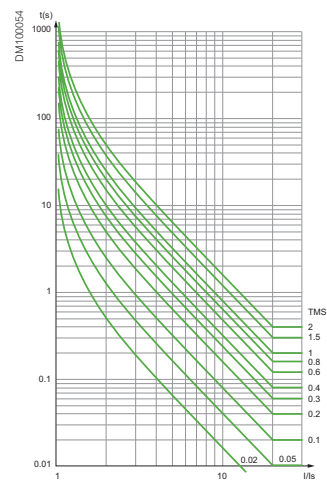
IEC Standard Inverse Time Curve (IEC/SIT or IEC/A)



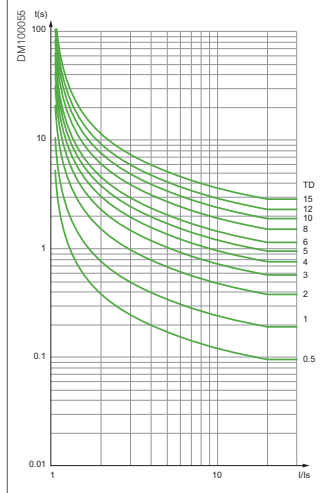
IEC Very Inverse Time Curve (IEC/VIT or IEC/B)



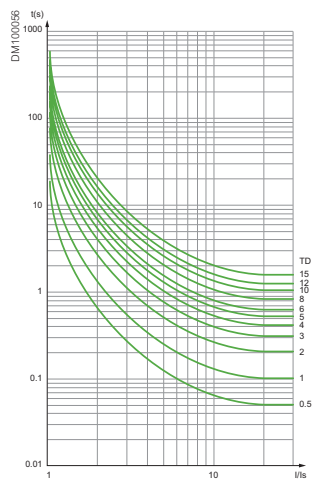
IEC Long Time Inverse Curve (IEC/LTI)



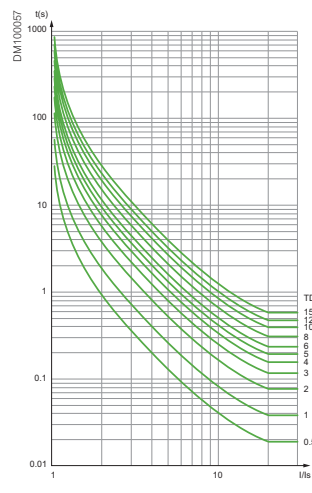
IEC Extremely Inverse Time Curve (IEC/EIT or IEC/C)



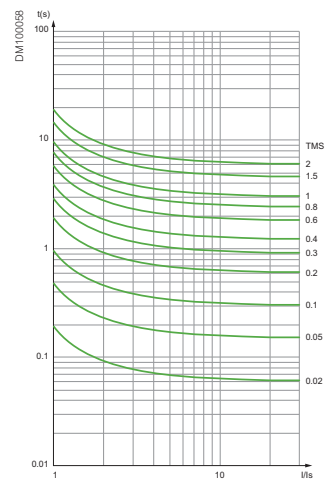
IEEE Moderately Inverse Curve (IEEE/MI or IEC/D)



IEEE Very Inverse Curve (IEEE/VI or IEC/E)



IEEE Extremely Inverse Curve (IEEE/EI or IEC/F)



RI Curve

### Sepam series10 protection relays

- Protection against phase to phase faults and earth faults, capable to detect the earth faults from 0.2 A.
- Possibility of communication with Easergy T200 I and remote circuit breaker control.
- Thermal image overload protection (ANSI 49RMS).
- Logic discrimination for shorter tripping time.
- Record of last fault or last five events.

### Main features

#### Protection system

The protection system includes:

- 3 current transformers mounted on the bushings (same as VIP)
- 1 specially designed homopolar transformer CSH120 or CSH200 for the measurement of residual current (only for high sensitivity models)
- 1 Sepam series 10 relay
- 1 trip coil of RM6.

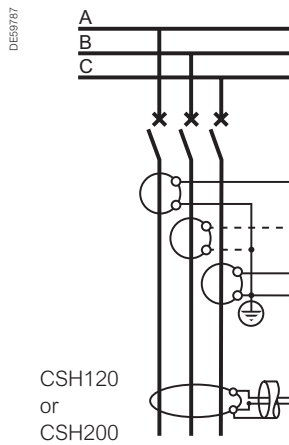
The Sepam series 10 needs an auxiliary power supply (not included in RM6). The Sepam series 10 of 24 or 48 Vdc can be supplied by T200 I with option dc/dc converter.

#### Simplicity and User-friendliness

- Easy operation: Human-Machine Interface with screen, keys and pictograms. Parameter setting directly on the relay without need of computer.
- Operating languages: English, Spanish, French, Italian, German, Turkish and Portuguese.

#### Characteristics

- 4 logic inputs
- 7 relay outputs
- 1 communication port.



Functions		ANSI code	Sepam series 10	
			B	A
<b>Protections</b>				
Earth-fault protection	Standard	50N/51N	<input type="checkbox"/>	<input type="checkbox"/>
	High sensitivity		<input type="checkbox"/>	<input type="checkbox"/>
Phase-overcurrent protection		50/51	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Thermal overload protection		49RMS	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Phase-overcurrent and earth fault protection cold load pick-up			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Logic discrimination	Blocking send	68	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Blocking reception			<input checked="" type="checkbox"/>
External tripping				<input checked="" type="checkbox"/>
<b>Measurements</b>				
Earth-fault current			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Phase currents			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Peak demand currents			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>Control and supervision</b>				
Circuit breaker tripping and lockout		86	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Tripping indication			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Trip-circuit supervision				<input checked="" type="checkbox"/>
Remote circuit-breaker control				<input checked="" type="checkbox"/>
Record of last fault			<input checked="" type="checkbox"/>	
Record of last five events				<input checked="" type="checkbox"/>
<b>Communication</b>				
Modbus				<input checked="" type="checkbox"/>
IEC 60870-5-103				<input checked="" type="checkbox"/>
<b>Inputs / Outputs (Number)</b>				
Earth-fault current inputs			1	1
Phase-current inputs			2 or 3	3
Logic relay outputs			3	7
Logic inputs			-	4
RS 485 communication port			-	1

■ Function available.

□ Function availability depends on the Sepam model.

The specifically designed CSH120 and CSH200 core balance CTs are used for direct residual current measurement.

The only difference between them is the diameter.

Due to their low voltage insulation, they may be used only on cables with earthed shielding.

### Characteristics

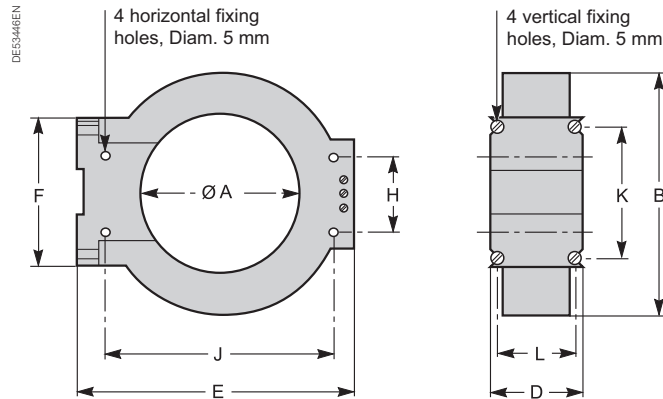
	CSH120	CSH200
Inner diameter	120 mm (4.7 in)	200 mm (7.9 in)
Weight	0.6 kg (1.32 lb)	1.4 kg (3.09 lb)
Accuracy	±5% to 20 °C (68 °F)	
	±6 % max. from -25°C to 70°C (-13°F to +158°F)	
Transformation ratio	1/470	
Maximum permissible current	20 kA - 1 s	
Operating temperature	-25°C to +70°C (-13°F to +158°F)	
Storage temperature	-40°C to +85°C (-40°F to +185°F)	

PE50032



Core balance CTs CSH120 and CSH200

### Dimensions



Dimensions		A	B	D	E	F	H	J	K	L
CSH120	mm	120	164	44	190	76	40	166	62	35
	in	4.72	6.46	1.73	7.48	2.99	1.57	6.54	2.44	1.38
CSH200	mm	200	256	46	274	120	60	257	104	37
	in	7.87	10.1	1.81	10.8	4.72	2.36	10.1	4.09	1.46



### Characteristics

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 (manufacturer).

Type of fuse may be installed:

- 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, Fusarc CF fuses with a rating of 50 A are chosen.

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

### Fuse replacement

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

### Selection table

(Rating in A, no overload,  $-25^{\circ}\text{C} < \theta < 40^{\circ}\text{C}$ )

Fuse type Fusarc CF and SIBA <sup>(1)</sup> (General case, IEC 60282-1 standard, IEC 62271-105 (to replace IEC 60420) and DIN 43625 standard)

Operating voltage (kV)	Transformer rating (kVA)															Rated voltage (kV)		
	50	75	100	125	160	200	250	315	400	500	630	800	1000	1250	1600		2000	
3	20	31.5	40	50	50	63	80	100	125 (2)	160 (1) (2)						12		
3.3	20	25	40	40	40	63	80	80	125 (2)	125 (2)	160 (1) (2)							
4.2	20	25	25	40	50	50	63.5	80	80	100	125 (2)	160 (1) (2)						
5.5	16	20	25	25	40	40	50	63	80	80	100	125 (2)	160 (1) (2)					
6	16	20	25	25	31.5	40	50	50	63	80	100	125 (2)	160 (1) (2)					
6.6	10	20	25	25	31.5	40	50	50	63	63	80	100	125 (2)	160 (1) (2)				
10	10	10	16	20	25	25	31.5	40	50	50	63	80	100	125 (2)				
11	10	10	16	20	20	25	25	40	40	50	50	63	80	100	125 (2)			
13.8	10	10	10	16	16	20	25	31.5	40	40	50	50	63	100 (2)			24	
15	10	10	10	10	16	20	25	31.5	31.5	40	50	50	63	80	100 (2)			
20	10	10	10	10	16	16	20	25	25	31.5	40	40	63	63	80	100 (2)		
22	10	10	10	10	10	16	16	20	25	31.5	40	40	50	63	80	100 (2)		

(1) SIBA type fuses at 160 A/12 kV reference 30-020-13.

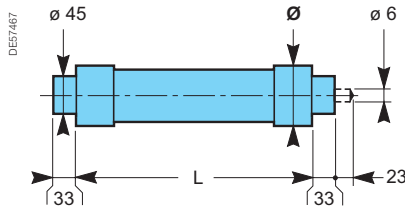
(2) In the case of an external trip system (e.g.: overcurrent relay)

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.

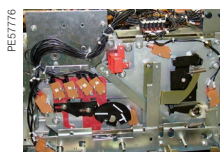
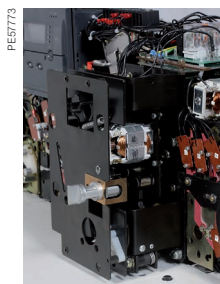
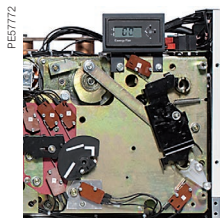
### Fuses dimensions

Fusarc CF		Ur (kV)	Ir (A)	L (mm)	Ø (mm)	Mass (kg)
	12	10 to 25	292	50.5	1.2	
		31.5 to 40	292	55	1.8	
		50 to 100	292	76	3.2	
		125	442	86	5	
24	10 to 25	442	50.5	1.7		
	31.5 to 40	442	55	2.6		
	50 to 80	442	76	4.5		
	100	442	86	5.7		

# Motorization

## Switch, circuit breaker and fuse-switch combination

### 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 and fuse-switch combination operating mechanism

- Circuit breaker or fuse protection functions can be motorized. Functional units of circuit breaker or fuse-switch protection can be equipped. The motorization 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. This functionality is an option for circuit breaker and is by default for fuse-switch function. 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.

### Unit applications

Operating mechanism types	CIT		CI1		CI1	
	Switch		Circuit breaker		Fuse switch combination	
Main circuit switch	Closing	Opening	Closing	Opening	Closing	Opening
Manual operating mode	Hand lever	Hand lever	Hand lever	Push button	Hand lever	Push button
Remote control option	Motor	Motor	Motor	Coil	Motor	Coil
Operating time	1 to 2 s	1 to 2 s	max. 13 s	65 to 75 ms	11 to 13 s	60 to 85 ms
Earthing switch	Closing	Opening	Closing	Opening	Closing	Opening
Manual operating mode	Hand lever	Hand lever	Hand lever	Hand lever	Hand lever	Hand lever

#### Motor option for switch-units and circuit breakers

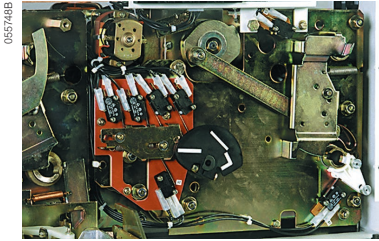
The operating mechanism I, D, B and Q functions may be motorized

		DCw					AC (50 Hz) *		
Un power supply	(V)**	24	48	60	110	125	220	120	230
Power	(W)	240							
	(VA)							280	

(\*) Please consult us for other frequencies.

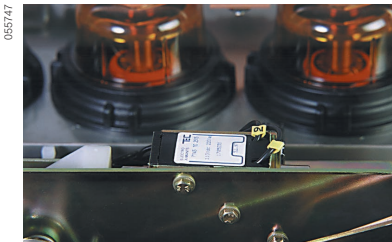
(\*\*) At least a 20 A power supply is necessary when starting the motor.

## Auxiliary contacts



- Each switch or circuit breaker can be fitted with 4 auxiliary contacts with the following positions: 2 NO and 2 NC.
- The earthing switch (except fuse-switch combination) can be fitted with 1 auxiliary contact with the following position: (opening/closing).
- Each circuit breaker can receive 1 auxiliary contact for tripping indication (protection by VIP).
- Each fuse-switch combination can be fitted with 1 blown fuse indication auxiliary contact.

## Opening release



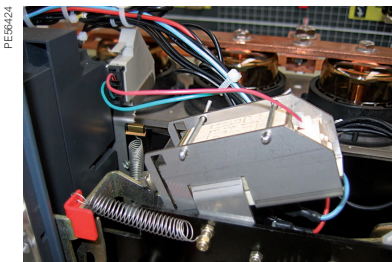
Each circuit breaker or fuse-switch combination can be fitted a switch-on opening release (shunt trip).

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

		DC						AC (50 Hz) *	
Un power supply	(V)	24	48	60	110	125	220	120	230
Power	(W)	200	250	250	300	300	300		
	(VA)							400	750
Response time	(ms)	35						35	

(\*) 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.

The time delay can be equipped with the undervoltage coil with the setting from 0.5 to 3 s.

		DC						AC (50 Hz) *		
Un power supply	(V)	24	48	60	110	125	220	120	230	
Power										
	Excitation (W or VA)	200 (during 200 ms)							200	
	Latched (W or VA)	4.5							4.5	
Threshold										
	Opening	0.35 to 0.7 Un						0.35 to 0.7		
	Closing	0.85 Un						0.85		

(\*) Please consult us for other frequencies

# Fault passage indicators

## Fault and load current with voltage detection combination

Enhance the power availability of your network thanks to Easergy Flair range of advanced Fault Passage Indicators.



Flair 21D



Flair 22D



Flair 23D



Flair 23DM



Amp21D

### Fault current indicators

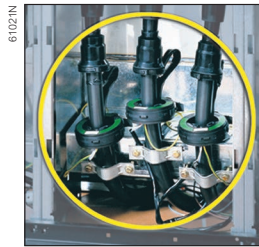
Easergy Flair (21D - 22D - 23D - 23DM) range of fault passage indicators has been improved to provide indicators in DIN format that are efficient, self-powered and self-adapting to the network to provide hassle-free installation. Flair indicators work with all types of neutral networks and benefit from LCD displays for high visibility of the information. Optional external outdoor indicating lamp.

#### Functions

- Indication of phase-phase and phase-earth faults
- Display of parameters & settings
- Display of the faulty phase
- Display of load current, maximum current for each phase, frequency and direction of flow of energy
- Fault passage indication with voltage detection & Modbus communication (Flair 23DM)

#### Easy and reliable to use

- Automatic setting on site
- Fault indication by LED, LCD and outdoor light indicator (optional)
- Battery life of 15 years (Flair 22D)
- Accurate Fault detection by validation of fault with voltage loss using VPIS-VO (except Flair 21D)
- Factory mounted or to be added on site
- On-site adaptation is facilitated by using split type current sensors to avoid disconnecting the MV cables.



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

### Voltage detection relay

#### Smart grid ready

Flair 23DM is a fault passage indicator with modbus communication and integrated voltage detection relay for all types of neutral networks.

- Combination fault passage indicator and voltage detector.
- Ideal for use with an Automatic Transfer of Source System.
- Needs a stabilised external DC power supply.
- Requires the VPIS-VO option to acquire the image of the mains voltage.

### Load current indicator

The ammeter Amp21D of Easergy range is dedicated to Medium Voltage network load monitoring.

#### Functions

- Display of 3 phase current: I1, I2, I3
- Display of the maximum current: I1, I2, I3.

#### Easy and reliable to use

- Automatic setting on site
- Possible to be mounted on RM6 in factory or to be added on site
- Adaptation on site can be facilitated by using the current sensor of split type, without removing MV cables.

# Fault passage indicators

## Fault and load current with voltage detection combination

### Characteristics

		Flair 21D	Flair 22D & 23D	Flair 23DM
Frequency (auto-detection)		50 Hz and 60 Hz	50 Hz and 60 Hz	50 Hz and 60 Hz
Operating voltage		Un: 3 to 36 kV - Vn: 1,7 to 24 kV	Un: 3 to 36 kV - Vn: 1,7 to 24 kV	Un: 3 to 36 kV - Vn: 1,7 to 24 kV
Neutral	Phase-to-phase fault	All systems	All systems	All systems
	Phase-to-earth fault	Impedance-earthed, directly earthed	Impedance-earthed, directly compensated, isolated Flair 22D: (type B), Flair 23D, type (B,C) <sup>(3)</sup>	
<b>Measurements</b>				
Load	Minimum current	> 2 A	> 2 A	> 2 A
Current (A) (resolution 1 A)	For each phase Accuracy: ± (2% + 2 digits)	Ammeter Maximeter	Ammeter Maximeter	OFF or AUTO or 100 to 800 A (50A increments)
Voltage (% of rated voltage)	With VPIS-VO option Accuracy: ±1%			Phase-to-neutral or phase-to-phase voltage
<b>Fault detection</b>				
Threshold configuration		Via microswitches	Via front panel buttons	Via front panel buttons
Overcurrent fault Accuracy ±10%	Auto-calibration	Yes	Yes	Yes
	Thresholds	AUTO or 200, 400, 600, 800 A	OFF or AUTO or 100 to 800 A (50 A increments)	OFF or AUTO or 100 to 800 A (50 A increments)
Earth fault With 3 phase CTs Accuracy ±10%	Auto-calibration	Yes	Yes	Yes
	Algorithm	$\sum 3I + di / dt$	$\sum 3I + di / dt$	$\sum 3I + di / dt$
	Thresholds	OFF or AUTO or 40, 60, 80, 100, 120, 160 A	OFF or 5 <sup>(2)</sup> to 30 A (5 A increments) and 30 to 200 A (10 A increments)	
Earth fault With zero sequence CT Accuracy ±10% or ±1 A	Auto-calibration	-	No	No
	Thresholds	-	OFF or AUTO <sup>(4)</sup> or 5 to 30 A (5 A increments) and from 30 to 200 A (10 A increments) <sup>(1)</sup>	
Fault acknowledge time delay		60 ms		
Fault confirmation time delay		70 s	3 s, 70 s or OFF	
Inrush	Time delay		3 s, 70 s or OFF	
Reset	Automatic	Upon current return 2 A (70 s or OFF)	Upon current return 2 A (3 s, 70 s or OFF)	
	Manual via front panel	Yes	Yes	Yes
	External contact	Yes	Yes	Yes
	Deferred	4 h	1, 2, 3, 4, 8, 12, 16, 20, 24 h. Factory setting = 4 h	
Indications	LED	Yes	Yes	Yes
	External contact	Yes	Yes	Yes
	External indicator lamp	Yes (with battery)	Yes (without battery)	Yes (without battery)
	Phase indication	Yes	Yes	Yes
<b>Communication</b>				
RS485 2-wire, connector with LEDs		No	No	Yes
Speed: auto-detection 9600, 19200, 38400 bits/s - Class A05				
Accessible data: Phase and earth faults; Fault passage counters including transient faults; Current measurements (I1, I2, I3, I0), max. current, voltage (U, V, residual); Resetting of fault indication, counters and max. values; Fault and voltage presence/absence detection parameters; Communication parameters; Time synchronisation and time-tagged events				
<b>Power supply</b>				
Self-powering	On measuring CTs	Yes (I load > 3 A)	Yes	Yes
Battery (Service life: 15 years)		No	Lithium (Flair 22D), No (Flair 23D)	No
External power supply		No	No (Flair22D), 24 to 48 Vcc (Conso mac: 50 mA) (Flair 23D)	24 to 48 Vdc (conso mac: 50 mA)
<b>Display</b>				
Display		4-digits LCD	4-digits LCD	4-digits LCD
Fault		Red LED	Red LED	Red LED
Phase at fault		Yes	Yes	Yes
Setting		Yes (CT type)	Yes	Yes
<b>Sensors</b>				
Phase CT		3 phase CTs	2 or 3 phase CTs	2 or 3 phase CTs
Zero sequence CT		No	Diameter: 170 mm	Diameter: 170 mm
<b>Test mode</b>				
By button on front panel		Product name - Software version Network frequency - Residual current - Digits test	Product name - Software version - Network frequency - Residual current - VPIS presence - Direction of energy - Digits test	

(1) The minimum threshold 5 A can only be reached with the earth CT ref CTRH2200.

(2) 20 A minimum for resistive neutral type, 5A minimum for isolated or compensated neutral type

(3) Type C mounting is not available on compensated neutral

(4) only with isolated and compensated neutra



VPIS

### Voltage presence indicators

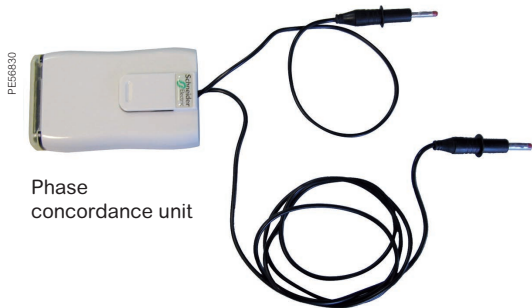
A voltage presence indicating device can be integrated in all the functional units, either on the cable or busbar side. It can be used to check whether or not a voltage is present across the cables.

Two devices are available:

- VPIS: Voltage Presence Indicator System, as defined by standard IEC 62271-206  
The VPIS can be fitted with a voltage output (VPIS-VO) dedicated to various voltage detection applications such as automatic transfer switches, voltage absence or presence contacts, live-cable earthing switch lockout, etc.
- VDS: Voltage Detecting System, as defined by standard IEC 61243-5.

### Voltage sensors

A voltage sensor is integrated in all the functional units. It provides a signal with an accuracy of 5% to the VPIS through a 30 pF capacitive divider. The sensor is integrated in the tightening cap used to fix the busbar or cable connections. The voltage can be detected either on the cable side or the busbar side.



Phase concordance unit

### Phase concordance unit

This unit is used to check phase concordance.

### VD23 voltage detection relay

VD23 is a compact voltage detection relay for MV networks voltage from 3 kV to 36 kV, 50/60 Hz, efficient and self-adapted.

- VD23 detects a presence and absence of voltage, and activates 2 relays:
  - R1 = Presence of voltage
  - R2 = Absence of voltage.
- The 2 functions are running simultaneously
- Both relay outputs are separate and can therefore work independently (e.g. voltage absence for automatic transfer function, voltage presence indication for interlocking on earthing switch, etc).
- Combination of the function allows specific applications.

VD23 is fitted to a VPIS-VO adapted for the voltage measurement. The VPIS-VO, is linked to the capacitor connected to the MV busbar, and delivers a voltage signal on a specific connector.



VD23

### New LPVT options

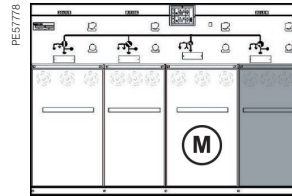
RM6 can now be specified with compact high accuracy Low Power Voltage Transformers (LPVT). These innovative sensors are ideal for the new generation of electronic protection devices and are the only way to measure energy in secondary MV loops.

- Up to Class 0.5 accuracy levels for metering
- Linear wide spectrum voltage range with no ferro resonance characteristics.
- Low power consumption and reduced size - ideal for new or retrofit solutions
- Excellent harmonic performance for Power Quality monitoring
- Increased quality and safety under over-voltage, open circuit, or short circuit conditions
- Easy to install, operate and test - no need to disconnect for cable testing 42kV / 15min
- Comply to international standard : IEC 60044-7

3 types of operating handle (standard, long and super long) are proposed in RM6 offer for different combinations of cubicles.

## The longer operating handle is necessary:

- For RM6 of with 2, 3, 4 or 5 functions, when circuit breaker is motorized and is on the left side of switch function



(M) Means that the circuit breaker function is motorized

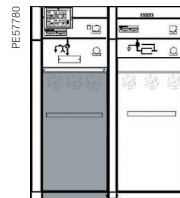
- For RM6 of 1 function extensible, when circuit breaker is motorized and is on the left side of a fuse-switch function



(M) Means that the circuit breaker function is motorized

## The super long operating handle is necessary:

- For RM6 of 1 function extensible, when circuit breaker is manual and is on the left side of a fuse-switch function



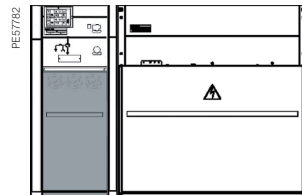
Functional unit marked in orange needs longer or super long handle to be operated.

- For RM6 of 1 function extensible, when two fuse-switch functions are connected



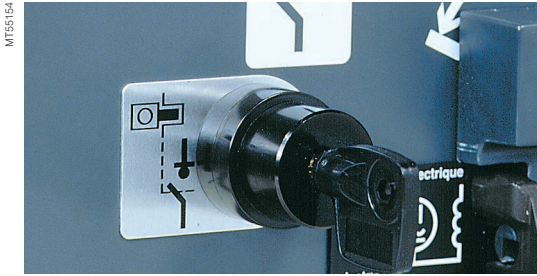
Functional units marked in orange needs longer or super long handle to be operated.

- For DE-Q, DE-D, DE-B, DE-Bc, when the metering cubicle DE-Mt is on its right side



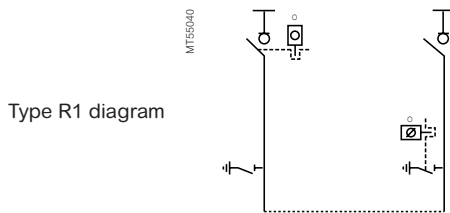
Functional unit marked in orange needs longer or super long handle to be operated.

For all other possible cubicle combinations, the standard operating handle is enough to operate the RM6 switchgears.



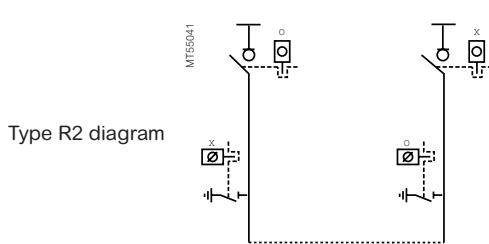
As an additional safety feature, RM6 can be fitted with keys to lock operations. For instance the remote control of RM6 can be disabled when the switchgear is locked in the "open" position. Keys and locks are engraved with specific markings (O, S and X) to help with the understanding of the diagrams.

## On network switches or 630 A circuit breaker feeder



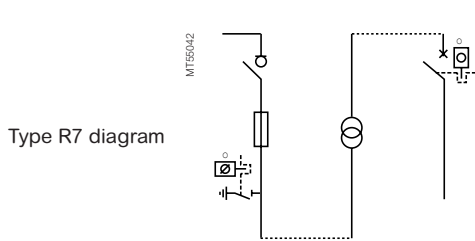
Semi-crossed locking

- Prohibits the closing of the earthing switch of the downstream switchgear unless the upstream switchgear is locked in the "open" position



Crossed locking

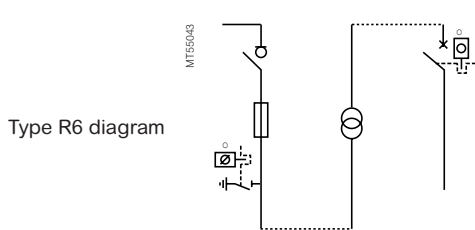
- Prohibits closing of the earthing switches unless the upstream and downstream switchgear is locked in the "open" position.



## On transformer feeders

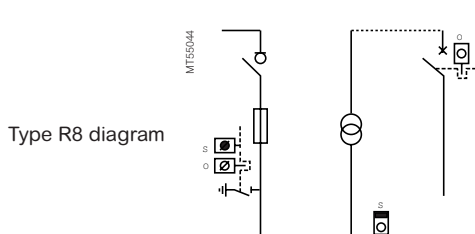
RM6/transformer

- Prohibits access to the transformer unless the earthing switch has been locked in the "closed" position.



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.

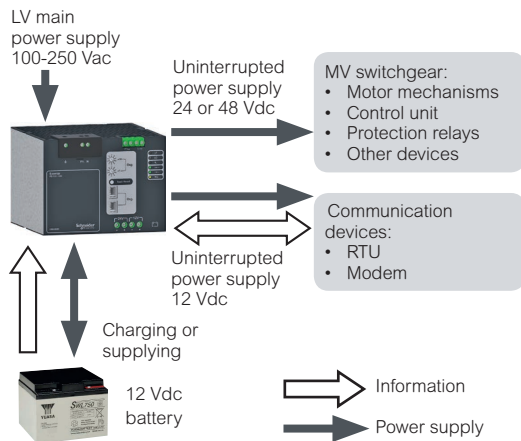


RM6/transformer/low voltage

- 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".

: no key      : free key      : captive key





## PS100 high-availability power supply

The PS100 is associated with a backup battery, ensuring the uninterrupted power supply up to 48 hours in the event of micro outages and power interruptions. The battery is a standard sealed lead-acid 12 Vdc battery with a 10-year service that can be purchased easily anywhere in the world. The backup solution with PS100 allows an easy maintenance with only one battery and withstands harsh substation environments.

### The PS100 backup power supply unit:

Reserves an "additional energy backup" to restart the installation after an extended power interruption

- Includes a regulated and temperature-compensated charger
- Stops the battery before deep discharge
- Carries out a battery check every 12 hours
- Measures battery ageing
- Forwards monitoring information via a modbus communication port and output relays, which allows the preventive battery replacement before the end of its life.

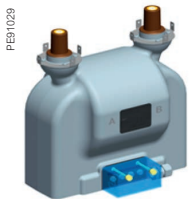
## VRT7 screened voltage transformer for auxiliary power supply

A phase-to-phase screened voltage transformer.

- Compact dimensions and screened design for easy installation; insensitivity to harsh environments.
- Designed to withstand power frequency tests (no need for disconnection during commissioning)
- Power: 300 VA continuous, 500 VA for 1 mn.

Voltages* (kV)	7.2 - 20 - 60	7.2 - 32 - 60	12 - 28 - 75	12 - 42 - 75	24 - 50 - 125
Primary (kV)	6 & 6.6	6	10 - 11	10	13.8 - 15
Secondary (V)	230				
Power and accuracy class	30 VA cl. 3				

\* Rated Voltage -Rated power-frequency withstand voltage kVms- Rated lightning impulse withstand voltage kV peak



VRT7 screened voltage transformer

## Metering in harsh environment

**The VRT4 is a phase-to-earth screened voltage transformer, placed behind the cables.**

Totally insensitive to harsh atmosphere effects, it does not require any fuse protection. A flexible connection to the front T-type cable plugs can be easily disconnected for commissioning tests.

Standard	IEC 61869-3								
Voltage (kV)	7.2 - 20 - 60	7.2 - 32 - 60	12 - 28 - 75	12 - 42 - 75	17.5 - 38 - 95				
Primary (kV)	6/√3	6.6/√3	6/√3	10/√3	11/√3	10/√3	13.8/√3	15/√3	
1 <sup>st</sup> secondary (V)	100/√3	110/√3	100/√3	100/√3	110/√3	100/√3	110/√3	100/√3	
Rated output and accuracy class	10 VA cl 0.2								
2 <sup>nd</sup> secondary (V)	100/3	110/3	100/3	100/3	110/3	100/3	110/3	100/3	
Rated output and accuracy class	30 VA 3P								

**The ARC5 is a ring-type current transformer used in core unit.**

- Compact dimensions for easy installation.
- Cost-effective compared to standard MV block CTs.

Rated & Insulation voltage (kV)	0.72/3			
Thermal withstand	25kA x 2s			
Transformation ratio	100/5	200/5	400/5	600/5
Rated output with class 0,2S Fs ≤ 5 (VA)	5			



VRT4 screened voltage transformer



ARC5 ring current transformer

## Options for cable compartment

### Standard equipment:

- A closing panel
- Cable binding
- Connection of cable earthing.

### Optional equipment:

- Panel with window to display liquid type overcurrent indicators installed around the cables
- Deeper cable compartment to allow the addition of a lightning arrester
- ESw interlocking to prohibit access to the connection compartment when the earthing switch is open
- LBSw or CB interlocking to prohibit closing of the switch or circuit breaker when the connection compartment panel is open
- Internal arc withstand for the cable compartment up to 20 kA 1s.



Function type		I	B	D	Q	O	Ic	Bc	DE-Mt
Motorization for remote operation	Motorization including auxiliary contacts (LSBw 2 NO-2 NC and ESsw 1 O/C)	■					■		(2)
	Motorization including shunt trip coil and auxiliary contacts circuit breaker (CB 2 NO – 2 NC and ESsw 1 O/C)		■	■				■	(2)
	Motorization including auxiliary contact fuse-switch combinations (LBSw 2 NO – 2 NC)				■				(2)
Auxiliary contacts alone (this option is included in remote operation option)	For main switch position indication, LSBw 2 NO – 2 NC and ESsw 1 O/C	■					■		(2)
	For circuit breaker position indication, CB 2 NO – 2 NC and ESsw 1 O/C		■	■				■	(2)
	For fuse-switch combinations position indication, LBSw 2 NO – 2 NC				■				(2)
Front door of cable connection compartment	Bolted - Removable with ESsw interlocking - Removable with ESsw interlocking and LSBw interlocking	■	■	■			■	■	(2)
Self-powered fault passage and load current indicators	Flair 21D - Flair 22D - Flair 23D - Flair 23DM - Amp 21D	■							(2)
Key locking devices	Type R1 - Type R2	■	■				■		(2)
	Type R6 - Type R7 - Type R8			■	■			■	(2)
Shunt trip coil for external tripping	24 VDC - 48/60 VDC - 120 VAC - 110/125 VDC – 220 VAC - 220 VDC / 380 VAC		■	■	■			■	(2)
Undervoltage coil	24 VDC - 48 VDC - 125 VDC - 110-230 VAC		■	■	■			■	(2)
Protection relay for CB transformer protection	VIP 40			■					(2)
	VIP 45			■					(2)
	VIP 400		■	■				■	(2)
	VIP 410		■	■				■	(2)
	Sepam series 10		■ (1)	■				■	(2)
Voltage detection	VPIS	■	■	■	■	■	■	■	(2)
	VDS	■	■	■	■	■	■	■	(2)
Forbidden closing under fault 1NC			■	■				■	(2)
Auxiliary contact D or B tripping			■	■				■	(2)
Auxiliary contact for fuse blown					■				(2)
With or without earthing switch							■	■	(2)
Arc Killer : RM6 arc short-circuiting device (3)		■							(2)
Screened Voltage Transformers (phase-to-phase or phase-to-earth)		■							(2)

(1) In case of such relays, ring-core CTs are mandatory

(2) See specific page for DE-Mt

(3) Available for Non Extensible cubicle or not on a side of extension, because arc killer block is not compatible with the extension bushing

# Network automation

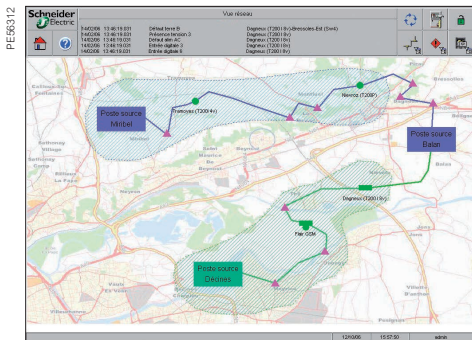
<b>Architecture and Easergy L500</b>	<b>52</b>
<b>Easergy Remote Terminal Units</b>	<b>53</b>
<b>Automatic transfer systems</b>	<b>54</b>

# Architecture and Easergy L500

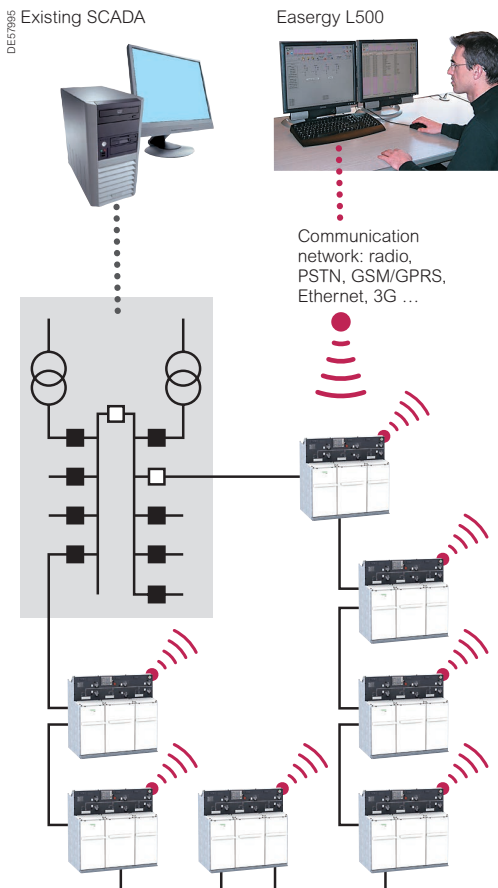
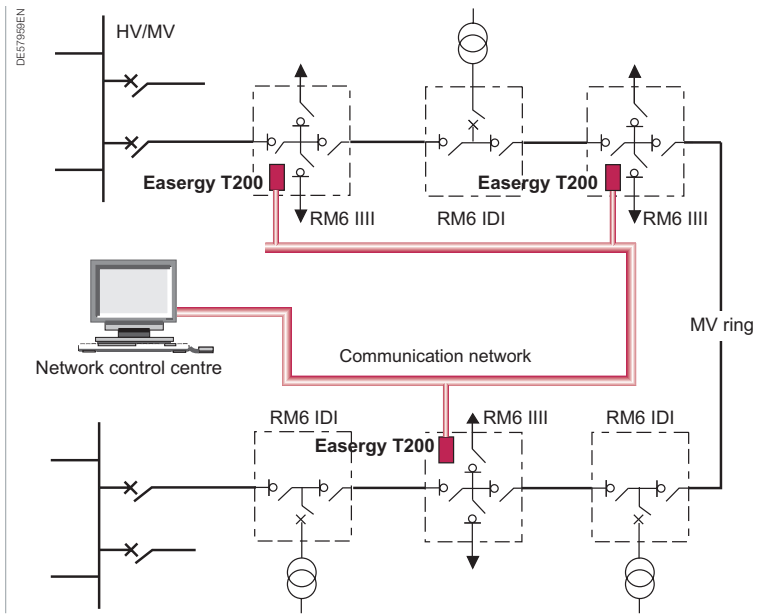
## Continuity of service guaranteed by an overall telecontrol offer

Schneider Electric offers you a complete solution, including:

- the Easergy T200 I telecontrol interface
- MV switchgear that is adapted for telecontrol.



L500 network monitor screen



## Easergy L500, a low cost solution to immediately improve your SAIDI (System Average Interruption Duration Index)

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

- Pre-configured with Easergy range products for monitoring and control of MV networks:
  - MV/LV substations equipped with T200 I or Flair 200C
  - Overhead LBS equipped with T200 P
  - Overhead line equipped with Flite 116/G200
  - Overhead CB equipped with ADV C ACR U and N series
- Broad range of transmission supports: Radio, GSM, GPRS, 3G, PSTN, LL, FO.

### Advantages

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

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



PE56311

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).

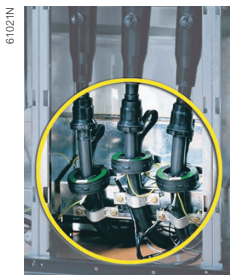


PE57775

CT on bushings

## 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) or of closed type mounted on RM6 bushings.
  - Works with 24 Vdc and 48 Vdc motor units.

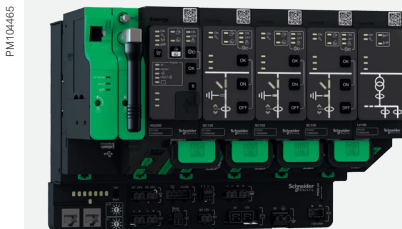


61021N

Split sensors

Please consult the Easergy T200 I documentation for any further information.

## Easergy T300: newest generation of remote terminal unit



PM104465

Easergy T300

- Modular architecture with very small footprint, power supply back-up and up to 24 RM6 functions and 3 transformers management.
- Powerful communication with Standard and secure protocol, open P2P communication for decentralized automation, easy to upgrade on site.
- Advanced MV and LV network control with directional fault detection for distributed generation networks, MV & LV power measurement (IEC 61557-12), power quality measurement (IEC 61000-4-30 Class S), MV voltage monitoring (VPIS, VDS, LPVT, VT), PLC framework IEC61131-3 for automation design, MV broken conductor detection...
- Cyber Security inside with compliancy to latest cyber regulations (IEEE P1686, IEC62351), secure communication protocol and secure local WiFi access.
- Latest user interface technology with web server compatibility with PC, smartphone and digital tablet.

# Automatic transfer system

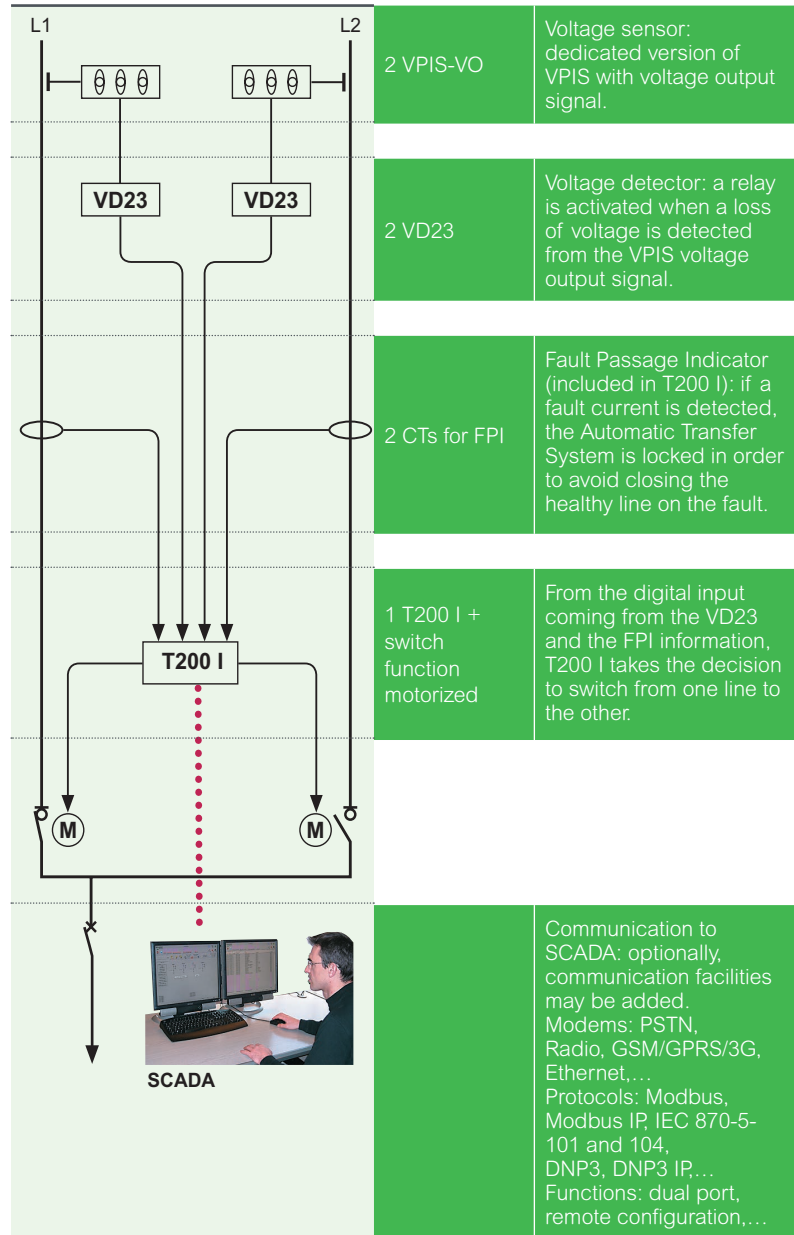
Because a MV power supply interruption is unacceptable especially in critical applications, an automatic system is required for MV source transfer.



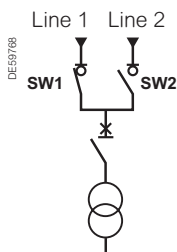
For your peace of mind, RM6 gives automatic control and management of power sources in your Medium Voltage secondary distribution network with a short transfer time (less than 10 seconds), guaranteeing the hi-reliability of your installation.

Automatic control is performed by Easergy T200 I. This T200 I device can also be used for remote control with a wide range of modems and protocols. By default, the T200 I is provided with the RS232 modem and the Modbus/IP protocol.

An ATS solution is made of:







## Network ATS (1/2): changeover between 2 MV network sources.

### 3 operating modes (selected from the T200 I Web server)

#### 1 - Auto SW1 or Auto SW2 mode

In the event of a voltage loss on the distribution line in service (SW1), the ATS changes over to the backup line (SW2) after a configurable time delay (T1).  
[opening of SW1, closing of SW2]

As soon as voltage returns on the main line (SW1), the ATS changes back to the main line after a time delay (T2).

[opening of SW2, closing of SW1 if the paralleling option is not activated]  
[closing of SW1, opening of SW2 if the paralleling option is activated]

#### 2 - Semi-Auto SW1XVSW2

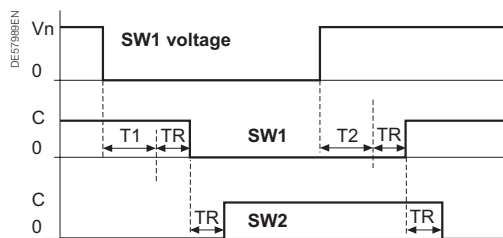
In the event of a voltage loss on the distribution line in service (SW1), the ATS changes over to the backup line (SW2) after a configurable time delay (T1).  
[opening of SW1, closing of SW2]

The ATS does not change back to the main line, except in the event of a voltage loss on the backup line [opening of SW2, closing of SW1]

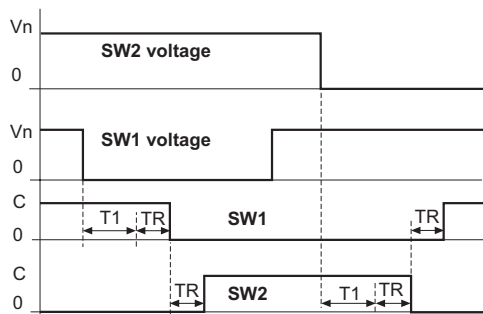
#### 3 - Semi-Auto SW1VSW2 or Semi-Auto SW2VSW1

In the event of a voltage loss on the distribution line in service (SW1), the ATS changes over to the backup line (SW2) after an adjustable time delay (T1).  
[opening of SW1, closing of SW2]

The ATS maintains the backup line in service (SW2) irrespective of the voltage on the two lines.



**Network ATS - Auto Mode SW1**  
(with paralleling upon automatic return)

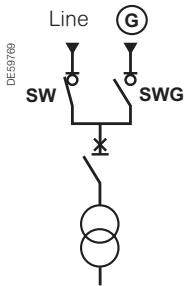


**Network ATS - Semi-Auto Mode**  
(without paralleling upon automatic return)

## Characteristics

TR: switch response time (< 2 s).

- Time delay before changeover (T1)  
Configurable from 0 s to 200 s in increments of 100 ms (factory setting = 1 s).  
This time delay is also used to delay return to the initial channel in Semi-Auto mode SW1XVSW2
- Time delay before return to the initial channel (T2) (Auto mode only)  
Configurable from 0 s to 30 min. in increments of 5 s (factory setting = 15 s).



## Generator ATS (1/2): changeover between a distribution system line and a generator.

### 3 operating modes

#### 1 - Auto SW mode

In the event of a voltage loss on the distribution line in service (SW), after a time delay T1, the ATS sends the opening command to SW and at the same time the Generator start-up order.

The remaining operation of the changeover sequence depends on the configuration of the "Generator channel closing" option:

- Case 1 "Generator channel closing after Generator power on": the Generator channel closing order is sent only when Generator voltage is detected.
- Case 2 "Generator channel closing after Generator start-up order": immediately after sending the Generator start-up order, the closing order is given to the Generator channel, without waiting until the Generator is actually started. [opening of SW, closing of SWG]

As soon as voltage returns on the main line (SW), after a time delay T2, the ATS changes back to the main line and the generator stoppage order is activated. [opening of SWG, closing of SW if the paralleling option is not activated] [closing of SW, opening of SWG if the paralleling option is activated]

#### 2 - Semi-Auto SWXSWG

The ATS does not change back to the main line, except in the event of a voltage loss on the generator due to generator stoppage or the opening of a switch upstream of the SWG channel.

#### 3 - Semi-Auto SWVSWG

In the event of a voltage loss on the distribution line in service (SW), after a time delay T1, the ATS sends the opening command to SW and at the same time the Generator start-up order.

The remaining operation of the changeover sequence depends on the configuration of the "Generator channel closing" option:

- Case 1 "Generator channel closing after Generator power on"
- Case 2 "Generator channel closing after Generator start-up order" [opening of SW, closing of SWG]

The ATS maintains the backup line in service (SWG) and there is no automatic return.

### Characteristics

TR: switch response time

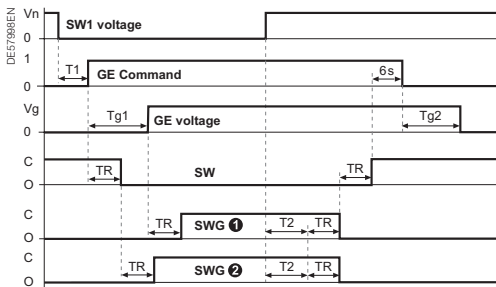
- Time delay before changeover (T1): configurable from 0 s to 200 s in increments of 100 ms (factory setting = 1 s).

This time delay is also used to delay return to the initial channel in Semi-Auto mode SWXVSWG

- Time delay before return to the initial channel (T2)
- (Auto mode only). Configurable from 0 s to 30 min. in increments of 5 s (factory setting = 15 s).

- Tg1: Generator start-up, depending on the generator type, not configurable (max. waiting time: 60 s). If Tg1 is greater than 60 s, changeover is suspended.
- Tg2: Generator stoppage, depending on the generator type, not configurable (max. waiting time: 30 s).

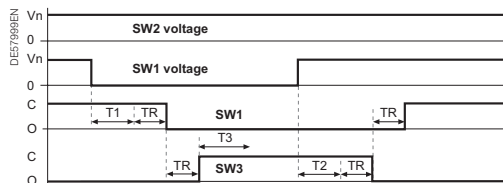
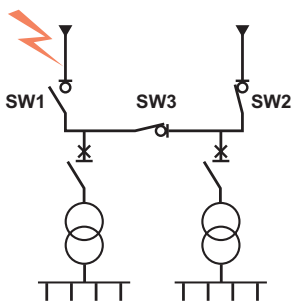
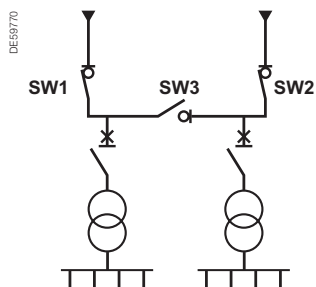
Note: the generator stoppage command is sent 6 s after the end of changeover



Generator ATS - Auto SW mode  
(without paralleling upon automatic return)

Case 1: Generator channel closing after Generator power on (configurable option)

Case 2: Generator channel closing after Generator start-up command (configurable option)



BTA - Standard mode  
(without paralleling upon automatic return)

## Bus tie coupling (2/3): source changeover between 2 incoming lines (SW1 and SW2) and a busbar coupling switch (SW3)

2 operating modes (selected from the Easergy T200 I configurator)

### 1 - Standard mode

In the event of a voltage loss on the distribution line in service (SW1), the ATS changes over to the backup line (SW2) after a configurable time delay (T1).

[opening of SW1, closing of SW3]

As soon as voltage returns on the main line (SW1), the ATS changes back to the main line after a time delay (T2).

[opening of SW3, closing of SW1 if the paralleling option is not activated]

[closing of SW1, opening of SW3 if the paralleling option is activated]

### 2 - Mode with locking upon voltage loss after changeover

In the event of a voltage loss on the distribution line in service (SW1), the ATS changes over to the backup line (SW2) after an adjustable time delay (T1).

[opening of SW1, closing of SW3].

Voltage presence is monitored during a configurable period T3. If the voltage disappears during this period, coupling switch SW3 is opened and the automatic transfer system is locked.

## Characteristics

TR: switch response time (< 2 s).

- Time delay before changeover (T1)  
Configurable from 100 ms to 60 s in increments of 100 ms (factory setting = 5 s).
- Time delay before return to the initial channel (T2)  
Configurable from 5 s to 300 s in increments of 1 s (factory setting = 10 s).
- Monitoring time (T3)  
Configurable from 100 ms to 3 s in increments of 100 ms (factory setting = 1 s).

### Changeover conditions

- Validation of the ATS (from the configurator)
- The ATS is in operation (local control panel or remote control)
- The external closing digital input is OFF
- The switch for the main line is closed and the backup line switch is open
- No fault detected on the line in service
- The earthing switch is open on both switches.

## Other functions

### ATS in ON/OFF mode

The ATS system can be switched on or off from the local control panel (T200 I) or remotely (Scada system).

When the ATS is OFF, the RM6 switches can be electrically actuated by local or remote control (operation in parallel mode is therefore possible).

### ATS in parallel mode upon Auto return

Activating this option enables paralleling of the channels by the automatic transfer system, during the phase of automatic return to the priority channel.

To be used when the ATS is in "Auto" mode.

Application: synchronization of the voltages of the main power supply line and the backup line allows return to the main line without any interruption.

### Generator ON override command

Activation of the ATS and transfer on Generator can be activated upon an order: remotely or through dedicated digital input.

Applications:

- Periodic maintenance tests of the ATS/Generator system
- Switch on Generator when the Network is overloaded.

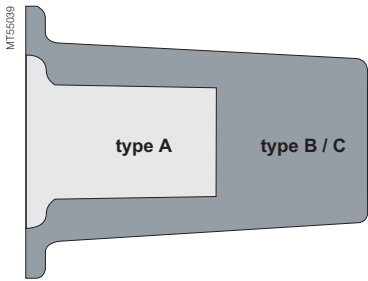
During peak hours, and if network is overloaded, Utility can send a remote order that will activate Generator. Having this facility, it will allow a private customer to negotiate better tariff of electricity.

# Cable connection

<b>Selecting bushings and connectors</b>	<b>60</b>
<b>Compatible cable connections</b>	<b>61</b>
<b>Other types of compatible connections</b>	<b>63</b>

# Selecting bushings and connectors

- 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.
- An insulated connector must be used in order to guarantee the dielectric performance over time. Schneider Electric recommends using nkt connectors.



Types of connection interface

## 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, 21 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 mm<sup>2</sup>
- 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.

## Type A bushing

Directed field plug-in connector  
Dry single-core cable

Performance	Connection	Supplier	Reference	Cross section	Remarks
7.2 to 10 kV 200 A -95 kV impulse	Plug-in	Elastimold	158LR	16 to 120	T-shaped elbow
		Elastimold	151SR	16 to 120	Straight, Q function only
		Prysmian	FMCE 250	16 to 95	
7.2 to 17.5 kV 200 A -95 kV impulse	Plug-in	nkt cables GmbH	EASW 12/250 A	25 to 95	Shaped elbow
		nkt cables GmbH	EASG 12/250 A	25 to 95	Straight
		Tycoelectronics	RSES-52xx	25 to 120	Shaped elbow
		Tycoelectronics	RSSS-52xx	25 to 95	Straight connection
7.2 to 24 kV 200 A -125 kV impulse	Plug-in	Elastimold	K158LR	16 to 95	T-shaped elbow
24 kV 200 A -125 kV impulse	Plug-in	nkt cables GmbH	EASW 20/250 A	25 to 95	Shaped elbow
		nkt cables GmbH	EASG 20/250 A	25 to 95	Straight
		Tycoelectronics	RSES-52xx	25 to 120	Shaped elbow
		Tycoelectronics	RSSS-52xx	25 to 95	Straight connection

## Type A/M8 bushing

Non-directed field disconnectable connector (\*)  
Dry single and 3-core cable

Performance	Connection	Supplier	Reference	Cross section	Remarks
7.2 to 17.5 kV 200 A -95 kV impulse	Heat shrinkable	Tycoelectronics	EPKT + EAKT + RSRB	16 to 150	
	Insulating boots	Kabeldon	KAP70	70 max.	

(\*) 520 mm plinth must be used

## Type B bushing

Directed field plug-in connector  
Dry single-core cable

Performance	Connection	Supplier	Reference	Cross section	Remarks
7.2 to 10 kV 400 A-95 kV impulse	Plug-in	Elastimold	400 LR	70 to 240	Limited to Us = 10 kV
7.2 to 17.5 kV 400 A-95 kV impulse	Plug-in	nkt cables GmbH	CE 12-400	25 to 300	
		Tycoelectronics	RSES-54xx	25 to 300	Shaped elbow
24 kV 400 A-125 kV impulse	Plug-in	Prysmian	FMCE 400	70 to 300	
		Elastimold	K400LR	35 to 240	
		Kabeldon	SOC 630	50 to 300	
		nkt cables GmbH	CE 24-400	25 to 300	
		Tycoelectronics	RSES-54xx	25 to 300	Shaped elbow

For cross section > 300 mm<sup>2</sup>, please consult us.

## Type C bushing

Directed field disconnectable connector  
Dry single-core cable

Performance	Connection	Supplier	Reference	Cross section	Remarks
7.2 to 10 kV 630 A-95 kV impulse	Disconnectable	Elastimold	440 TB	70 to 240	
7.2 to 17.5 kV 630 A-95 kV impulse	Disconnectable	nkt cables GmbH	CB 12-630	25 to 300	
		Tycoelectronics	RSTI-58xx	25 to 300	"T"-shaped connector
7.2 to 24 kV 630 A-125 kV impulse	Disconnectable	Prysmian	FMCTs 400	70 to 300	
		Elastimold	K400TB	35 to 240	
		Kabeldon	SOC 630	50 to 300	
24 kV 630 A-125 kV impulse	Disconnectable	nkt cables GmbH	CB 24-630	25 to 300	
		Tycoelectronics	RSTI-58xx	25 to 300	"T"-shaped connector

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

Performance	Connection	Supplier	Reference	Cross section	Remarks
7.2 to 10 kV 630 A -95 kV impulse	Heat shrinkable	Tycoelectronics	EPKT + EAKT + RSRB	16 to 300	
		Sigmaform	Q-CAP	16 to 300	
	Insulating boots	Kabeldon	SOC 630	50 to 300	Completed by a kit for three core-pole cable
	Simplified disconnectable	Tycoelectronics	RICS + EPKT	25 to 300	
Euromold		15TS-NSS	50 to 300	Limited to Us = 20 kV	
24 kV 630 A -125 kV impulse	Disconnectable	nkt cables GmbH	AB 12-630	25 to 300 (+ATS)	For 3-core cable
	Simplified disconnectable	Tycoelectronics	RICS + EPKT	25 to 300	

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

Performance	Connection	Supplier	Reference	Cross section	Remarks
7.2 to 17.5 kV 630 A-95 kV impulse	Insulating boots	Kabeldon	SOC	25 to 300	
	Simplified disconnectable	Tycoelectronics	RICS - EPKT	25 to 300	
	Heat shrinkable	Tycoelectronics	EPKT+EAKT+RSRB	95 to 300	
24 kV 630 A-125 kV impulse	Simplified disconnectable	Tycoelectronics	RICS - EPKT	25 to 300	

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

Performance	Connection	Supplier	Reference	Cross section	Remarks
7.2 to 17.5 kV 630 A-95 kV impulse	Insulating boots	Kabeldon	SOC 630	25 to 300	
	Simplified disconnectable	Tycoelectronics	RICS - EPKT	25 to 300	
	Heat shrinkable	Tycoelectronics	EPKT+EAKT+RSRB	16 to 300	
24 kV 630 A-125 kV impulse	Simplified disconnectable	Tycoelectronics	RICS - EPKT	25 to 300	

For cross section > 300 mm<sup>2</sup>, please consult us.



## Connectors with lightning arrestors

Disconnectable connector  
Single-core dry cable and lightning arrester

Performance	Connection	Supplier	Reference	Cross section	Remarks
7.2 to 17.5 kV 630 A-95 kV impulse	Disconnectable	nkt cables GmbH	AB 12-630 + ASA12 (5 or 10 kA)	25 to 300	Non-directed field
			CB 24-630 + CSA 24 (5 or 10 kA)	25 to 300	Directed field
24 kV 630 A-125 kV impulse	Disconnectable	nkt cables GmbH	AB 12-630 + ASA12 (5 or 10 kA)	25 to 300	Non-directed field
			CB 24-630 + CSA 24 (5 or 10 kA)	25 to 300	Directed field
7.2 to 17.5 kV 630 A-95 kV impulse	Disconnectable	Tycoelectronics	RICS+EPKT RDA 12 or 18	25 to 300	
		Elastimold	K400TB + K400RTPA + K156SA	35 to 300	Enlarged cable box
24 kV 630 A-125 kV impulse	Disconnectable	Tycoelectronics	RICS + EPKT RDA 24	25 to 300	Enlarged cable box
		Elastimold	K440TB + K400RTPA + K156SA	35 to 300	Enlarged cable box
		Tycoelectronics	RSTI-58 + RSTI-CC-58SAxx05	25 to 300	Directed field 5 kA arrester
		Tycoelectronics	RSTI-58 + RSTI-CC- 66SAxx10M16	25 to 300	Directed field 10 kA arrester

For cross section > 300 mm<sup>2</sup>, please consult us.

# Installation

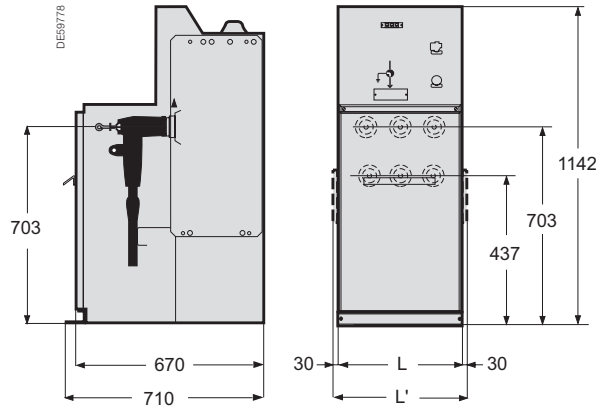
<b>Dimensions and installation conditions</b>	<b>66</b>
<b>Civil works</b>	<b>71</b>

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# Dimensions and installation conditions

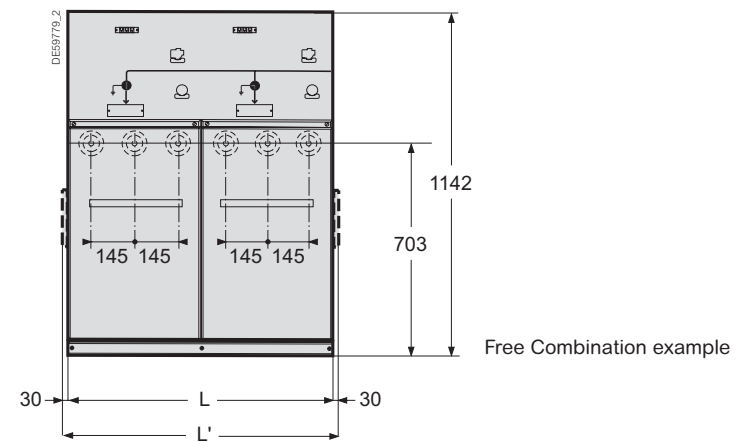
## 1 function modules

	Function	Weight (kg)	Length (mm)
Regular RM6			
NE	I	135	L = 572
	D		L = 572
	B		L = 572
DE	I	135	L' = 472 + 30 + 30 = 532
	D		L' = 572 + 30 + 30 = 632
	B		L' = 572 + 30 + 30 = 632
	Q		L' = 472 + 30 + 30 = 532
RE	O	135	L' = 472 + 30 = 502
LE			L' = 472 + 30 = 502
DE			L' = 472 + 30 + 30 = 532
DE	Ic	145	L' = 572 + 30 + 30 = 632
	Bc		L' = 572 + 30 + 30 = 632



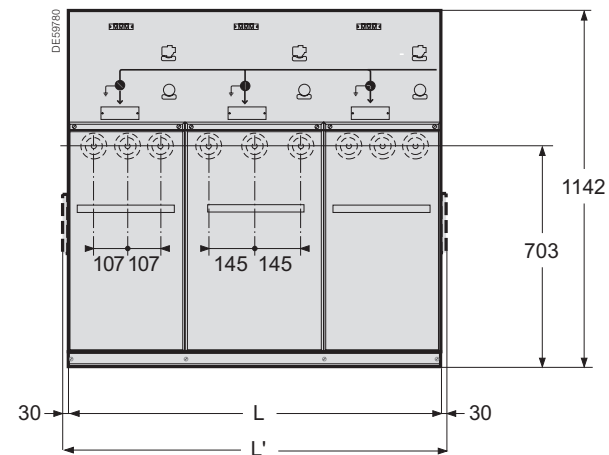
## 2 functions modules

	Function	Weight (kg)	Length (mm)
Regular RM6			
NE	QI	180	L = 829
	DI, BI		L = 829
	II		L = 829
RE	II	155	L' = 829 + 30 = 859
RM6 Free Combination			
NE			L = 1052
LE			L' = 1052 + 30 = 1082
RE			L' = 1052 + 30 = 1082
DE			L' = 1052 + 30 + 30 = 1112



## 3 functions modules

	Function	Weight (kg)	Length (mm)
Regular RM6			
NE	IQI	275	L = 1186
	III	240	L = 1186
	IDI		L = 1186
	IBI	250	L = 1186
RE	IQI	275	L' = 1186 + 30 = 1216
	III	240	L' = 1186 + 30 = 1216
	IDI		L' = 1186 + 30 = 1216
	IBI	250	L' = 1186 + 30 = 1216
DE	IQI	275	L' = 1186 + 30 + 30 = 1246
	III	240	L' = 1186 + 30 + 30 = 1246
	IDI		L' = 1186 + 30 + 30 = 1246
	IBI	250	L' = 1186 + 30 + 30 = 1246
RM6 Free Combination			
NE			L = 1532
LE			L' = 1532 + 30 = 1562
RE			L' = 1532 + 30 = 1562
DE			L' = 1532 + 30 + 30 = 1592
RM6 Free Combination with bus coupler			
RE			L' = 1532 + 30 = 1562
DE			L' = 1532 + 30 + 30 = 1592

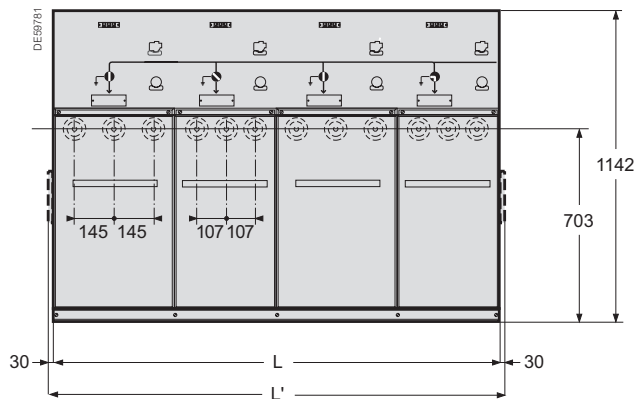


### Type of tank

- NE: non-extensible
- RE: extensible to the right
- LE: extensible to the left
- DE: extensible to the left and right

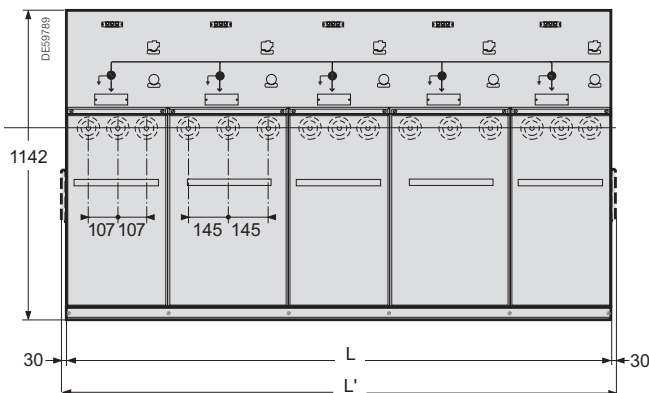
## 4 functions modules

	Function	Weight (kg)	Length (mm)
Regular RM6			
NE	IIQI	355	L = 1619
	IIII	320	L = 1619
	IIDI	330	L = 1619
	IIBI	330	L = 1619
	QIQI	390	L = 1619
	BIBI	340	L = 1619
RE	IIQI	355	L' = 1619 + 30 = 1649
	IIII	320	L' = 1619 + 30 = 1649
	IIDI	330	L' = 1619 + 30 = 1649
	IIBI	330	L' = 1619 + 30 = 1649
	QIQI	390	L' = 1619 + 30 = 1649
	DIDI	340	L' = 1619 + 30 = 1649
DE	IIQI	355	L' = 1619 + 30 + 30 = 1679
	IIII	320	L' = 1619 + 30 + 30 = 1679
	IIDI	330	L' = 1619 + 30 + 30 = 1679
	IIBI	330	L' = 1619 + 30 + 30 = 1679



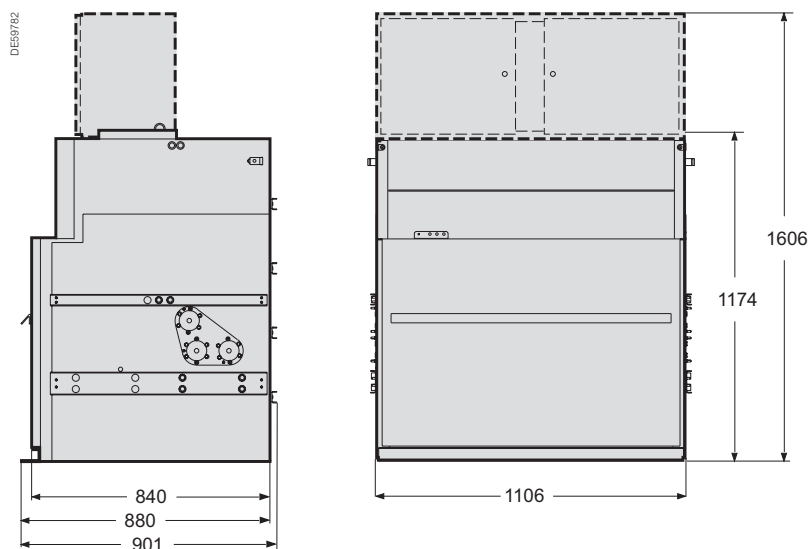
## 5 functions modules

	Function	Weight (kg)	Length (mm)
Regular RM6			
NE	IDIDI	470	L = 2000
	IQIQI	520	L = 2000
	IBIQI	495	L = 2000
RE	IDIDI	475	L' = 2000 + 30 = 2030
	IIIII	455	L' = 2000 + 30 = 2030
DE	IDIDI	480	L' = 2000 + 30 + 30 = 2060
	IIIIQI	495	L' = 2000 + 30 + 30 = 2060

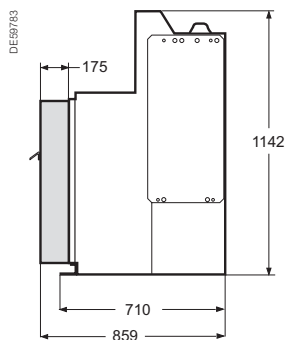


	Function	Weight (kg)	Length (mm)
RM6 metering cubicle with LV compartment			
DE	DE-Mt	420	L = 1106
RM6 metering cubicle without LV compartment			
DE	DE-Mt	400	L = 1106

## Metering cubicle

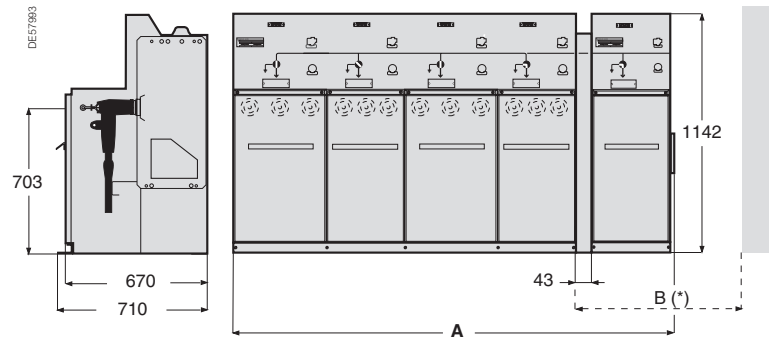


## Arrester option



# Dimensions and installation conditions

## Dimensions of RM6 REs with an extension module



(\*) B = 900 for 1 DE function  
 B = 1600 for 3 DE functions  
 B = 2000 for 4 DE functions

These dimensions can be reduced under special conditions, consult us.

Nb of RE units	DE single unit type	A Length (mm)
<b>RM6 standard functional units</b>		
2 units	Type 1	1374
	Type 2	1474
3 units	Type 1	1731
	Type 2	1831
4 units	Type 1	2164
	Type 2	2264
<b>RM6 Free Combination functional units</b>		
2 units	Type 1	1597
	Type 2	1697
3 units	Type 1	2077
	Type 2	2177

Type 1: DE-I, DE-Q, DE-O  
 Type 2: DE-B, DE-D, DE-IC, DE-BC

For reminder see the only one restriction of installation on standard range (see page 10). For standard range, as a rule, the installation is made from left to right by leaving of the heaviest station.

## Layout

Floor mounting

The RM6 is supported by 2 metal feet with holes for mounting:

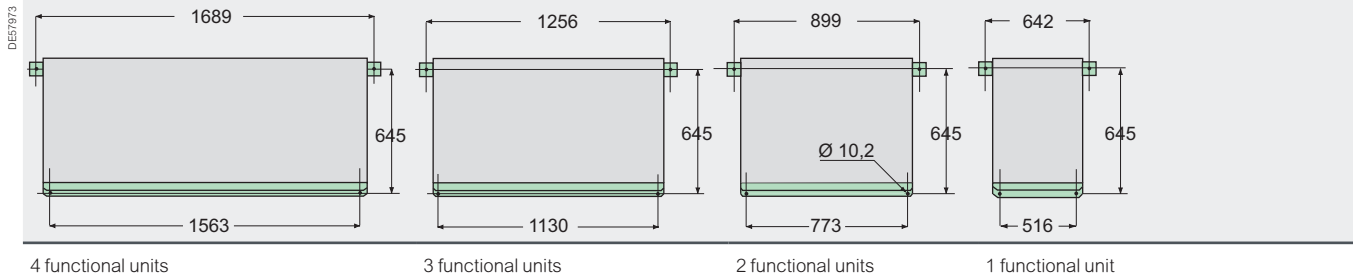
- on a flat floor fitted with trenches, passages or ducts
- on concrete footing
- on studs
- on metal rails etc.

Possibilities to add cubicle	1 <sup>st</sup> position	2 <sup>nd</sup> position	3 <sup>rd</sup> position	Last position
∅	RE-x	DE-x	DE-x	LE-x
RE-x*	DE-x	DE-x	LE-x	∅

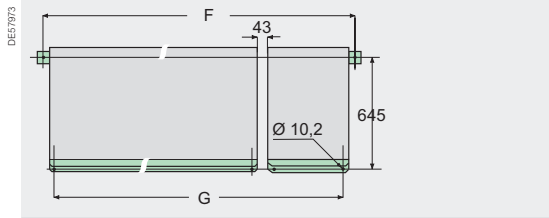
\* It is not possible to add RE-x if switchboard with a station DE is in first position

# Dimensions and installation conditions

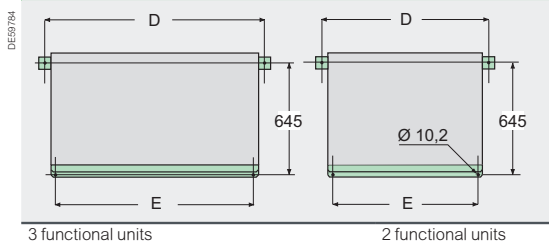
## Standard non-extensible RM6 (top view)



## Extensible RM6 (top view)



## RM6 Free Combination (top view)



Nb of RE units	DE single unit type	Length (mm)	
		F	G

### RM6 standard functional units

2 units	Type 1	1414	1288
	Type 2	1514	1388
3 units	Type 1	1771	1645
	Type 2	1871	1745
4 units	Type 1	2204	2078
	Type 2	2304	2178

### RM6 Free Combination functional units

2 units	Type 1	1637	1511
	Type 2	1737	1611
3 units	Type 1	2117	1991
	Type 2	2217	2091

Nb of units	Length (mm)	
	D	E

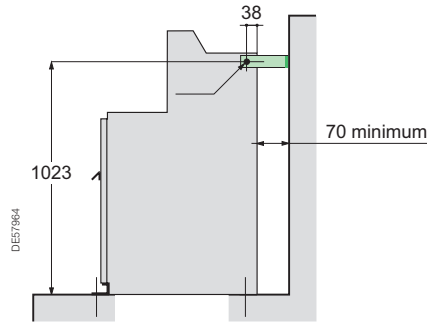
### RM6 Free Combination functional units

2 units	1122	996
3 units	1602	1476

# Dimensions and installation conditions

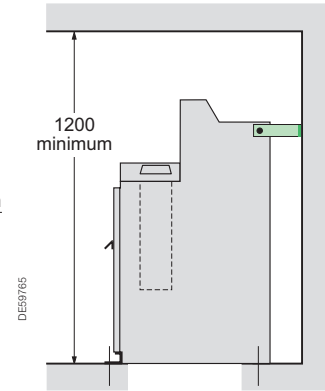
## Wall mounting

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



## Ceiling clearance

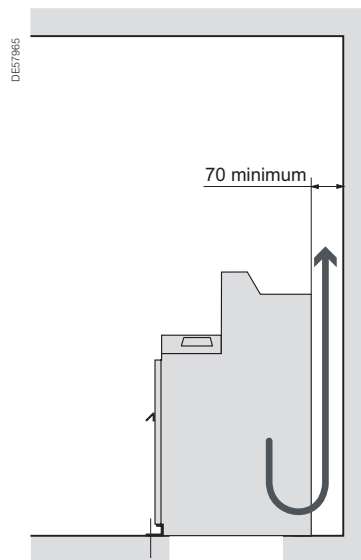
For substations with fuse-holders, provide a minimum ceiling clearance of 1200 mm.



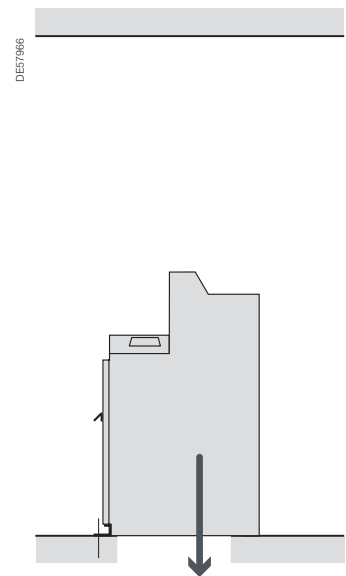
## Installation of the substation for internal arc withstand

When there is a requirement for installations with protection against internal arc faults, refer to the following diagrams.

### Gas removal to the rear



### Gas removal to the bottom



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.

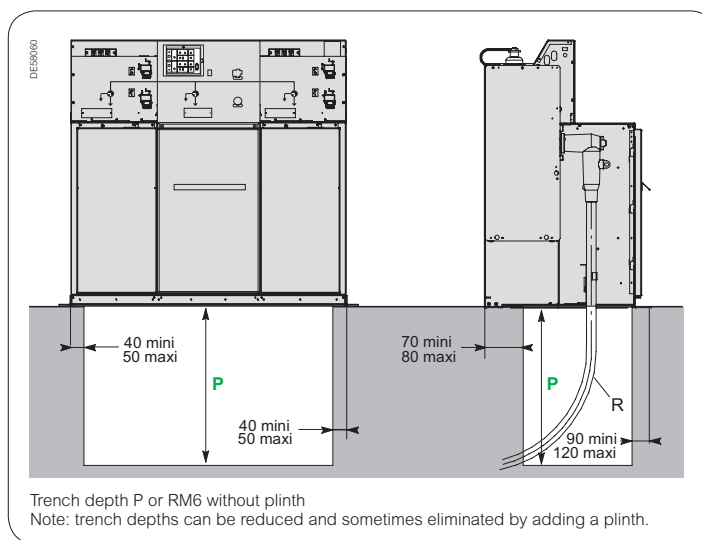


## For connection to “network” or “transformer” via circuit breaker

The “network” cables can be run either:

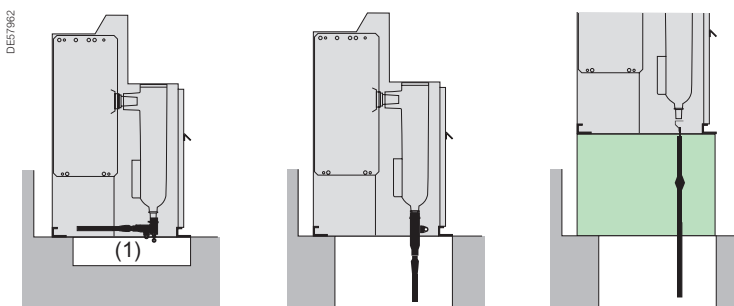
- through trenches, passages, ducts
- through the left or the right side.

Cable insulation	Cable	Cross-section (mm <sup>2</sup> )	Bending radius	Cable entry through a trench		Cable entry through a duct	
				P (plug-in)	P (disconnectable)	P (plug-in)	P (disconnectable)
Dry insulation	Single	≤ 150	500	400		400	
		185 to 300	600	520		520	
	Three	≤ 150	550	660		660	
		185	650	770		770	
Paper impregnated non-draining type	Single	≤ 150	500		580		580
		185 to 300	675		800		800
	Three	≤ 95	635		750		750
		150 to 300	835		970		970



## 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.



Cable insulation	Cable	Cross-section (mm <sup>2</sup> )	Bending radius	Plug-in Elbow connector	Plug-in Straight connector	Disconnectable (2)
				P	P	P
Dry insulation	Single	16 to 35	335	100	520	335
		50 to 70	400	100	520	440
		95 to 120	440	100	550	440
	Three	35	435		520	725
		50 to 70	500		520	800
		95	545		550	860

(1) Leave a clearance of 100 mm

(2) 520 mm plinth must be used

# Services

<b>ProDiag Corona</b>	<b>74</b>
<b>ProDiag Fuses</b>	<b>75</b>

# ProDiag Corona

## Diagnostics of partial discharges



### What is ProDiag Corona?

ProDiag Corona is a Schneider Electric diagnosis tool.

ProDiag Corona detects partial discharges in Medium Voltage cubicles.

- Partial Discharge occurs across part of the insulation between two conducting electrodes, without completely bridging the gap.

- Partial discharge can happen under normal working conditions as a result of insulation breakdown due to premature aging caused by thermal or electrical over-stressing of the high voltage system.

ProDiag Corona analyses the primary electrical signal through VIS (Voltage Indicator System) fixed on the switchboards.

Measurements are taken by an electronic sensor and the data is transmitted to the ProDiag Corona software in order to evaluate the level of criticality of the controlled equipment.

A written report is generated, which will be handed over by Schneider Electric so that the customer can use it as a tool to define the necessary corrective action, whether maintenance, repair or replacement.

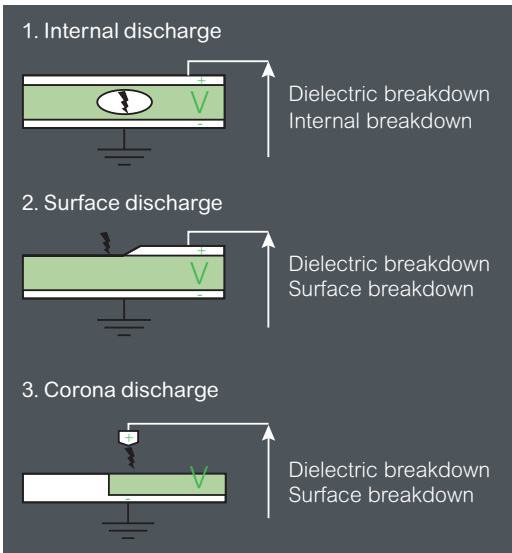
ProDiag Corona is not a certification tool.

ProDiag Corona executes the assessment of the energized equipment, without any shutdown and then without disruption for the users.

This system allows you to control all types of the most common partial discharges:

- Internal partial discharges
- Surface partial discharge
- Corona effect

ProDiag Corona diagnostic can be realized on most Medium Voltage equipment on the market equipped with VIS.



### Where can ProDiag Corona reduce costs?

ProDiag Corona significantly reduces the time taken to identify potential faults in a switch, without electrical shutdown.

A device's normal operating life is increased by timely diagnostics of when and what repairs are necessary. ProDiag Corona is a trouble shooting anticipation tool which can avoid internal arc risks and untimely tripping.

- The tool comprises both hardware and software, resulting in a highly efficient preventive maintenance program.

### Results

ProDiag Corona provides a report of the complete electrical room, detailing : ventilation, air filtration, due point calculation, level of criticability of each set of equipment, constructor recommendations on any potential maintenance, repair & rehabilitation.

This report enables any required maintenance to be targeted and timed to optimize the customer's maintenance plan.

ProDiag Corona is performed thanks to XDP2 testing equipment from NDB technology

### ProDiag Corona objectives

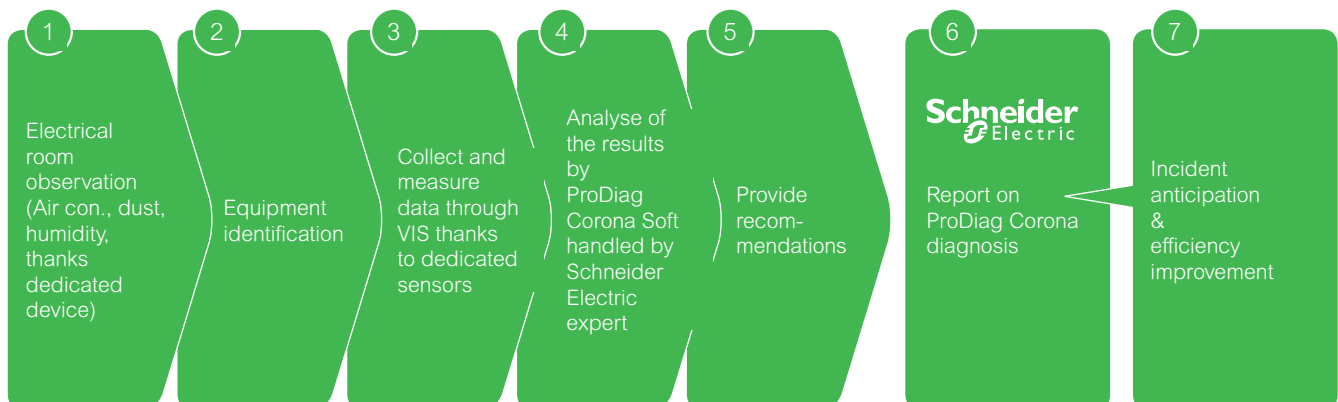
Your priority is to have fast Electrical equipment inspection without shutdown

#### Safety (Human Life and asset)

- Enhance the reliability of your installation
- Optimisation of installation life duration & costs

#### Risks prevention from:

- Partial discharges and internal arc
- Dielectric degradation
- Electrical Fire



# ProDiag Fuses

## Proprietary and standards diagnostics tools



### Customer needs

Electrical power installations protected by MV switchgear with fuse protection should be regularly checked (for correct assembly, electrical parameters, etc.) to confirm that their characteristics correspond to the original specification. Regular diagnosis of fuse performance (electrical parameters, resistance) according to the manufacturer's recommendations is necessary to secure the ED installation and its service continuity, which are important for customers. The ProDiag Fuse diagnostic solution can be used on MV switchgear protected by fuses that have not received any maintenance intervention in the last four years (under normal operating conditions, and less if operating in severe environments or depending on their criticality in the installation).

The purpose of ProDiag Fuse (a proprietary hardware-software solution) is to mitigate the risks on MV switchgear and equipment by fuses of faults or drifts causing unwanted effects. The result of fuse ageing is the destruction of filaments that can lead to thermal runaway, partial damage, complete destruction of MV switchgear and equipment, or even destruction of the electrical room.



### Customer benefits

ProDiag Fuse helps customers visualise, discover, and understand MV switchgear fuse ageing and wear and tear as compared to the original fuse manufacturers' technical specification.

ProDiag Fuse monitors the performance of MV switchgear fuses. Thanks to ProDiag Fuse, maintenance managers can implement, manage, and enrich their maintenance plans. Schneider Electric FSRs conclude their on-site interventions with an exhaustive report on the MV switchgear fuses conformity/non-conformity. If a MV fuse is declared non-conforming, Schneider Electric suggests a corrective plan that includes fuse replacement to regain original performance in safety and service continuity.

Customers can augment their preventive maintenance plans with this corrective action at the most convenient time for each ED device.

### "Unique value for customer vs standard market tools"

Electrical parameter measurements (resistance, etc.) on MV switchgear fuses at customer sites are taken by a test tool and transmitted to the Schneider Electric FSRs' ProDiag Fuse software. Data are compared to those of a fuse manufacturers' technical database.

The aim is to determine whether recorded measurements are within the acceptable range, at the limit, or fall outside it, as criteria for MV switchgear fuse conformity.

As an ED equipment manufacturer, Schneider Electric is uniquely positioned to develop and invest in specific tests tools, proprietary software, and testing methodology to collect reliable measurements from MV switchgears fuses.

ProDiag Fuse measures a larger number of parameters than standard market tools. It delivers best-in-class MV switchgear fuse diagnostics.

Schneider Electric scope: Schneider Electric fuses and main market fuses players.

# Order form

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# Available functions

Basic unit characteristics																			
Rated voltage	(kV)	12	12	12	12	17.5	17.5	17.5	17.5	24	24	24	24	24	24	24	24	24	
Short-time withstand current	(kA rms)	21	21	25	25	21	21	21	21	12.5	12.5	12.5	16	16	16	20	20	20	
	Duration (s)	1	1	1	1	1	3	1	3	1	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	
Extensions	Functions																		
NE	I				■				■		■	■			■	■		■	
	D	■		■		■				■			■			■			
	B				■				■	■					■			■	
	QI			■		■	■			■			■			■			
	DI			■		■	■			■			■			■			
	BI				■				■	■					■			■	
	II				■				■			■			■			■	
	IQI		■		■				■	■			■			■	■		■
	IIQI		■		■				■	■			■			■	■		■
	QIQI		■		■				■	■			■			■	■		■
	IDI				■				■	■			■	■		■	■		■
	IIDI				■				■	■			■	■		■	■		■
	DIDI				■				■	■			■	■		■	■		■
	III				■				■	■			■			■	■		■
	IIII				■				■	■			■			■	■		■
	IBI				■				■	■					■			■	■
IIBI				■				■	■					■			■	■	
BIBI				■				■	■					■			■	■	
RE	O			■	■		■		■				■		■	■		■	
	IQI		■		■			■	■			■			■	■		■	
	IIQI		■		■			■	■			■			■	■		■	
	QIQI		■		■			■	■			■			■	■		■	
	IDI				■			■	■			■	■		■	■		■	
	IIDI				■			■	■			■	■		■	■		■	
	DIDI				■			■	■			■	■		■	■		■	
	II				■				■			■			■	■		■	
	III				■				■	■			■			■	■		■
	IIII				■				■	■			■			■	■		■
	IBI				■				■	■					■			■	■
	IIBI				■				■	■					■			■	■
BIBI				■				■	■					■			■	■	
LE	O			■	■		■		■				■		■	■		■	
DE	I				■				■	■		■			■	■		■	
	BC				■				■						■			■	
	IC				■				■						■			■	
	O			■	■		■		■				■		■	■		■	
	Q	■		■		■	■			■			■			■	■		
	D			■		■	■			■			■			■	■		
	B				■				■	■					■			■	
	IQI		■		■				■	■					■			■	
	IIQI		■		■				■	■					■			■	
	IDI				■				■	■			■			■		■	
	IIDI				■				■	■			■			■		■	
	III				■				■	■					■			■	
	IIII				■				■	■					■			■	
	IBI				■				■	■					■			■	
	IIBI				■				■	■					■			■	
	Mt				■				■	■					■			■	■

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.

All the performances are available for RM6 Free Combination cubicles.





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

Basic unit configuration					Quantity
	5th function	4th function	3rd function	2nd function	1st function
Configuration (one function per box, fill in from the right) 5 functions choice → <b>Option for I, D, B, Ic, Bc functions</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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) <b>Option for I or Ic function</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Arc killer device	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Front door of cable connection compartment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bolted	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Removable with ESw interlocking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Removable with ESw interlocking and LBSw interlocking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fault or load current indicator and voltage detection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Amp 21D	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flair 21D	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flair 22D	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flair 23DM*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
VD23	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alpha M	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Alpha E	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CT on bushings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CT for T200 I on bushings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CT for T200 I on bushings + VD23	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Remote operation on I function Motor mechanism and auxiliary contacts LBSw 2 NO - 2 NC and ESw 1 O/C Add metallic VT in some RM6 cubicle (I function) <b>Option for D, B, Bc functions</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Front door of cable connection compartment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bolted	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Removable with ESw interlocking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Removable with ESw interlocking and C.B. interlocking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Protection relay for lines or transformer protection by circuit breaker (only one type of relay by unit)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Relay Sepam series 10	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				Standard	Very sensitive
				Without com.	With communication
				Auxiliary power supply	24 to 115 Vdc
				100 to 240 Vac	120 to 250 Vdc
Relay VIP 40 (over current)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Relay VIP 45 (over current and earth fault)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Relay VIP 410	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Relay VIP 400 (over current & earth fault/multi curve in accordance with IEC 255-3)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Motor disabled when CB trips	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fault tripping auxiliary contact	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shunt trip coil for external tripping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				50 Hz	60 Hz
				120 Vac	220 Vac
				24 Vdc	48 Vdc
				60 Vdc	110 Vdc
				125 Vdc	220 Vdc
Remote operation on D, B, Bc functions Motor mechanism and auxiliary contacts C.B. 2 NO - 2 NC and ESw 1 O/C (including shunt trip coil)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				50 Hz	60 Hz
				120 Vac	220 Vac
				24 Vdc	48 Vdc
				60 Vdc	110 Vdc
				125 Vdc	220 Vdc
DE -D et DE-B only. Possibility to add ring type CT in some RM6 cubicle <b>Option for Q function</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Auxiliary contacts alone For position indication 2 NO - 2 NC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Auxiliary contact for fuses blown	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shunt trip coil for external tripping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				50 Hz	60 Hz
				120 Vac	220 Vac
				24 Vdc	48 Vdc
				60 Vdc	110 Vdc
				125 Vdc	220 Vdc
Remote operation on Q function Motor mechanism and auxiliary contacts 2 NO - 2 NC (including shunt trip coil) <b>Option for D, B, Q functions</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Undervoltage coil	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				24 Vdc	120 Vac
				48 Vdc	220 Vac
					110 Vdc

\* Contact us for availabilities

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

Basic unit configuration (continued)					Quantity	
	5th function	4th function	3rd function	2nd function	1st function	
Configuration (one function per box, fill in from the right)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Example →	I		I		I	
Option for operation						
Voltage indicator						
VPIS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
VPIS Voltage Output (compulsory if with VD23 or Flair 22D*, 23D*, 23DM*)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
VDS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Key locking devices						Flat key type <input type="checkbox"/> Tubular key type <input type="checkbox"/>  
Type R1 (on I and B functions)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	On switch or circuit breaker <input type="checkbox"/> On earth switch <input type="checkbox"/>
Type R2 (on I and B functions)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Type R6 (on Q or D functions)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Type R7 (on Q or D functions)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Type R8 (on Q or D functions)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

\* contact us for availability

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

### Specific option for one function

Bushing for I function			
Plug in 400 A type B			<input type="checkbox"/>
Bolted M16 screw type C (compulsory with 17.5 or 24 kV-630 A)			<input type="checkbox"/>
Bolted 5/8" ANSI			<input type="checkbox"/>
Bushing for D function			
Plug in 200 A type A (limited to 12.5 kA 1 s)			<input type="checkbox"/>
Plug in 400 A type B (limited to 16 kA 1 s)			<input type="checkbox"/>
Bolted M16 screw type C (compulsory with 17.5 or 24 kV-630 A)			<input type="checkbox"/>
Bushing well ANSI (limited to 12.5 kA 1 s)			<input type="checkbox"/>
Bushing for B function			
Bolted M16 type C			<input type="checkbox"/>
Bolted 5/8" ANSI			<input type="checkbox"/>
Bushing for Q function			
Plug in 200 A			<input type="checkbox"/>
Heat shrinkable terminal for fuse chamber			<input type="checkbox"/>
Cable type for I, Ic functions	Single core <input type="checkbox"/>		Three-core <input checked="" type="checkbox"/>
Bottom plate in cable box (compulsory in case of three-core cable)			<input checked="" type="checkbox"/>
Cable type for D, B, Bc functions	Single core <input type="checkbox"/>		Three-core <input checked="" type="checkbox"/>
Bottom plate in cable box (compulsory in case of three-core cable)			<input checked="" type="checkbox"/>
Cable type for O function	Single core <input type="checkbox"/>		Three-core <input checked="" type="checkbox"/>
Bottom plate in cable box (compulsory in case of three-core cable)			<input checked="" type="checkbox"/>
In and fuse type for Q function	6 kV <input type="checkbox"/>	10 kV <input checked="" type="checkbox"/>	12/24 kV & 10/100 A <input checked="" type="checkbox"/>
(fuses to be procured separately)	16 to 100 A <input checked="" type="checkbox"/>	125 A <input checked="" type="checkbox"/>	

### Global option

Pressure detection				Without <input checked="" type="checkbox"/>
Manometer	Arabic <input type="checkbox"/>	Scandinavian <input type="checkbox"/>	Standard <input type="checkbox"/>	
or pressure switch		Scandinavian <input type="checkbox"/>	Standard <input type="checkbox"/>	
Door with window (for I, D and B functions)				
Deep cable box for I and D or B functions				
(enables surge arrestors to be fitted)				
Additional earth busbar				
(compulsory if earth fault > 6 kA 1 s)				
Internal arc cable box 20 kA 1 s for I, D, B, O, Ic, Bc functions				
(unable to coexist with door with window)				
Autotransfer system for I function I (48 Vdc electrical motorization compulsory)				
Fixation support T200 I to RM6		Without <input checked="" type="checkbox"/>	With <input type="checkbox"/>	
Changeover type	ATS 1/2 network <input type="checkbox"/>	ATS 1/2 genset <input type="checkbox"/>	BTA 2/3 <input type="checkbox"/>	
Communication modem	GSM/GPRS <input type="checkbox"/>	FSK (radio) <input type="checkbox"/>	RS485 <input type="checkbox"/>	
Protocol		IEC101/104 <input type="checkbox"/>	DNP3/IP <input type="checkbox"/>	
Current measurement (only cables, if CT on RM6 bushings)				
sensors + cables	Single core AC 5 m <input type="checkbox"/>	Single core AC 10 m <input type="checkbox"/>	Three-core AH 5 m <input type="checkbox"/>	Three-core AH 10 m <input type="checkbox"/>
Connection cable to motorization 1		3 m <input type="checkbox"/>	5 m <input type="checkbox"/>	10 m <input type="checkbox"/>
Connection cable to bus tie (only for BTA 2/3)			5 m <input type="checkbox"/>	10 m <input type="checkbox"/>
Connection cable to motorization 2		3 m <input type="checkbox"/>	5 m <input type="checkbox"/>	10 m <input type="checkbox"/>

### Accessories

Raising plinth		h = 260 mm <input type="checkbox"/>	h = 520 mm <input type="checkbox"/>
Set of 3 MV fuses Fusarc CF			Rating (A) <input type="text"/>
Phase comparator			<input type="checkbox"/>
Test box for circuit breaker relay (VAP 6)			<input type="checkbox"/>
PS100 backup power supply			<input type="checkbox"/>
Exhaust gas		To the bottom <input type="checkbox"/>	To the rear <input type="checkbox"/>
Additional operating handle		Standard <input type="checkbox"/>	Longer <input type="checkbox"/>
			Super long <input type="checkbox"/>
Additional extension kit	1 fct <input type="checkbox"/>	2 fct <input type="checkbox"/>	3 fct <input type="checkbox"/>
			4 fct <input type="checkbox"/>
			5 fct <input type="checkbox"/>
Additional instructions			DE Mt <input type="checkbox"/>
Installation and civil engineering instructions		French <input checked="" type="checkbox"/>	English <input checked="" type="checkbox"/>

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