EcoStruxure™
Innovation At Every Level

SeT Series

RM AirSeT

Ring Main Unit & Modular Switchgear



Catalog 2024

Secondary Gas Insulated Switchgear
Up to 24 kV

Innovation is in the Air!

se.com/RM AirSeT

Life Is On | Schneider Electric

Innovation in AirSeT

SM Air**SeT**



Modular – Secondary AIS

Air & Vacuum
Air Insulated Switchgear

RM Air**SeT**



RMU – Secondary GIS

Air & Vacuum
Gas* Insulated Switchgear

GM Air**SeT**/
GM Air**SeT** Performance



Primary GIS

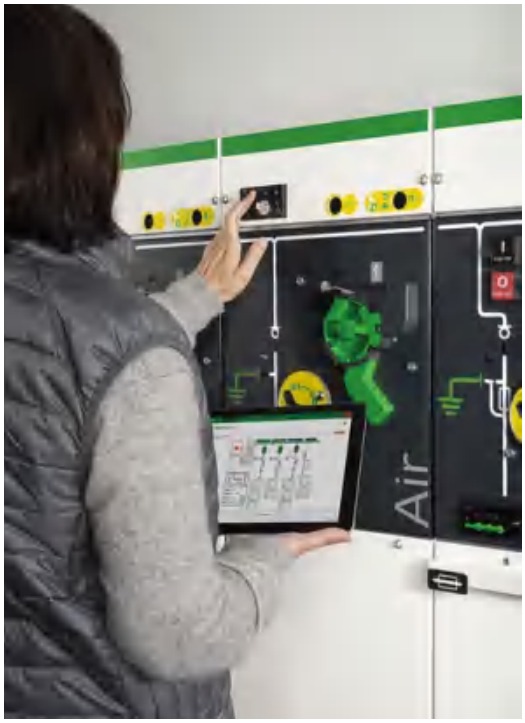
Air & Vacuum
Gas* Insulated Switchgear

(*) GIS: Main Circuit in a sealed compartment - "Gas" is pure air

General contents

RM Air**SeT**

PM109793



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Find more information here

All pictures of the catalogue illustrate the product in an environment close to reality. They were taken off-line. For live operation the P.P.E. (personal protective equipment) must be used in accordance with the regulations of the place of installation.

RM Air**SeT** advantages

Sustainability



- Innovative design combining pure air for insulation and vacuum for breaking, without any F-gas
- Air avoids ambiguity of alternative gases and is immune to future tax or regulation
- Air has no Global Warming Potential; It is released into the atmosphere without costly end-of-life treatment

Safety



- Disconnection and insulation performance, preserved from ambient conditions in an IP67 enclosure
- A genuine 3 position switch-disconnector closed / disconnected / earthed with Shunt Vacuum Interruption (SVI)™ technology for load switching
- Air is preferred for the health of people, animals or biodiversity, while Switching in Vacuum eliminates any toxic by-products.

Reliability



- Designed and sustained high quality of product for 40 years: Large installed base of more than 5 million functional units with great customer experience
- IP67 stainless steel tank protecting main circuits from ambient air conditions - Gas Insulated Switchgear, sealed for life, requiring no refill
- Improved mechanism and auxiliaries with longer life
- Condition based maintenance with sensors connected to EcoStruxure asset management software (optional)
- Integrated Live Cable Interlock (optional)

Flexibility



- 1 to 4 functional units in 1 sealed enclosure with combination of functional units
- 2 heights of switchgear (1.625 m or 1.40 m) and 2 heights of raising plinths (250 mm or 450 mm) available.
- Footprint similar to usual GIS RMU
- A powerfull switch-fuse combination allowing protection of transformers up to 2000 kVA @ 20 kV
- Circuit Breaker adapted to transformers or to line fastclosing duty
- Pre-wired kits to customize in shorter time (add motor, auxiliary contacts...)
- Architecture suitable for kiosk manufacturers and partners

Connectivity



- IT & OT technologies integration, for real time monitoring
- Active Plus version allows a direct connection to DMS, factory integration & test of PowerLogic T300 RTU simplifying site works
- Sensors for Control Monitoring
- Allowing asset preventive and predictive maintenance
- 3D models available for accurate substation design



Green Premium™

Green Premium™

More than 75 % of our product sales offer superior transparency on the material content, regulatory information and environmental impact of our products:

- RoHS compliance
- REACh substance information
- Industry leading # of PEP's*
- Circularity instructions

Discover what we mean by green
Check your products!

The Green Premium program stands for Schneider Electric commitment to deliver customer valued sustainable performance. It has been upgraded with recognized environmental claims and extended to cover all offers including Products, Services and Solutions.

CO_2 and P&L impact through… Resource Performance

Green Premium brings improved resource efficiency throughout an asset's lifecycle. This includes efficient use of energy and natural resources, along with the minimization of CO_2 emissions.

Cost of ownership optimization through… Circular Performance

We're helping our customers optimize the total cost of ownership of their assets. To do this, we provide IoT-enabled solutions, as well as upgrade, repair, retrofit, and remanufacture services.

Peace of mind through… Well-being Performance

Green Premium products are RoHS and REACh compliant. We're going beyond regulatory compliance with step-by-step substitution of certain materials and substances from our products.

Improved sales through… Differentiation

Green Premium delivers strong value propositions through third-party labels and services. By collaborating with third-party organizations we can support our customers in meeting their sustainability goals such as green building certifications.

*PEP: Product Environmental Profile (i.e. Environmental Product Declaration)

DM107444

...SUSTAINABILITY READY



PM109430

RM AirSeT:

Innovation is in the Air!

Proven technology: pure air insulation and vacuum breaking

Durability: Life span extended to 40 years

- Innovative Shunt Vacuum Interruption™ (SVI) combines proven and reliable technologies of pure air & vacuum breaking
- Extended mechanical endurance with modern mechanisms
- Protection against ambient air pollution and humidity in a sealed stainless-steel tank

Resource performance: One 3-position switch

- Smart network operation to reduce energy losses enabled by energy quality functions along with EcoStruxure™ ADMS: native PowerLogic T300 integration in the connected RM AirSeT
- Sensors for condition-based maintenance: fewer site visits

Upgradeability

- Simple additions of switchgear units with easy extensibility
- Digitizing the grid: on-site integration of motorization and RTU possible with numerous plug & play features

Easier end-of-life management

- No toxic by-product, the breaking is ensured by vacuum interrupter: environmental safety
- No gas recovery with pure air at end of life





RM AirSeT provides LEED™ credits

- Building Product Disclosure and Optimization
- Advanced Energy Metering



Connectivity and innovative technologies for greater sustainability and efficiency

Powered by air and digital

Next generation power system equipment prioritizes sustainability by focusing on efficient air-based switching and digital integration. Our latest MV equipment is designed to be more sustainable when powered by Air and Digital.

Sustainability, let's clear the Air

With increasing energy demands and the need to decarbonize, making the CO_2 footprint of our products clearly visible is a priority for understanding their sustainability impact. Our Product Environmental Profiles show all necessary information for making a sustainable choice. Our latest ranges use breaking and isolation technologies based on pure air or vacuum technology, reducing CO_2 footprint and concerns for future regulation.*

Natively digital equipment contributes massively to sustainability goals in a number of ways. With embedded connectivity and IoT sensors in our Active ranges, you can:

- Monitor equipment health and use optional EcoStruxure Service Plans to optimize efficiency, and reduce unplanned downtime
- Enable operation of live equipment from outside of the arc-flash zone
- Speed up daily interactions with paperless documentation and records.

The unique combination of Air and Digital equipment with EcoStruxure Service Plans helps you decarbonize, simplify, reduce downtime and maintenance costs, while increasing equipment lifespan and saving time. All with less CO2, for a more sustainable future.

* Scalable with additional sensors using Connectivity Tiers such as Active Plus

Watch the SF6-free video playlist



Innovation is in the Air

RM AirSeT brings sustainable innovation to support the transition to greener energy systems and installations. It combines pure air for insulation and vacuum technology for breaking in an ingenious arrangement called Shunt Vacuum Interruption (SVI)™.

Why SF_6-free?

Today, distribution networks and installations commonly rely on SF_6 gas. It has outstanding dielectric properties, which allows for safe and compact equipment.
This is critical in many buildings and applications where space is scarce. The downside is that it is a potent greenhouse gas with Global Warming Potential 23,500 higher than that of CO_2, and produces toxic by-products in the process of breaking.
As such it is subject to strict regulation and must be recycled properly to avoid negative impact on the environment. Regulators are increasingly considering the adoption of new measures to limit the use of SF_6.



Pure air as the ultimate choice

Adopting pure air switchgear is not only better for the environment. It also helps improve health and safety as pure air is naturally sustainable. It reduces the switchgear's carbon footprint across its full lifecycle - from manufacturing to end of life - by eliminating the need for SF_6 or alternative gas and avoiding the difficulties of end-of-life recapture, recycling.

No compromise on benefits

The ingenious design retains the benefits valued by customers in former SF_6 equipment: compact physical footprint, 3-position switch, transformer protection via switch-fuse unit - all important considerations to avoid changes to installations and working practices.

Transparent for the future

Pure air is transparent and gives peace-of-mind, because it helps avoid the risk of future regulations.

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The experience of a world leader

Founded nearly 180 years ago Schneider Electric became a major player in the steel and machine industry, but soon expanded into the emerging electricity market.

Over the years the company has solidified its position and gained recognition for high quality products and innovative solutions.

Today, with a unique portfolio of connected offers: connected products, edge and edge control, apps, analytics, and services, **Schneider Electric is the global specialist in energy management and automation.**

At Schneider Electric, we are also proud of achievement of our former brands, such as Merlin Gerin, Magrini Gallileo, MESA, Yorkshire Switchgears, Square D, Alstom-Areva, AEG, Delixi, Telvent, Sorhodel, Modicon, Telemecanique, Invensys, etc.

5+ millions Schneider Electric MV functional units have been operated for decades in 150+ countries (Europe, Asia, Americas, and Africa). We have analyzed the experience from installations of our products working under various conditions and customer feedback on other brands. The resulting knowledge has further extended expertise acquired by Schneider Electric engineers: **40+ years operation design** is in fact based on this **return of experience method, unique in our industry.**

The other pillar of Schneider Electric's reputation is linked to the **product quality and teams expertise** of our multicultural company. The **diversity has led to a balanced company promoting robustness, stability, dynamism and innovation.**

Our products are supported by services from **Schneider Electric field services teams.**

Unrivalled experience in Ring Main Unit design


PM108694


PE41070


PM108695


PM108338

1983 — Launch of the first **compact RM6** with integrated insulation

1984 — Sepam: the first multifunction relays (protection, monitoring and controls, with measure)

1987 — **RM6 circuit breaker**

1992 — **SM6** best in class secondary AIS up to 36 kV.

1994 — Easergy T200 RTU for field automation

1996/1998 — **MCSet / F400**: best in class primary AIS up to 40.5 kV.

2003 — Launch of **FBX**

2006/2007 — **GHA & GMA**: best in class primary GIS up to 40.5 kV

2011 — **RM6 Flexible Combination units**

2012 — **RM6 5 functions**

VIP 45 and **VIP 400/410** self powered protection relays

2016 — **Smart RMU** with **PowerLogic T300 integrated**

2017 — **PowerLogic T300**: the best RTU platform for secondary

RMU AIS & PRIMARY DIGITAL

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Fields of application

Distribution and public electrical networks

RM AirSeT extends the previous applications of GIS secondary switchgear for:

- Underground open ring & radial distribution networks, closed loops
- Protection towards overhead networks

RM AirSeT design is the optimal choice for Electrical Distribution Companies and Distribution Service Operators worldwide. It also provides more versatility for industrial, infrastructures, buildings or residential networks.

- Traditional Ring Main Unit (RMU for MV/LV kiosk or MV switching Substation)
- MV renewable distributed generation
- Automatic-fast-Transfer of Sources (ATS)*
- Feeders to overhead lines (including reclosing sequences)*

PM103350



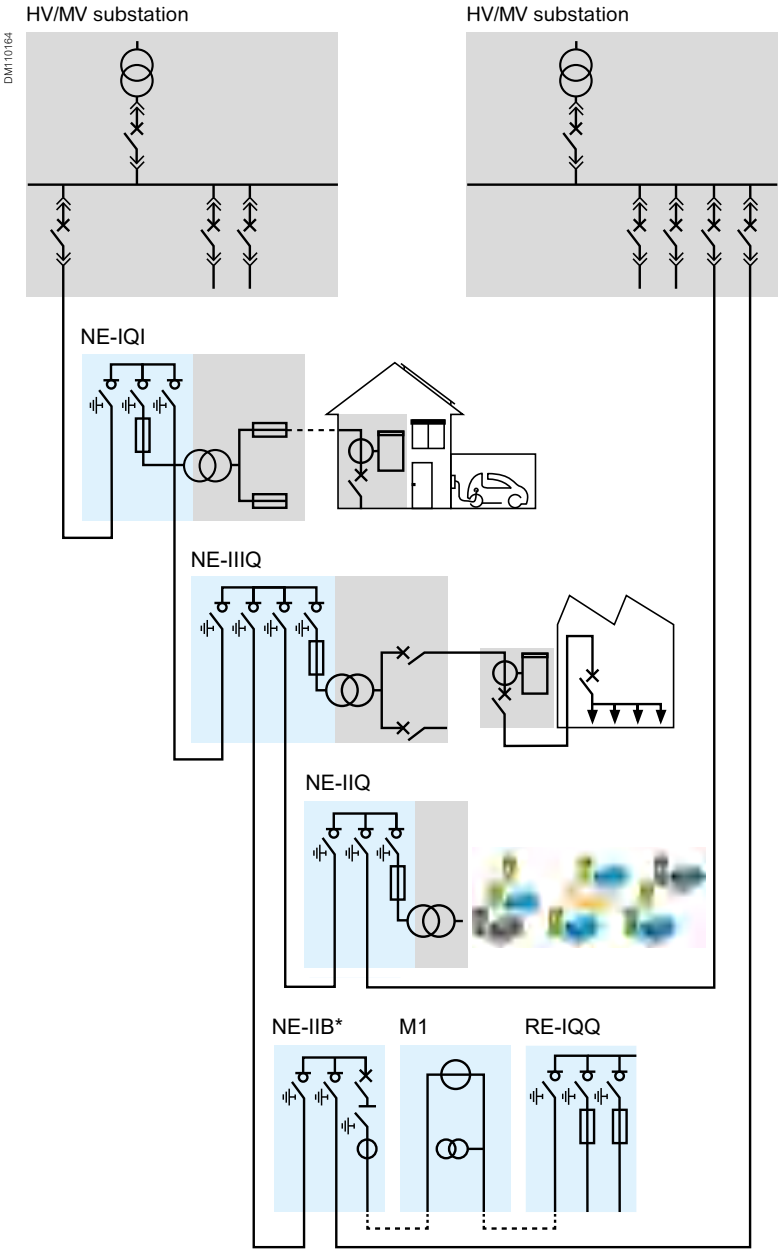
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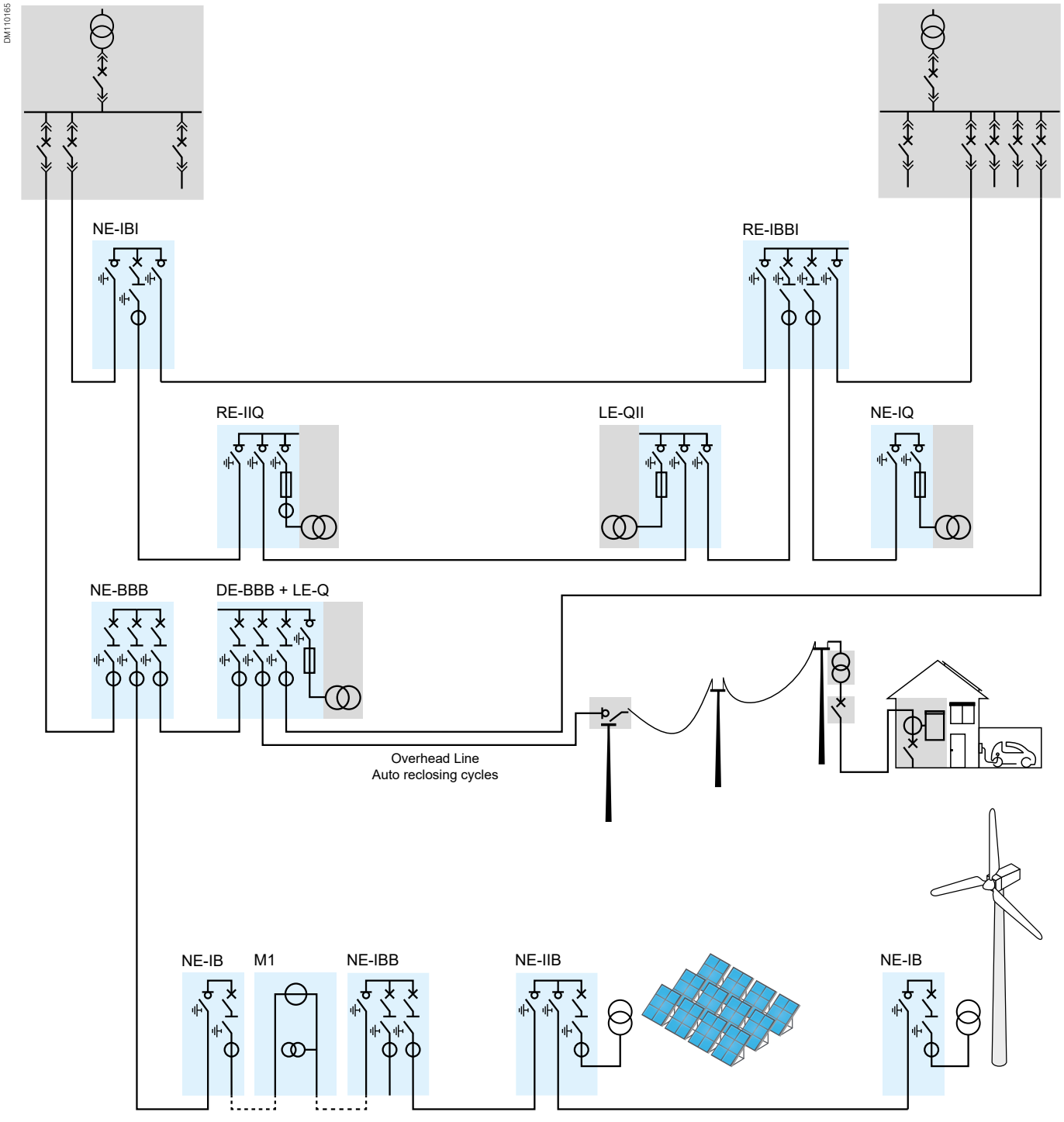
(*) Please consult us for availability.

Fields of application

Network connection or protection

Network connection or protection can be achieved by:

- 3-position load break switch-disconnector
- Line protection with 630 A circuit breaker
- Protection with **auto-reclosing capabilities** with 630 A circuit breaker



Life Is On Schneider Electric

Fields of application

Typical applications

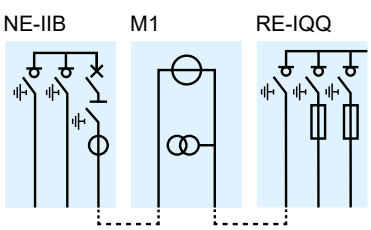
Critical applications

Hospitals, Data centers

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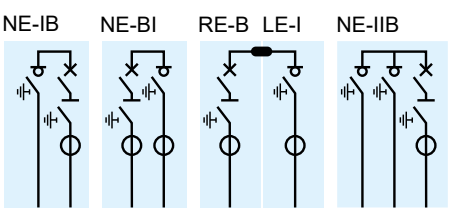
Renewable energies

Solar Photo Voltaic, Wind turbines and Battery storage, Hydro power plants

PM108697



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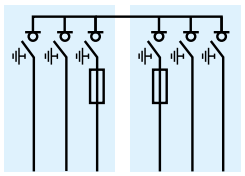
MV/LV Distribution substation - Dense urban area

MV/LV transformer and switching stations, package substations...

PM108698



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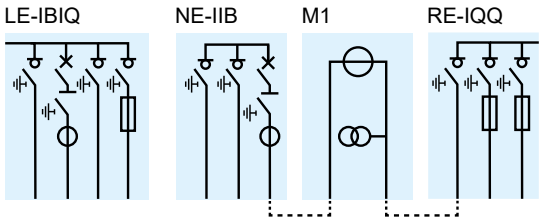


Industrial substations

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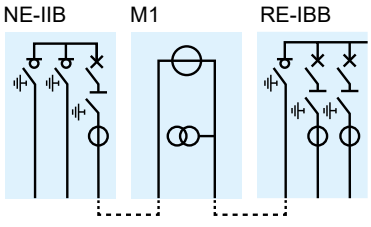
Building and Industries

Hotels, Shopping centers, Commercial buildings

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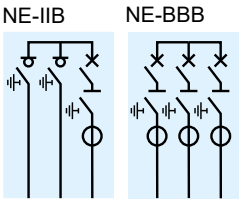
MV satellite substations

Railway infrastucture, Airport, Port electrification Underground transport

PM107080



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Safety and reliability

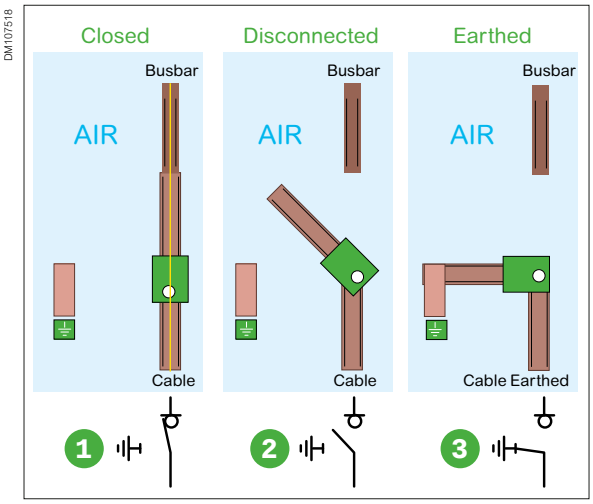
The safety of a 3-positions disconnector in pure air

Pure air has a proven chemical stability allowing stable dielectric performance at low and high temperatures. The contacts inside the sealed compartment are preserved from ambient conditions.

3 position disconnector and earthing switch:

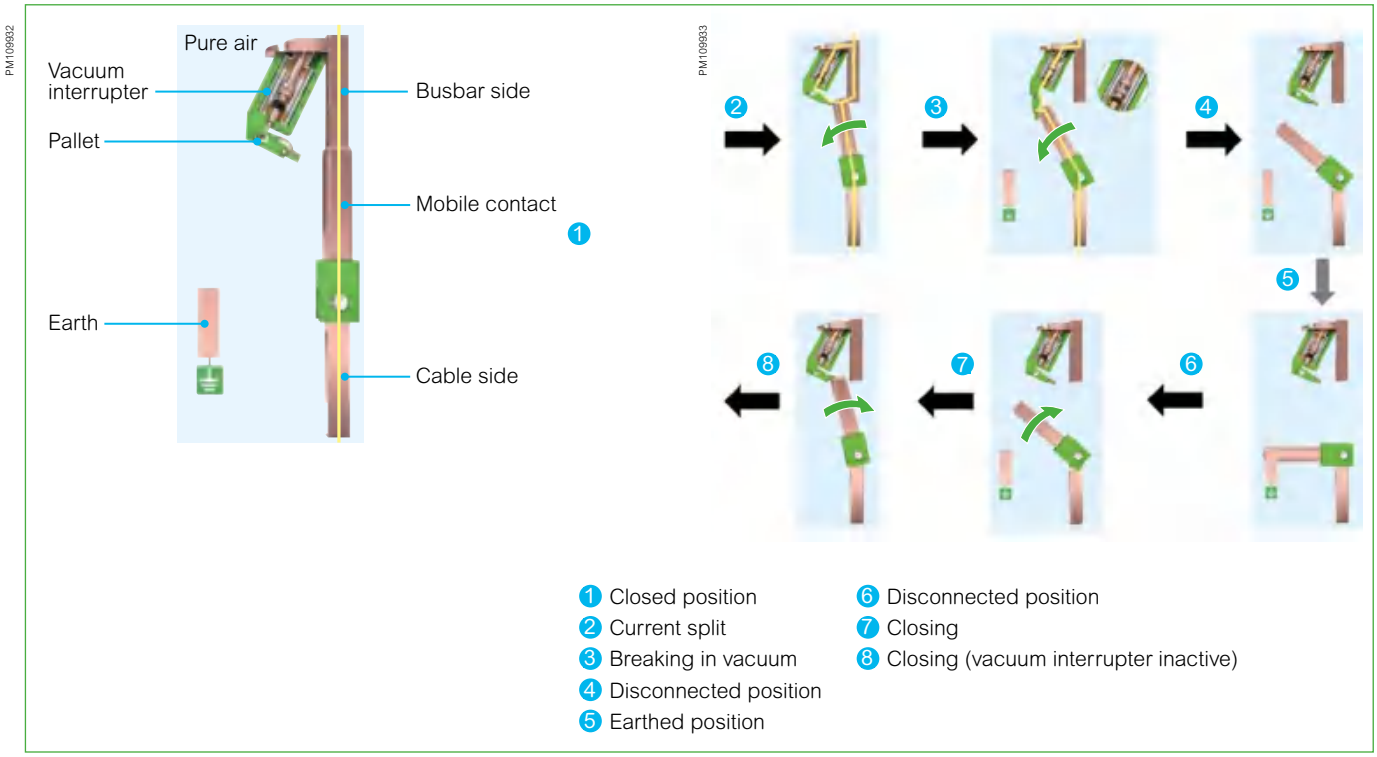
Natively prevents a live busbar from earthing. It can be either closed (1), disconnected (2) or earthed (3). Earthed 3, Disconnected 2, or Closed 1.





Principle diagram of three-position switch-disconnector: Shunt Vacuum Interruption (SVI)™*

A smart combination of proven technologies



(*) Diagram representing one phase, to clarify the principle.

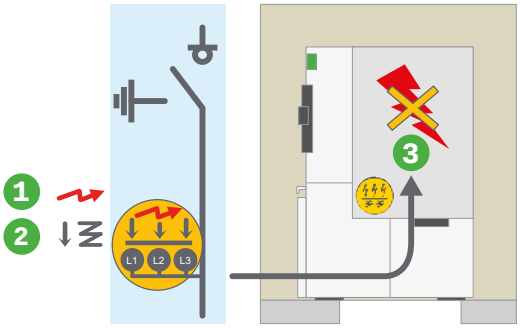
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Flexibility

Arc killer, integrated cable test facility

Arc killer

DM110161



1. An internal arc creates a sudden tank overpressure
2. Springs mechanically short circuit the three phases
3. The internal arc disappears in few milliseconds

Principle of arc killer

New

- The **Arc killer is available in RM AirSeT in option**.
  It is available in option on the ring functional units (I) in non-extensible versions of tanks.
- the compactness of RM AirSeT remains intact, not impacted by “Arc killer” and “AK Indic”
- An option “AK Indic” is also available in case of a triggered arc killer.

Integrated cable test facility (iCTF)

PM111230



Principle of iCTF

New

- The **Integrated cable test facility (iCTF) is available in RM AirSeT in option** on the ring switch-disconnector functional units (I), to help tests thanks to a direct connection to the cable.
- The cables can be tested from the front.
- The access to iCTF bushing is protected behind a specific iCTF cover, located below the operating mechanism of the three position switch.
- The iCTF cover is natively interlocked with the earthing switch to avoid wrong operation.
- The compactness of RM AirSeT remains unchanged.

PM111215



Fig1: iCTF front cover

Flexibility

Flexible combination, and extensibility

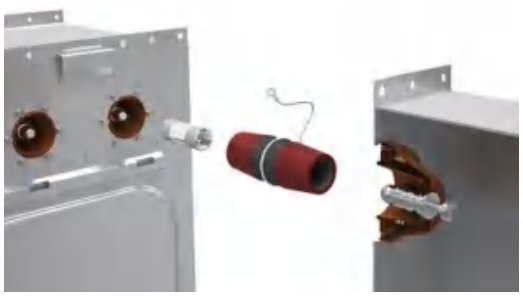
Flexible for any substation configuration.
- Traditional RMU and multifunctional block: several functional units in 1 tank
- Modular switchgear: unitary functional units can be assembled together
- Semi Modular: combining both

A RM AirSeT switchgear can integrate flexible configurations from 1 to 4 functional units. If selected with an extensibility option, it can be expanded with additional RM AirSeT switchgear

- 1 functional unit I, Q, B…
- 2 functional units: II, IQ, QI, QQ, IB, BB...
- 3 functional units: III, IIQ, QQI, IIB, BBB, IQQ, BIB, QIB...
- 4 functional units: IIII, IIIQ, IIQQ, QQQQ, IIIB, BBBB, BIIB, QIIB...

Compact NE (Non Extensible), or with Right, Left or Double Lateral Extensibilities (LE, RE or DE) to extend with other RM AirSeT switchgear. Extension is done without gas work on site.

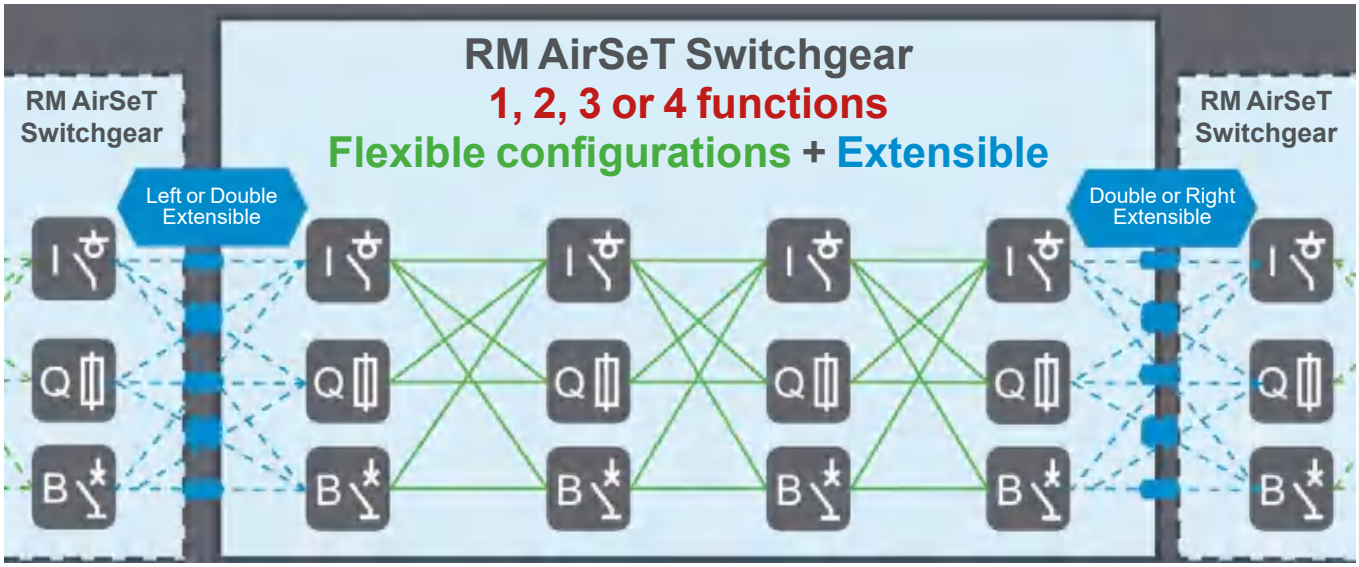
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RM AirSeT: Flexible Combination of functionnal units

Most combinations from 1 to 4 functional units can be proposed in one tank.
- **Efficient** than several modular switchgears
- **Compactness preserved:** each functional unit has same pitch

PM111232



Note: for a different combination than the ones shown in above figure, please consult us.

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Flexibility

Dimensions, Upgradeability

Height of base frame

Standard 1.6	Version 1.4





Height of optional raising plinth

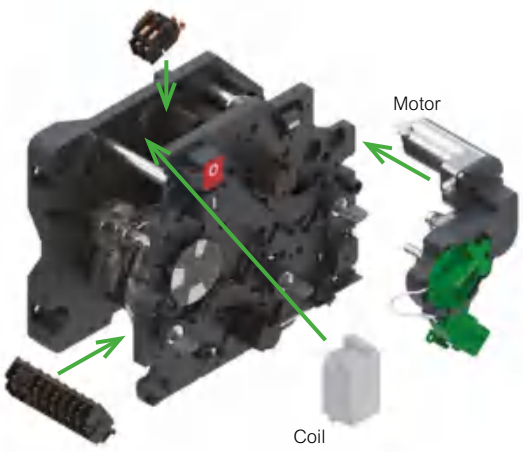
Height = 250 mm	Height = 450 mm





2 Auxiliary contacts available

PM108715



1st Auxiliary contacts
Up to 7 O & 8 C contacts

Accessories for easy upgrade

PM109761



Opening/ closing coil

PM109756



CompoDrive Motor kit with its wiring

PM108719



Auxiliary contacts kit

PM109759



CompoDrive Control Terminal Block

Kits including motorization are available for:

- Switch-disconnectors (I)
- For Circuit Breakers (B)

EcoStruxure™ ready solutions

RM AirSeT Active Plus: Local + remote improved operation and maintenance

Electrical distribution companies:

- Easier integration to Scada by reducing the conection works at site
- The interoperability of PowerLogic T300
- Possible collection of collect data for condition-based maintenance

Building, critical infrastructures:

- Ecostruxure Power and Ecostruxure Power Monitoring Expert
- The best functionalities offered with PowerLogic T300

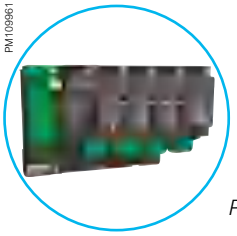
Active Plus features

Effective asset management, enhanced safety, 24/7 Real time connectivity for network management

The **RM AirSeT Active Plus** contributes to comprehensive solution for smart grid medium voltage distribution networks.

- A RM AirSeT switchgear with voltage and current sensors with motorised switches (I)
- A PowerLogic T300 RTU located in an LV cabinet, on top of the RM AirSeT
- A fully tested solution for peace-of-mind
- Plug-and-play installation

PM109961



PowerLogic T300

PM109432



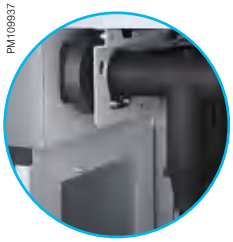
QR code on the nameplate

PM 106308



Thermal sensor

PM109937



Bushing CT

PM109432

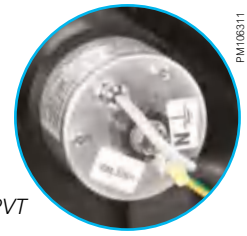


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*VPIS / VDIS**

PM106311



LPVT

PM106309



Cable mounted CT

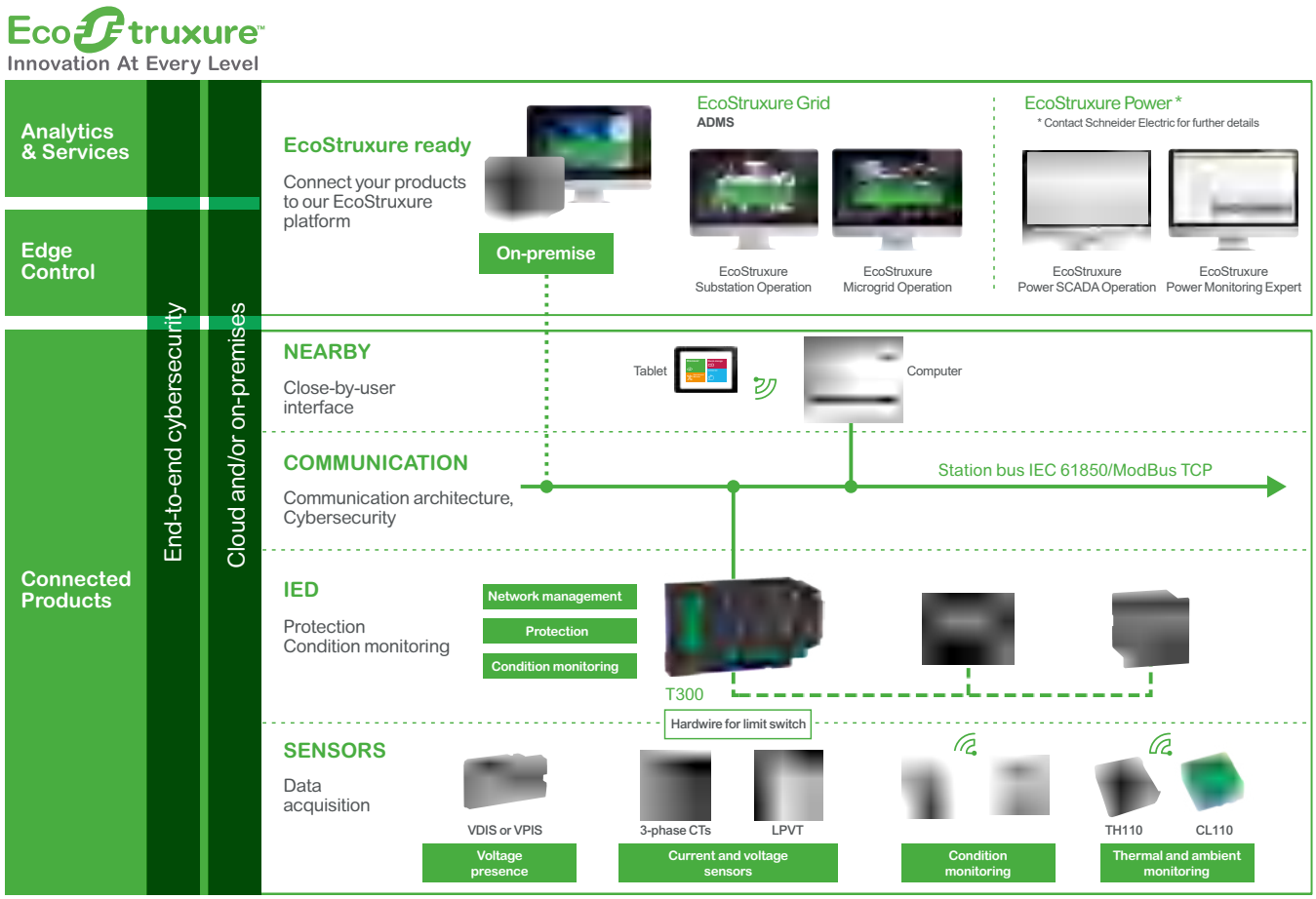
(*) Please contact us

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EcoStruxure™ ready solutions

RM AirSeT Active Plus: Local + remote improved operation and maintenance

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(*) Please contact us

All pictures of the catalogue illustrate the product in an environment close to reality. They were taken off-line. For live operation the P.P.E. (personal protective equipment) must be used in accordance with the regulations of the place of installation.

Quality and environment

PM111225

A major advantage

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

- Uniform throughout all departments
- Recognized by several demanding customers and approved organizations.

The conformity of the management system of Schneider Electric sites that design, manufacture and test RM AirSeT is certified by Bureau Veritas as per the requirements of the ISO 9001: 2015 quality assurance.

PM111234



Watch the video here

Meticulous and systematic controls

During manufacturing, each RM AirSeT is subject to systematic routine testing which aims to check the quality and conformity:

- Sealing testing
- Filling pressure testing
- Opening and closing rate testing
- Switching torque measurement
- Dielectric testing
- Conformity with drawings and plans

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

PM111236



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

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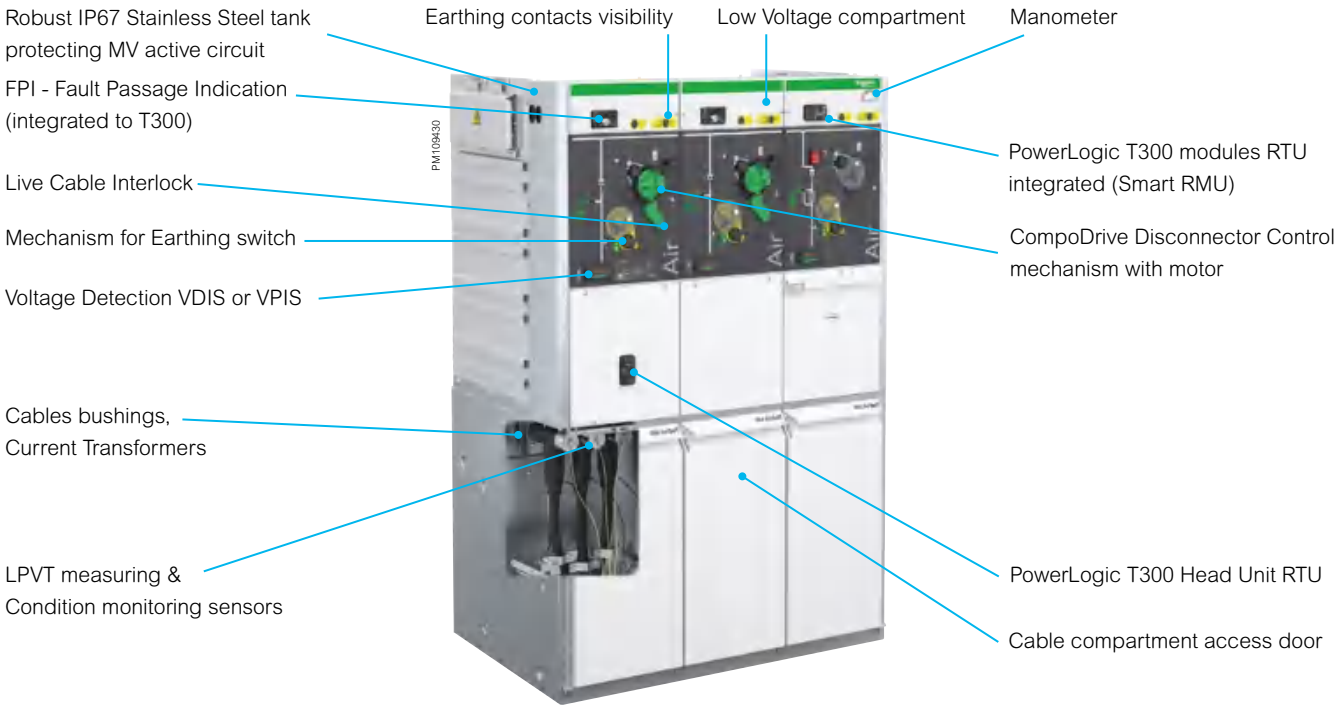
Arc killer 31

Description

RM AirSeT with Digital features

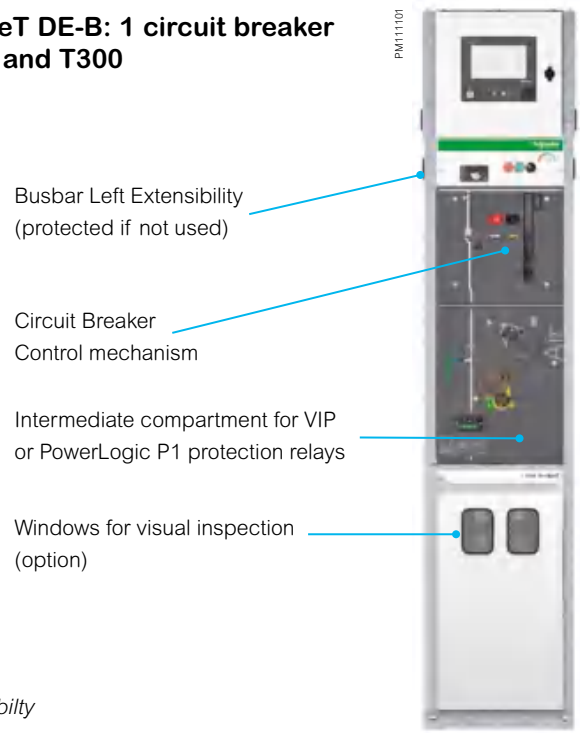
Ring Main Unit with multiple functional units with double extensibility

3 functions: Example of RM AirSeT DE-IIQ Active Plus: 2 switch-disconnectors + 1 switch-fuse combination including native integration of PowerLogic T300



Single module of one functional unit with double extensibility:

Example of RM AirSeT DE-B: 1 circuit breaker with PowerLogic P7 and T300



Please consult us for availabilty

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General characteristics

Insulation level - voltage withstands					
Rated voltage	Ur		kV	**12**	**24**
Rated frequency	f_r		Hz	50 / 60	
Rated short-duration power-frequency	U_d	Phase-to-Phase & Phase-to-Earth	kV (1 mn RMS)	28	50
		Across the Isolating Distance		32	60
Rated lightning impulse	U_p	Phase-to-Phase & Phase-to-Earth	kV (1.2 µs)	75	125
		Across the Isolating Distance		85	145
Insulation and switching					
Insulation medium		Busbar, Disconnectors, Earthing switch…		**Pure Air (1)**	
Air relative filling pressure		At 20 °C	MPa	0.04	0.15
Disconnecting principle		In pure air, compartment sealed from ambient conditions		Three position disconnector	
Switching and Breaking Medium				Vacuum	
Mechanical Endurance		As per IEC		Endurance class "Extended"	
Current					
Rated current	I_r	Busbar		630 A	
Short time withstand current	I_k/I_{ke}		kA	20 / 20	
Duration	t_k/t_{ke}		s	1 s or 3 s / 1 s	
Rated peak withstand current	I_p		kA	52	
Service continuity class as defined in the IEC 62271-200					
Other high-voltage compartments or function may remain energized		LSC 2: acces to cable compartment when busbar energized is possible		LSC 2	
Internal Partitions between compartment		PM: Metallic earthed		PM	
Degrees of protection provided by enclosure					
External Enclosure as per IEC 60529		Protection of active Medium voltage circuits (tank)		**IP67**	
		Protection of MV cable compartment		IP4X	
		Access to Mechanism		IP4X	
		Protection of LV auxiliary components		IP4X	
Internal as per IEC 60529		Index between compartments		IP2X	
Degree of protection against mechanical impacts					
IK code		Class as per IEC62262		IK07	
Internal Arc fault Withstand					
Basic		Sealed compartment is equipped with safety membrane		Not classified	
IAC	I_A	Class A FLR Front-Lateral & Rear access	kA	**20 kA AFLR**	
	t_A	Duration	s	1 s	
		Gas relief		Downwards in cable compartment	
Life Cycle characteristics					
Sealed pressure system: expected operating duration under IEC 62271-1 normal service conditions				**40 years**	
SF6-free Gas Insulated Switchgear: definition of enclosure as per IEC 62271-200				Sealed pressure system GIS	
High voltage mobile or fixed parts in the Gas Insulated compartment				No maintenance	
Specific procedure of recovery, transportation and recycling of gases				None: No fluoronated gas (air only)	
Contamination of sealed compartment by arc-quenching by-products				No by-products: switching in vacuum	
RM AirSeT 24 kV can be used on networks with Ur of 17.5 kV and / or Ud of 38 kV 1 mn and/or Up BIL of 95 kV					

(1) Pure air is compliant with IEC 62271-4 (gas handling) and IEC 63360 (gas composition) for synthetic air. It comprises approx. 79% nitrogen (N2) and 21% oxygen (O2) with less than 30ppm of other gases. Refilling of air is not needed under normal service conditions defined by the IEC 62271-1.

Functional overview

Choice of functional units

RM AirSeT: the advantages of Schneider Electric successful RMU ranges

- **Traditional RMU and multifunctional block:** several functions in 1 tank as complete switchgear
- **Modular switchgear still possible:** unitary functions can be assembled together for cases where modular, separated switchgears are required
- **Semi Modular switchgear:** combining several units comprising several functional units each, example: RE-IIBB + LE-QQ

A flexible secondary GIS switchgear

Better adapted to any substation configuration

- Quick and simple site installation
- Compact
- Adaptable to any arrangement
- Fewer maintenance operations

RM AirSeT: Flexible Combination in 1 tank (1) (2)

Many combination can be proposed inside a sole tank.

- **Flexible Combination:** all the options for each function
- **Easier, faster installation, cost saving** than adding several single extensible functions
- **Compactness preserved:** each functions has same dimensions

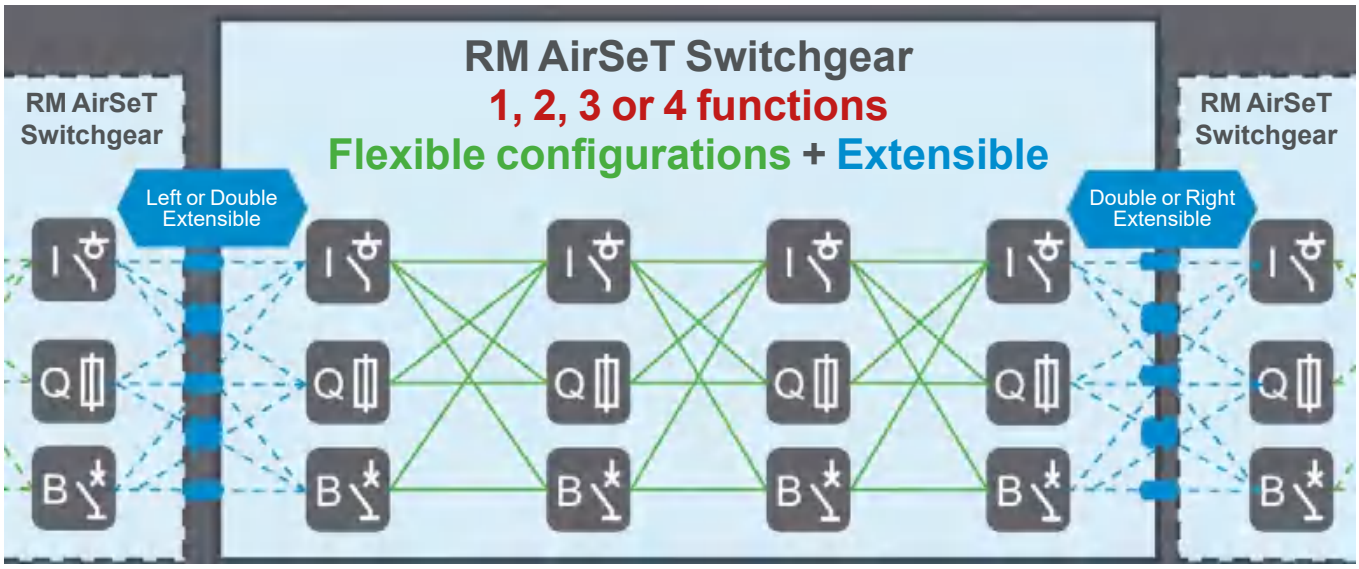
In a nutshell: 1 RM AirSeT can comprise in 1 switchgear

- 1 function: I, Q, B…
- 2 functions: II, IB,…
- 3 functions: IIQ, IQI, IIB, BBB, QQQ, BIQ…
- 4 functions: IIII, BIII, IIBI, BIBI…

All extensibility configurations

- **Non-Extensible NE**
- **Extensible**
  - RE: Right Extensible
  - LE: Left Extensible
  - DE: Double Extensible

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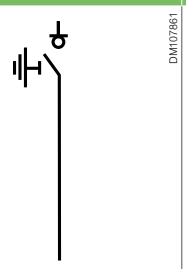
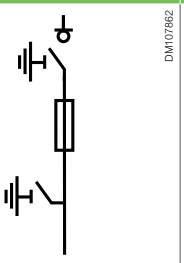
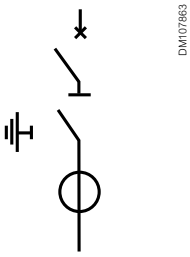
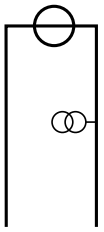


Note: in case of a different combination than the ones shown above, please consult us.

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Functional overview

Choice of functional units

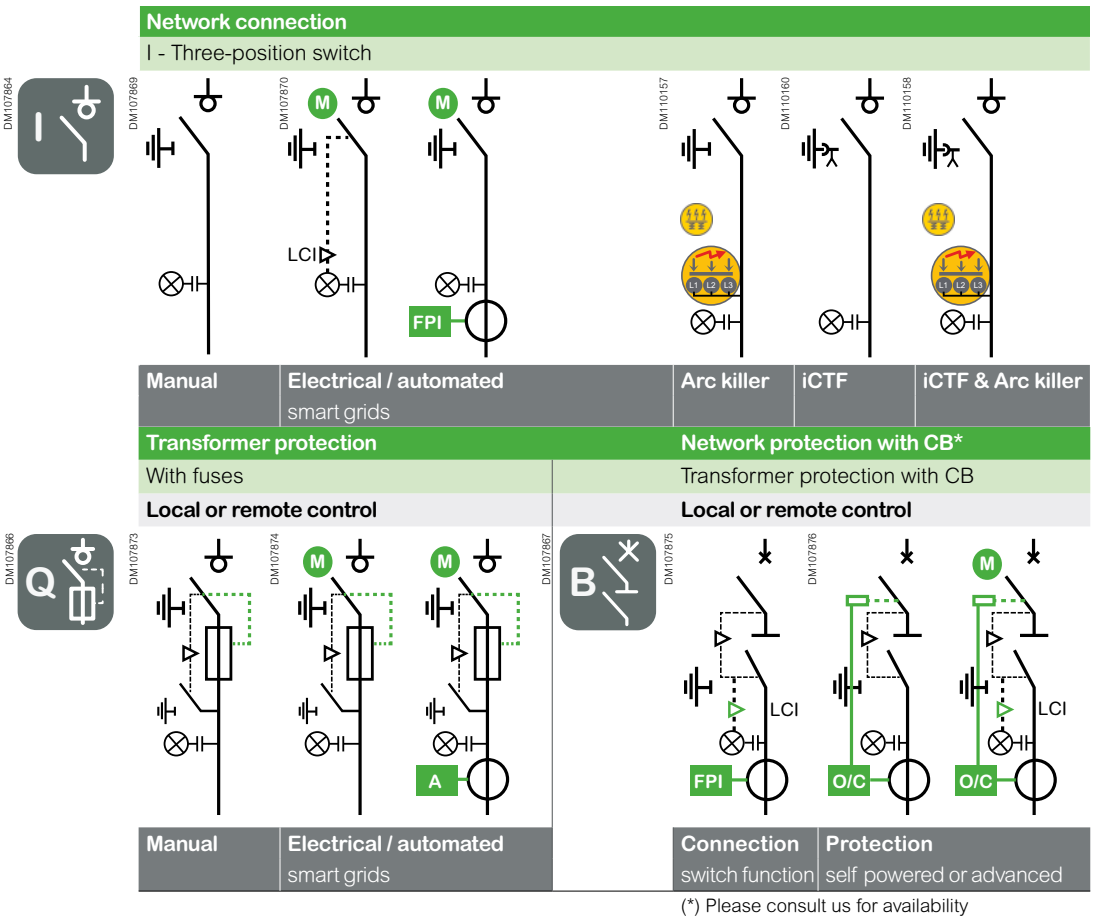
Name	I	Q	B (1)	M1 (2)
Function	Network connection	Transformer protection	Network or Transformer protection	Metering
Main Device	"Three-position switch"	"Three-position Switch-Fuse combination"	Vacuum Circuit Breaker (1)	Cables Metering
	DM107859  DM107861	 DM107862	 DM107863	
Disconnecting	Switch-Disconnector with SVI®	Disconnector Switch-fuse combination with SVI®	Three-position Disconnector	N/A (direct Busbar)
Earthing	Cable Earthing Switch	Cable Earthing Switch	Cable Earthing Switch	
Short name, comment	Load-Break-Switch (LBS)	Fuse-switch	Circuit breaker (1)	AIS metering
Symbol	DM107864 	DM107866 	DM107867 	DM107868 

(1) Please consult us for availability.
(2) M1 is a part from FBX range from Schneider Electric. Please consult FBX catalog and documents for more details.

Functional overview

Choice of functional units

Example of possible configurations of functional units



(*) Please consult us for availability

Legend

M	Motor	A	Measuring		Arc killer
O/C	Protection relay	LCI	Live Cable Interlock		iCTF (integrated cable test facility)
FPI	Fault passage indicator		Tripping coil		

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Standards

RM AirSeT units meet the following recommendations and standards:
- IEC standards.

PM109289

IEC standards

62271-1	High voltage switchgear and controlgear - Part 1: Common specifications
62271-200	AC metal enclosed switchgear and controlgear for rated voltage above 1 kV and up to and including 52 kV
62271-103	Switch-disconnectors: High voltage switches for rated voltage above 1 kV and less than 52 kV
62271-100	Circuit breakers: High voltage alternating current circuit breakers
62271-105	Switch-fuse combinations. Alternating current switch-fuse combination
62271-102	Part 102: High-voltage alternating current disconnectors and earthing switches
62271-206	Part 206: High-voltage prefabricated switchgear and controlgear assemblies - Voltage presence indicating systems
62271-213	Part 213: High-voltage switchgear and controlgear assemblies - voltage detecting and indicating system
62271-210	Part 210: Seismic qualification for metal enclosed switchgear up to 52 kV
EN 50181:2010	Plug-in type bushings above 1 kV up to 52 kV and from 250 A to 2.50 kA for equipment other than liquid filled transformers
61869-2	Instrument transformers – Part 2: Current transformers (replacing old IEC 60044-1)
61869-3	Instrument transformers – Part 3: Voltage transformers (replacing old IEC 60044-2)
61869-6	Instrument transformers - Part 6: Low-Power instrument transformers (for LPCT and LPVT replacing old IEC 60044-7 and IEC 60044-8)
60255	Measuring relays and protection equipment
60529	Degrees of protection provided by enclosures (IP code)

Sustainable Development

Quality, environment and manufacturing certifications

IEC 62474	Material declaration for products of and for the electrotechnical industry.
REACH	REACH compliance (Registration, Evaluation, Authorisation and Restriction of Chemicals) as per European Union regulation EC 1907/2006.
RoHS	RoHS compliance to European Directive RoHS (2002/95/CE) including its addenda in 2008, 201 and 2017 (Restriction of Hazardous Substances in electrical and electronic equipment).
ISO 14040:2006	Including amendments 1 2020: Environmental management - life cycle assessment - Principles and framework.
ISO 14044:2006	Including amendments 1 2017 and 2 2020: Environmental management - life cycle assessment.

Operating conditions

The RM AirSeT design for service operation of 40 years is based on normal service conditions defined in the IEC 62271-1, described here.

- RM AirSeT units are designed for indoor installations.
- Installation is possible against walls or in the middle of an electrical room with the 4 sides accessible:
  RM AirSeT can be installed and operated from the front.
  Cables are connected from the front.
- The control functions are centralized on a front plate, thus simplifying operation.

Normal operating conditions as per IEC 62271-1

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
- Higher than or equal to -25 °C.

A specific battery may be needed for use below °C: please consult Schneider Electric

Altitude

- Lower than or equal to 2000 m
- Above 2000 m, please consult Schneider Electric services teams.

Temperature

The derating in temperature for I_r is the following:

			40 °C	45 °C	50 °C	55 °C	60 °C
Busbars 630 A	I_r	A	630	600	570	540	510
Functions **I**, **R**, and **B**		A	630	600	570	540	510
Function **Q**		A	(1)	(2)	(2)	(2)	(2)

(1) Depends on fuse selection page 67
(2) For the case, please consult Schneider Electric

RM AirSeT protection index as per IEC 60529	
Tank with HV parts	IP67
Low voltage control compartment	IP4X
Front face + mechanism	IP4X
Protection against mechanical impact	IK07

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Internal arc fault withstand

Benefit from World Leader

Schneider Electric has an extended experience in the design of secondary switchgears which benefit to RM AirSeT performances especially regarding the internal arc containment.

However, the first design philosophy is to reduce the probability of internal default. The live parts located inside the IP67 sealed compartment, as well as the index of protection of the cable compartment contribute to reduce the probability of "an internal arc" due to dust or entry of rodents for example. EcoStruxure digital monitoring options as the Thermal monitoring on the cable termination allow the operator to monitor an abnormal behavior, allowing anticipation and correction of defaults before they generate an internal fault.

Internal arc classification

The Appendix A of the IEC 62271-200 specifies the conditions and criteria to be fulfilled for the type tests on metal enclosures in the event of internal faults.
The presence of an operator on the accessible sides of a switchgear inside electrical substations is simulated during this test according to the type A classification.
The internal arc classification IAC is granted when all these criteria are passed.

This IAC classification aims at reducing the risk to an operator in the event of an internal fault. RM AirSeT is designed to limit the effects of an internal arc by means such as:

- Reinforced panels of the enclosure to damp the thermal and mechanical forces that an internal arc can produce
- Trunking of hot gases to protect an operator situated around the RM AirSeT switchboard against the effects of arcing (according to Schneider Electric condition of use and installation recommendations)
- Limitation of an accidental overpressure due to an internal arc in the compartments by the opening of the relief pressure device, at the bottom of the metal enclosure.

RM AirSeT with the internal arc withstand option has been successfully type tested at 20 kA during 1 s to meet the IAC with accessibility class A on the 4 sides according to the IEC 62271-200 (5 acceptance criteria):

- F Front
- L Lateral (Right and Left)
- R Rear.

Internal arc fault withstand

Various installation conditions

The IAC classification A-FLR equally allows installation of RM AirSeT in various types of substations (typically in walk-out or walk-in prefabricated kiosks or in buildings):

- With front access only
- With front and lateral access
- Or with front, lateral and rear access.

The evacuation of the gases shall be provided at the bottom of the substation (typically in the cable trench). Civil engineering with an adequate volume is necessary. More details depending on the size of the switchgear are provided in the civil engineering and installation manual.

Front access

3D view

PM111125



Side view

PM111120



Front & lateral access

PM111124



PM111122



Front, lateral and rear access

PM111123



PM111118



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Arc killer

DM107864

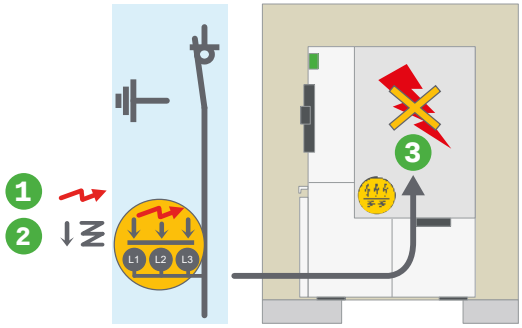


PM111223



Fig. 1: Arc Killer symbol on front mimic

DM110162



1 An internal arc creates a sudden tank overpressure

2 Springs mechanically short circuit the three phases

3 The internal arc disappears in few milliseconds

Fig. 2: Principle of arc killer

Principle

- The Arc killer is a mechanical device triggered in few milliseconds by the overpressure resulting of an internal arc inside the tank: it short-circuits the 3 phases. The upstream circuit breaker trips under the effect of line-to-line short circuit within the time of activation of the network protection. In absence of voltage between phases the arc is immediatly estinguished.
- In the tank the arc duration and the resulting air overpressure are drastically reduced: the safety membrane of the tank does not open, avoiding release of hot gases and particles in the substation.
- The effectiveness of this device is proven for decade in the Schneider Electric RM6 range.
- The performance of the system in RM AirSeT provides a consistent performance from 0 to 20kA up to 1s: For low arcing current up to few hundred Ampere, the low overpressure inside the tank prevents from safety membrane's opening. For higher current the activation of RM AirSeT arc-killer device is validated up to 20kA in the most constraining configurations.

Use

- Internal arc inside the sealed compartment remains a very rare phenomenon. However, its consequences typically require substation's designs qualification as per IEC 62271-202 such as IAC type tests for substations.
- Arc killer (also called arc suppressor) is a concept required by some customers and local regulations as an alternative to re-use existing compact substations, reduce the footprint for new designs, or install in a confined location like wind turbine tower…
- Unlike an internal arc in a tank without arc killer, the device helps to avoid hot gases or particles from being exhausted, while mitigating the consequences in the electrical room (over pressure, subsequent cleaning...).
- Arc killer is applied for distribution in switches (for instance, for RM AirSeT type NE-II, NE-III, NE-IQ, NE-IIQ, NE-IQI, NE-IIIQ, NE-IB, NE-IIB, NE-IBI, NE-IIIB…).

limits to application

- The arc killer does not operate in case of internal arc happening in another compartment, like the cable compartment. Therefore, regulations requiring arc killers generally request the mitigation of the probability and the consequences of any internal arc in the cable compartment:
  - The MV cables and cable connectors must be shielded and properly earthed, to prevent from line-to-line short circuit in the cable compartment.
  - The neutral earthing system shall limit the earth fault to low current, and its elimination happening at first fault.

Selection in RM AirSeT

- The Arc killer is an option, available on the ring functional units (I). It is assembled before the welding of the sealed compartment. It is only available in "NE" tanks (non-extensible),
- The compactness of RM AirSeT remains intact,
- An option "AK Indic" is available to provide a local visual indication as well as a remote indication in case of a triggered arc killer.

Function/module description

Functional overview **33**

I function: 3-position switch-disconnector Load Break Switch 33

Q function: 3-position Switch-Fuse combination 35

B function: Vacuum Circuit Breaker with three position Disconnector 37

M1 function: Air Insulated Metering Connection by cable 39

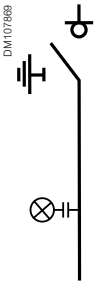
Functional overview

I function: 3-position switch-disconnector Load Break Switch

DM107864



DM107869



PM109963



Characteristics

Insulation and switching					
Switching		Switch-disconnector: Shunt Vacuum Interruption (SVI)™		**SVI**	
Disconnecting principle		In pure air, sealed compartment from ambient conditions		Three position disconnector	
Switch-disconnector class		Extended endurance (IEC 62271-102 & 103)		YES	
Capability on rated current		To CLOSE / to OPEN		YES / YES	
Capability in case of Short-Circuit		To CLOSE / to OPEN-TRIP		YES / NO (1)	
Switching contacts - Breaking Medium				**Vacuum interrupter** (1)	
Insulation medium		3 positions: Closed-connected/Open disconnected/Earthed		**Pure Air** (2)	
Earthing of cable					
Heavy duty Earthing switch		Making capability (closing on short-circuit)		YES	
Earthing switch class		Extended mechanical endurance as per IEC 62271-102		YES	
Circuit for Earthing of cables				Independent of vacuum interrupter	
Insulation level - voltage withstands					
Rated voltage	Ur		kV	**12**	**24**
Rated frequency	f_r		Hz	50 / 60	
Rated short-duration power-frequency	U_d	Phase-to-Phase & Phase-to-Earth	kV (1 mn RMS)	28	50
		Across the Isolating Distance		32	60
Rated lightning impulse	U_p	Phase-to-Phase & Phase-to-Earth	kV (1.2-50 µs)	75	125
		Across the Isolating Distance		85	145
Current					
Rated current	I_r	Functional unit	A	630	
		Busbar	A	630	
Short time withstand current	I_k/I_{ke}		kA	20 / 20	
Duration	t_k/t_{ke}		s	1 s or 3 s / 1 s	
Rated peak withstand current	I_p		kA	52	
Breaking capacity	I_{load}	Switch-Disconnector (Load-Break-Switch)	A	630	
Making capacity	I_{ma}	Switch-Disconnector	kA	50	
		Earthing Switch	kA	50	
Bushing	Type			C (3)	

(1) Using the SVI™ technology, the switching contact in the vacuum interrupter is active a for couple of milliseconds during opening of main contacts. The Vacuum interrupter is not used for closing.

(2) Pure air is compliant with IEC 62271-4 (gas handling) and IEC 63360 (gas composition) for synthetic air. It comprises approx. 79% nitrogen (N2) and 21% oxygen (O2) with less than 30ppm of other gases. Refilling of air is not needed under normal service conditions defined by the IEC 62271-1.

(3) Please consult Schneider Electric for other options.

Functional overview

I function: 3-position switch-disconnector Load Break Switch

Switch-Disconnector Endurance (1) classes		
Classification of mechanical endurance	M1 = 1 000 M2 (extended) = 5 000 or 10 000 operations	M2 10000 with CDT 5000 with CD2
Classification for current breaking	E1 = 10 - 2 | E2 = 30 - 3 E3 = 100 cycles at I_{load} and 0.7p.f. - 5 at I_{ma}	E3
Classification for capacitive switching and probability of restrike	C1 = capacitive switching C2 = capacitive switching restrikes unprobable	C2
Earthing Switch Endurance class		
Classification of mechanical endurance	M0 (normal) = 1 000 M1 = 2 000 CO cycles	M1
Classification short circuit making	E1 = 2 E2 = 5 at I_{ma}	E2
Recycling considerations		
Specific procedure of handling for operation/recycling of gases		No hazardous gas (Air Only)
SF6-free technology		YES
Service life		40

(1) In conformity with the definition of "Switch-Disconnector", Load-Break-switch insuring Operation on rated current, Closing on short-circuit and insulation between open contacts. More operations are possible for Automatic Transfer or Smart Grid thanks to the M2 endurance class (similar to a Circuit-Breaker).
"Switch-Disconnector" does not trip short circuit current: Switch-Fuse combination or Circuit-Breaker are available in functions Q or B.

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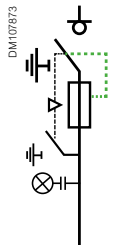
All pictures of the catalogue illustrate the product in an environment close to reality. They were taken off-line. For live operation the P.P.E. (personal protective equipment) must be used in accordance with the regulations of the place of installation.

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Functional overview

Q function: 3-position Switch-Fuse combination







Characteristics

Insulation and switching					
Switching		Switch-disconnector: Shunt Vacuum Interruption (SVI)™		**SVI**	
Disconnecting principle		In pure air, sealed compartment from ambient conditions		Three position disconnector	
Switch-disconnector class		Extended mechanical endurance as per IEC 62271-103		**YES**	
Interrupting Capability on rated current		To CLOSE / to OPEN		**YES / YES**	
Interrupting Capability on Short-Circuit		To CLOSE / to OPEN-TRIP: IEC 62271-105		**YES / NO**	
Switching contacts - Breaking Medium				**Vacuum interrupter** (1)	
Insulation medium		3 positions: Closed-connected/Open disconnected/Earthed		**Pure Air** (2)	
Earthing of cable					
Heavy duty Earthing switch		Making capability (closing on short-circuit)		YES	
Earthing switch class		Extended mechanical endurance as per IEC 62271-102		YES	
Circuit for Earthing of cables				Independent of vacuum tube interrupter	
Insulation level - voltage withstands					
Rated voltage	Ur		kV	**12**	**24**
Rated frequency	f_r		Hz	50/60	
Rated short-duration power-frequency	U_d	Phase-to-Phase & Phase-to-Earth	kV (1 mn RMS)	28	50
		Across the Isolating Distance		32	60
Rated lightning impulse	U_p	Phase-to-Phase & Phase-to-Earth	kV (1.2-50 µs)	75	125
		Across the Isolating Distance		85	145
Current					
Rated current	I_r	Functional unit	A	200	
		Busbar	A	630	
Short time withstand current	I_k/I_{ke}		kA	20 / 20	
Duration	t_k/t_{ke}		s	1 s or 3 s / 1 s	
Rated peak withstand current	I_p		kA	52	
Breaking capacity	I_{load}	Switch-Disconnector (Load-Break-Switch)	kA	20	
Making capacity	I_{ma}	Switch-Disconnector	kA	50	
		Earthing Switch	kA	50	
Bushing	Type			A (3)	

(1) Using the SVI™ technology, the switching contact in the vacuum interrupter is active a for couple of milliseconds during opening of main contacts. The Vacuum interrupter is not used for closing.

(2) Pure air is made by filtering ambient air in order to remove humidity and impurities.

(3) Please consult Schneider Electric for other options.

Functional overview

Q function: 3-position Switch-Fuse combination

Switch-Disconnector Endurance classes		
Classification of mechanical endurance	M1 = 1 000 M2 (extended) = 5 000 operations	M1 (1000) (CD1)
Classification for current breaking	E1 = 10 - 2 | E2 = 30 - 3 E3 = 100 cycles at I_{load} and 0.7p.f. - 5 at I_{ma}	E3
Classification for capacitive switching and probability of restrike	C1 = capacitive switching C2 = capacitive switching restrikes unprobable	C2
Earthing Switch Endurance class		
Classification of mechanical endurance	M0 (normal) = 1 000 M1 = 2 000 CO cycles	M1
Classification short circuit making	E1 = 2 E2 = 5 at I_{ma}	E2
Recycling considerations		
Specific procedure of handling for operation/recycling of gases		No hazardous gas (Air Only)
SF6-free technology		YES
Service life		40
Possible selection of fuse chamber time delay system		

PM109772



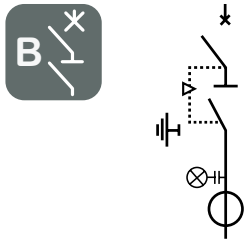
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Functional overview

B function: Vacuum Circuit Breaker with three position Disconnector

DM107867



PM111084



Characteristics

Please consult us for availability of B functional unit.

Insulation and switching					
Switching / breaking		Vacuum Circuit-Breaker CB		CB	
Commutation principle		1 CB + 3 position disconnector			
Capability on rated current		To CLOSE / to OPEN		YES / YES	
Capability in case of Short-Circuit		To CLOSE / to OPEN-TRIP		YES / YES	
Switching contacts - Breaking Medium				Vacuum interrupter	
Insulation medium		3 positions: Closed-connected/Open disconnected/Earthed		**Pure Air** (1)	
Earthing of cable					
Heavy duty Earthing switch		Making capability (closing on short-circuit)		YES (2)	
Earthing switch class		Extended endurance (IEC 62271-102)		YES	
Circuit for Earthing of cables				Independent of vacuum interrupter (2)	
Insulation level - voltage withstands					
Rated voltage	Ur		kV	**12**	**24**
Rated frequency	f_r		Hz	50 / 60	
Rated short-duration power-frequency	U_d	Phase-to-Phase & Phase-to-Earth	kV (1 mn RMS)	28	50
		Across the Isolating Distance		32	60
Rated lightning impulse	U_p	Phase-to-Phase & Phase-to-Earth	kV (1.2-50 µs)	75	125
		Across the Isolating Distance		85	145
Current					
Rated current	I_r	Functional unit	A	630	
		Busbar	A	630	
Short time withstand current	I_k/I_{ke}		kA	20 / 20	
Duration	t_k / t_{ke}		s	1 s or 3 s / 1 s	
Rated peak withstand current	I_p		kA	52	
Breaking capacity	I_{sc}	Circuit-breaker	kA	20	
Making capacity	I_{ma}	Disconnector	kA	50	
		Earthing Switch	kA	50	
Bushing	Type			C	

(1) Pure air is compliant with IEC 62271-4 (gas handling) and IEC 63360 (gas composition) for synthetic air. It comprises approx. 79% nitrogen (N2) and 21% oxygen (O2) with less than 30ppm of other gases. Refilling of air is not needed under normal service conditions defined by the IEC 62271-1.

(2) The cable is directly EARTHED by the 3 position disconnector (independently from the circuit in the vacuum interrupters). The capability of making-closing on short circuit as defined by the standards is provided by the Earthing Switch.

Functional overview

B function: Vacuum Circuit Breaker with three position Disconnector

Circuit-Breaker Endurance classification (IEC 62271-100)		
Mechanical endurance	M1 = 2 000	●
	M2 (extended) = 10 000 operations	○
Electrical endurance	E2	●
Capacitive switching and probability of restrike	C2	●
Available application Capabilities - Operating sequences		
Operating sequences	O - 0.3s - CO - 3 min - CO	●
	O - 0.3s - CO - 15 s - CO	○
Recycling considerations		
Specific procedure of handling for operation/recycling of gases		No hazardous gas (Air Only)
SF6-free technology		YES
Service life		40

The operating sequences of the circuit breaker allow fast transfer ATS and Auto-Reclosing.

Resulting from decades of experience, the Vacuum Circuit Breaker integrated to RM AirSeT is an evolution of the best Schneider Electric vacuum CB ranges. As per class E2 of IEC 62271-100. It is designed to not require maintenance of the making and breaking units during its expected operating life.

Legend:

●: *Standard* / ○: *Option*

Life Is On Schneider Electric

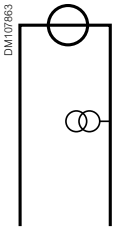
Functional overview

M1 function: Air Insulated Metering Connection by cable

DM107868



DM107863



PM103239



Introduction

M1 is part of FBX range. It is SF6-free. It allows a connection by cables.

Characteristics

Insulation level - voltage withstands					
Rated voltage	Ur		kV	**12**	**24**
Rated frequency	f_r		Hz	50/60	
Rated short-duration power-frequency	U_d	Phase-to-Phase & Phase-to-Earth	kV (1 mn RMS)	28	50
		Across the Isolating Distance		32	60
Rated lightning impulse	U_p	Phase-to-Phase & Phase-to-Earth	kV (1.2 µs)	75	125
		Across the Isolating Distance		85	145
Current					
Rated current	I_r	Busbar	A	630	
Short time withstand current	I_k		kA	21	20
Duration	t_k		s	1 or 3 s	
Rated peak withstand current	I_p		kA	52.5	50
MV cable connection	Type			EUIC	
Life Cycle characteristics					
Insulation				Air insulated under IP4X envelope	
End-Of-Life procedure for gas recovery / tax or regulation on gas				None: no synthetic-gas or F-gas (air only)	

Note: M1 is a part from FBX range from Schneider Electric. Please consult FBX catalog and documents for more details.

Components and accessories

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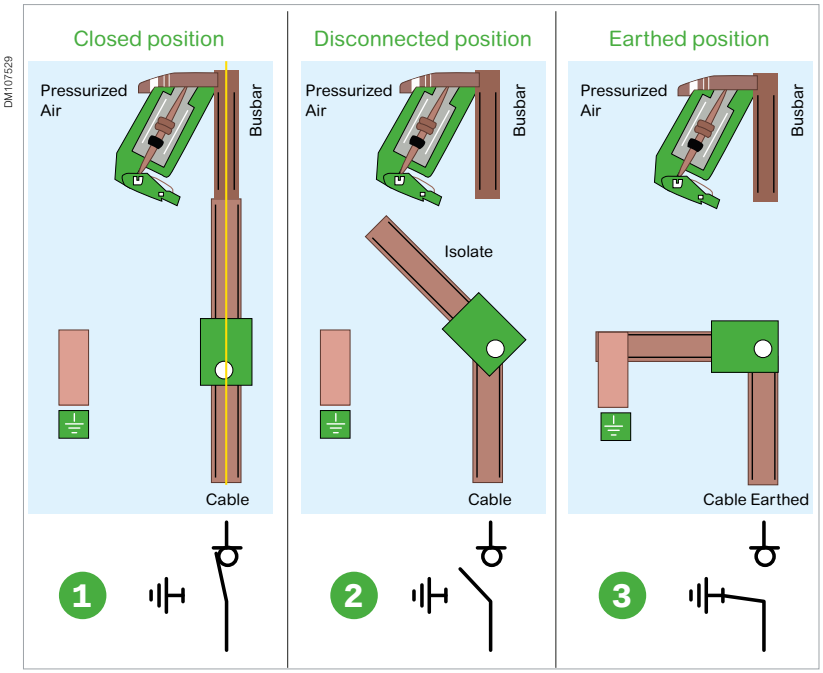
3 position switch-disconnector and earthing switch

Shunt Vacuum Interruption (SVI)™

SVI technology at a glance:

- 3 position switch (one operation to break and disconnect, one operation to earth).
- High mechanical endurance: up to 10 000 CO.
- Vacuum technology is well known and proven.
- Designed and tested according to IEC standards 62271-103 (switch) and IEC 62271-105 (switch-fuse combination).
- Compact and robust.
- Patented design from Schneider Electric.

Functional units I and Q:



Principle

Shunt Vacuum Interruption (SVI)™ is located in pressurized pure air, helping to provide the dielectric withstand.

Shunt Vacuum Interruption (SVI)™ works by shunting the current through the vacuum interrupter while the disconnector is opening, so that the current is interrupted in vacuum.

It is a compact and robust disconnecting and breaking device for both load break switch and switch-fuse applications.

- Reliability of breaking by vacuum interrupter
- Safety of disconnection by an air gap
- Breaking and disconnecting in one operation

Main benefits

Advantages: enhanced reliability, reduced maintenance costs

1. Proven vacuum technology and air gap disconnection
2. No toxic byproducts generated during breaking
3. High mechanical endurance: up to 10 000 CO operations so 10 times M1 class according to IEC 62271-103: ready to increase number of reconfiguration due to new constraints on the networks
4. High breaking capacity helping to protect large distribution transformers with switch-fuse combination
5. Adapted to smart grid with high level of distributed energy resources and frequent reconfigurations of the network
6. 3 positions switch (one operation to break and disconnect, one operation to earth): simple and usual operation, no change of operator habits
7. Shunt Vacuum Interruption (SVI) technology enables switch device to be as compact as the SF6 one

Vacuum Circuit Breaker

DE60163

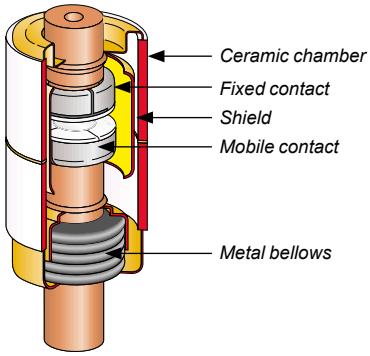


Fig. 1: vacuum interrupter components

More than 60 years of experience in MV vacuum circuit breakers

The vacuum interrupter has to convey and break the rated normal current, and has to convey and break the rated short-circuit current a number of times, in line with the manufacturer's specification.

It consists of two electrical contacts, one fixed and the other mobile inside a sealed enclosure. The level of pressure inside the enclosure has to be very low to reach the value specified for the dielectric withstand between the open contacts. In order to maintain the pressure level inside the interrupter throughout its expected operating life, the enclosure has to be perfectly sealed, and the various components have to be fully degassed.

To help achieving this goal,

- the materials are specifically selected for this application (metals and ceramics)
- an appropriate assembly process is chosen (vacuum, high temperature brazing)
- The use of a "getter" material to absorb the residual gas inside the enclosure
  - RM AirSeT vacuum interrupters are designed to operate under the conditions defined by the IEC standard.Mechanical operating tests.

Quality upgraded by continuous improvement

PE55694



RM AirSeT vacuum circuit breakers have been designed in accordance with rigorous verification checks that include:

- A product design quality system certified ISO 9001
- Recognized simulation software to verify the dielectric, thermal, and electrodynamic behavior of the circuit breaker components in various switchgear models
- Extensive type tests in laboratories accredited according to ISO/IEC 17025 standard.

Robust manufacturing controls

RM AirSeT vacuum circuit breaker is manufactured in factories certified compliant to ISO 9001 for product quality by third party. The following quality controls are implemented to customers.

- Regular inspection of critical components and processes using a coordinate measuring machine
- Regular measure of residual gas inside the vacuum interrupter by mass spectrometry
- Regular mechanical tests on circuit breaker samples
- Routine tests on all products:
  - Dielectric tests on the main circuit
  - Tests on auxiliary and control circuit
  - Measurement of the resistance of the main circuit
  - Design and visual checks
  - Mechanical operating tests
  - Tightness test of each individual vacuum interrupter.

Consult Schneider Electric for availability

Life Is On Schneider Electric

Operating mechanism

Switch/Disconnector and Earthing switch

PM109171



CompoDrive: more endurance and flexibility, less maintenance

RM AirSet integrates the modern CompoDrive operating mechanism for Disconnector, Switch-disconnector and Switch-Fuse functions.

CompoDrive forms a comprehensive mechanical set with the mobile active parts for long term performances.

RM AirSeT offers three types of CompoDrive operating mechanisms - one per type of application:

- Spring mechanisms: opening / closing time are independent of the lever speed
  - Without latching: CDT without Energy stored
  - With 1 latching system: CD1 with Energy stored to Open
  - With 2 latching systems: CD2 with Energy stored to Close & Open

(Spring with latching allows faster closing and opening for some applications: mostly fuse switches, Automatic Transfer Switch...)

PM109161



Double-function operating mechanism CDT

Switch function

Operation-independent opening or closing by lever or motor when operated electrically, an operation requires less than 10 s.

Earthing switch function

- Operation-independent opening or closing by lever.
  Operating energy is provided by a compressed spring which, when released, causes the contacts to open or close.

PM109174



Double-function operating mechanism CD1

Switch function

Operation-independent opening or closing by lever.

- Operation-independent opening by pushbutton (O) or Opening coil (optionnal).
  Operating energy is provided by a compressed spring which, when released, causes the contacts to open or close.

Earthing switch function

- Operation-independent opening or closing by lever.
  Operating energy is provided by a compressed spring which, when released, causes the contacts to open or close.

DM109173



Double-function operating mechanism CD2

Switch function

- Operation-independent closing in two steps:
  1 – Operating mechanism recharging by lever or motor with opening & closing coils
  2 – Stored energy released by pushbutton (I) or electrical release
- Operation-independent opening by pushbutton (O) or trip units when operated electrically, an operation requires less than 500 ms.

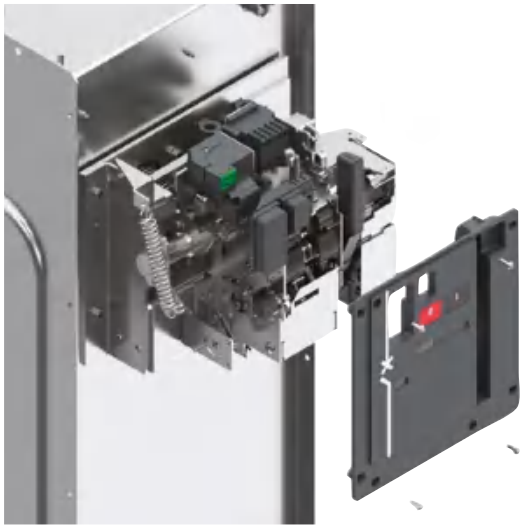
Earthing switch function

- Operation-independent opening or closing by lever.
  Operating energy is provided by a compressed spring which, when released, causes the contacts to open or close

Operating mechanism

Circuit breaker

PM109962



Operating mechanism of circuit breakers

The B functional unit (please consult us for availability) comprises two operating mechanisms for:

- The rotation of the disconnector and earthing switch (CompoDrive type CDT)
- The actuation of the Vacuum Interrupters of the Circuit Breaker.

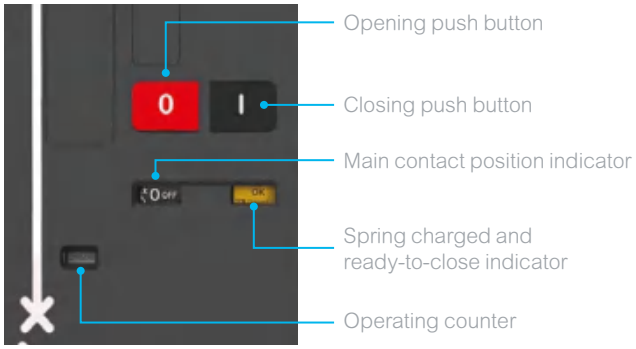
The disconnector and earthing switch is located on the cables side, in order to provide a direct connection between the cables and the Earthing switch (Earthing independent from position of contacts in the vacuum circuit breaker).

The two mechanisms are equipped with mechanical functional interlock, avoiding operation of disconnector when circuit breaker is in closed position.

- An evolution of proven mechanisms from Schneider Electric benefiting from decades of experience in Medium Voltage Circuit Breakers
- Springs store the energy to fast open-trip, and fast close
- **Local / Manual controls**
  - 2 push buttons at front for manual opening and closing orders
  - Mechanical indicators (spring “charged” / “discharged” – device “open” / “closed”)
  - Built-in lever for manual loading (no additional tool is required)
  - Operation counter (option “CDM”)
- **Controls are easily accessible**.

Push buttons and indicators

PM108728



Life Is On Schneider Electric

Operating mechanism

Description

Functional unit		Operating mechanism	Disconnector / Switch-disconnector CompoDrive Mechanism			CB mechanism
		Type	CDT (0)	CD1 (1)	CD2 (2)	CDT + CB (3)
		Mechanism principle	Spring mechanism (2)	Energy stored (O)	Energy stored (C & O)	Disconnector + energy stored (C & O)
Speed of operation			Independent from operator			
Available operations: Local/remote - Manual/Electrical						
Local Operation mode	Operating lever					
	Mechanical push buttons		-			
Motor option availability			M	-	M	M (5)
Coil/releases option availability	Opening/Tripping Release		-			
	2nd Opening/Tripping Release		-			
	Closing release		-	-		
DM107864 **Switch-Disconnector**						
Manual			●	-	-	-
Controlled from remote via RTU or for Automatic transfer system (ATS)			○ (motor)	-	○ (coils & motor)	-
DM107866 **Switch-fuse**						
Transformer protection with Switch-fuse combination			-	● (4)	○ (2)	-
Trip by fuse, relay, transformer protection: pressure, temperature			-	○ (coil)	○ (coil)	-
Transformer feeder: controlled from remote via RTU			-	○ (coil)	○ (coils & motor)	-
DM107867 **Circuit Breaker with three position Disconnector**						
Disconnector (breaking by circuit breaker)			●	-	-	
Circuit Breaker with fast auto-reclosing operating sequence						●

Auxiliary contacts clarification

(0) CDT operating mechanism: CompoDrive tumbler mechanism does not comprise any Latching:
OPEN and CLOSE position are achieved by turning the LEVER or by motor mechanism.

(1) CD1 operating mechanism: with Energy stored (O) on the mechanism: a LEVER or motor mechanism allow to close and load the spring simultaneously;
1 PUSH BUTTON allows to OPEN the Switch-Disconnector. Shunt or Undervoltage («coil») are available.

(2) CD2 operating mechanism: Energy stored (C & O) on the mechanism: the LEVER or motor mechanism allow to load the springs for Closing and for Opening;
2 PUSH BUTTONS allow to OPEN or CLOSE the Switch-Disconnector.
Shunt and Undervoltage RELEASES («coil») are available.

(3) The B functional unit comprises 2 mechanisms:

- *Heavy duty Operating mechanism with energy stored (C & O) for Vacuum Circuit Breaker*
- *CDT operating mechanism for disconnector. providing the making capacity for earthing, independent from Vacuum CB*

Interlock equipped to prevent operation of Disconnector when CB is in closed position.

(4) Please consult us.

(5) motor available on the circuit breaker operating mechanism.

Legend:

●: *Standard* / ○: *Option* / -: *Not Available* — M *Motor* — *Coil* — *Local control*

Operating mechanism

Auxiliary contacts/Control terminal blocks



Accronyms:

NO/NC: *change-over dry contacts for normally opened/ normally closed, with one common point. They are wired up to the LV compartment*

SW, SO/SC: *line disconnector or switch-disconnector, in open/closed position*

ESW, ESO/ESC: *earthing switch, in open/closed position*

CTB: *Control Terminal Block*

PS*: power supply.*



Note about the auxiliary contacts
On a CompoDrive not motorised, the NO/NC dry contacts are available on terminal blocks.
On a motorised CompoDrive:
• 2 line disconnector NO/NC and 1 earthing switch NO/NC are connected to CTB.
They are not available on terminal blocks.
• additional wet contacts are available on CTB unmistakable connectors:
- on RTU port: 1 SO, 1 SC, 1 ESO, 1 ESC
- on HMI port: 1 SO, 1 SC, 1 ESC
• if true the wet contacts are connected to the 0V of control PS (if false, the wet contact is open).



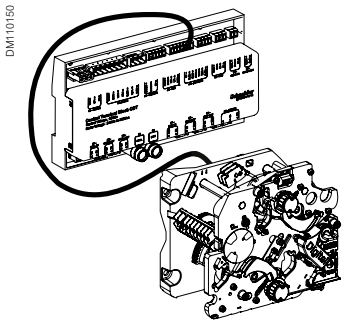


Fig. 1: models of CTB

Note about the power supplies (PS) :
The CTB uses 2 independent power supplies:
• the motor PS : CompoDrive motor, coils (if any)
• the control PS : controls and monitoring signals.

The CTB selection (fig. 1) depends on :
• the type of CompoDrive (CDT, CD2)
• the control PS available (12 V DC, 24 V DC, 48 V DC).
When auxiliary voltage is 24 V DC or 48 V DC, the same power supply can be used. When available voltage is superior, CTB for 24 V DC control PS is supplied with an optional power conversion kit.
All models of CTB can control motors between 24 V DC and 240 V AC/DC.

Auxiliary contacts

3 position disconnectors		
Auxiliary contacts on the CompDrive mechanism		
Kit selected	**Line disconnector**	**Earthing switch**
Without	0 NO/NC	0 NO/NC
3 : 2 C/O - SW + 1 C/O - ESW	2 NO/NC	1 NO/NC
7 : 5 C/O - SW + 2 C/O - ESW	5 NO/NC	2 NO/NC
9 : 7 C/O - SW + 2 C/O - ESW	7 NO/NC	2 NO/NC

Circuit breakers
Auxiliary contacts on the CB Mechanism.
0 NO / 0 NC (1)
2 NO / 2 NC (1)
4 NO / 4 NC (1)
6 NO / 6 NC

(1) Please consult Schneider Electric

Control Terminal Block (CTB) for motorised CompoDrive mechanisms

Control Terminal Block (CTB) is a device required for each motorised switch-disconnector in a functional unit I or Q.

- It provides the main electrical controls and interlocks for the motors and coil-releases of CDT or CD2 CompoDrive mechanisms. (including antipumping, lockout of the electrical operation after tripping...)
- The CTB provides one dedicated port for local HMI and one dedicated port for remote control (RTU or similar)
- The integrated power sharing system limits the output current required on power supply: only one motor can run at a time
- Its monobloc design avoids most of traditional wiring with additional auxiliary relays, and reduces error possibilities.
- CTB is not needed on motorised circuit breaker
- CTB is mounted in the LV compartment
- It mainly integrates relays and unmistakable connectors on a PCBA
- Its casing with potting helps to protect these parts from environment conditions
- 6 models are available as per fig 1.

	CompDrive type	
Control PS voltage to supply CTB	**CDT**	**CD2**
12 V DC	CDVT-CTB-12DC	CDVX-CTB-12DC
24 V DC*	CDVT-CTB-24DC	CDVX-CTB-24DC
48-60 V DC	CDVT-CTB-48DC	CDVX-CTB-48DC
Other voltages DC - AC*	Power inverter to 24 V DC	

(*) When only other voltages are available (ex. 110 or 220 V AC/DC) a CTB with 24 V DC control PS voltage is supplied from a power inverter

Life Is On Schneider Electric

Operating mechanism

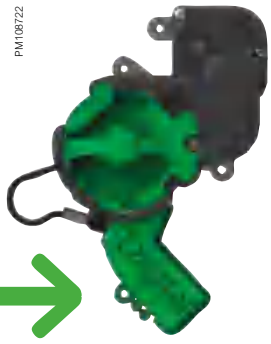
Upgrade

PM108721



When not motorized: a removable cap is natively accessible on the operating mechanism

PM108722



After motorization the motor is housed at the same place

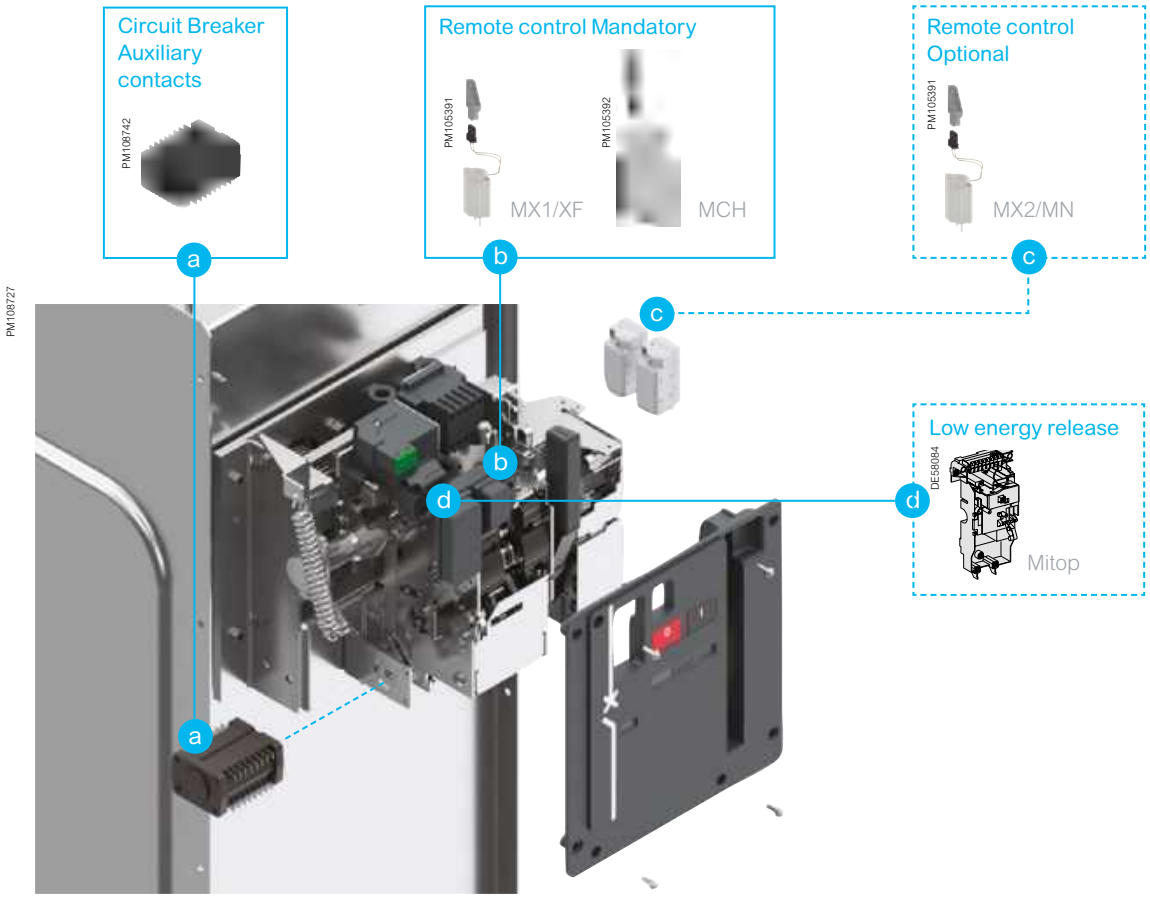
Digital: Smart Grid ready

In addition, Schneider Electric paid a special attention to allow upgrades in kiosk manufacturers, contractors, or partners workshops or at site:

- The front plate of RM AirSeT is adaptable and does not need to be replaced.
- Addition of 1 motorization kit, including wiring and any card is simplified: a few minutes are enough, with little training (“How-to-Video” available at www.se.com)
- Concretely: limited investment (install NON motorized version, and ADD only when the Substation is connected to the Distribution Automation or Advanced Distribution Management System).
- Kits are prepared to simplify the work at site: for example, motorization comprises:
  - Gear-Motor with mechanical components, and fixing accessories
  - Auxiliary contacts with LV wiring to terminal blocks
  - The advanced Control Terminal Block that allows connection to relay, RTU…

Circuit breaker operating mechanism: available kits

PM108727



Consult Schneider Electric for availability

Interlocking

RM AirSeT interlocking: Complete and robust

RM AirSeT complies with the recommendations of IEC 62271-200 for functional interlocks and integrates a set of built-in native robust mechanical interlocks in each function.

In addition, RM AirSeT provides supplementary systems adapted to the various principles adopted by Electrical Distribution Companies and Private Operators for protections of personnel and assets: Padlocking, Key locking, Live Cable Interlocking or combinations of them.

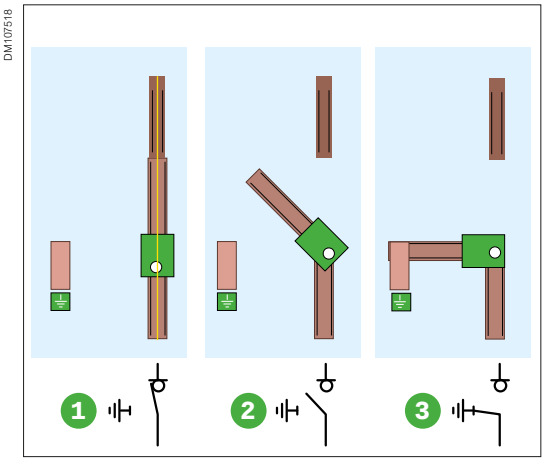
4 levels of interlocks



Each function* is equipped with the following features:

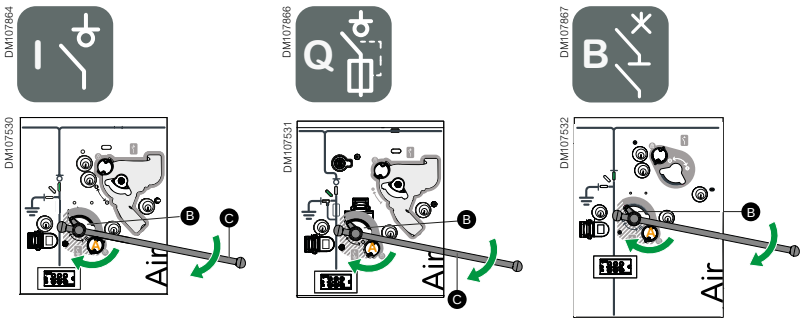
- Native Architecture and built-in functional interlocks:
  - Mechanical prevention inherent to 3 position disconnectors
  - Access to the cable compartment and to the fuses is only possible if the appropriate outgoing feeder is connected to earth.
- Padlocking capabilities
- Supplementary key interlocking
- Supplementary Live cable interlocking

*(*except function R direct incomer, when not equipped with Earthing switch)*



Consistent operation in various functional units

For example, below is an extract of user guide manuals:



Same operating lever for Switch-disconnector and Earthing Switch.

Life Is On Schneider Electric

Interlocking

Built-in functional interlocks

Cable Access Door

DM107864
DM107866
DM107867



“STANDARD” (I, Q & B functional units): Cable Access Door interlocked with Earthing Switch only.
The standard system comprises Internal interlock which prevents opening of the cable compartment door.

- Cable door can be opened with Earthing Switch (ES) closed.
- Earthing Switch (ES) cannot be reopened with Cable Door open.
- Cable termination shall be removed for some operations of Cable Testing.

“Access with ES closed and Main Switch/Disconnector open” (I & B functional units): Cable Access Door interlocked with Earthing Switch (ES) and main Switch/Disconnector.

- Cable door can be opened with Earthing Switch (ES) closed.
- Earth Switch (ES) can be reopened with Cable Access Door open: Cable termination does not need to be removed for Cable Insulation Testing.
- The main Switch/Disconnector cannot be closed with cable door open.
- Earthing Switch must be EARTHED to allow the Cable Access Door closing and back to normal integrity of the switchgear.

A **"BOLTED"** option is also available (I & B functional units): Cable access door is bolted only.
When operation is based on procedures, excluding interlock on the cable access door, the Cable Access Door interlocks are removed. In this case, the cable access door is not interlocked with earthed position.

Fuse Access Door

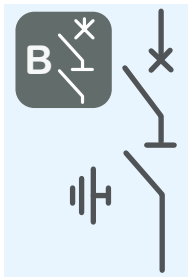
DM107866



- **“Fuse Access Door interlocked with Earthing Switch”**: Internal interlock prevents opening of the fuse compartment door.

Circuit breaker

DM107867

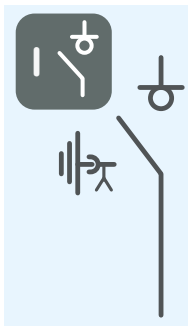


Operation of the disconnector to open or closed position is possible only if the circuit breaker is open and the cable access door is closed.

- The earthing switch can be closed only if the circuit breaker is open.
- The earthing switch is independent from the circuit breaker. The circuit breaker position has no consequence on the earthing.

iCTF (integrated cable test facility) access door

DM107864
DM110159



iCTF access door interlocked with Earthing switch:

- closing the earthing switch is required to open the iCTF access door.
- closing the iCTF earth bar is required to close the iCTF access door.
- closing the iCTF access door is required to open the earthing switch.

Interlocking

Key locking options



Key interlocks are optional. Later upgrade is possible.

Flexible: 2 possible modes of selection

In the configuration tool of RM AirSeT, it is possible to select the key locks:

Selection mode 1: functional by DIRECT SELECTION Preconfigured key interlocking system for the most common interlocking logics.

Selection mode 2: individually for each lock INDIVIDUALLY FOR EACH KEY LOCK for specific requirement.

Legend:

: no key

: free key

: captive key

Selection mode 1: Functional

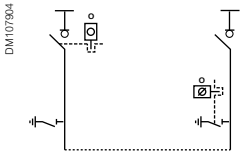
Preconfigured key interlocking

This mode of selection is simpler. It covers common cases in electrical distribution companies and private substations.

Network connection

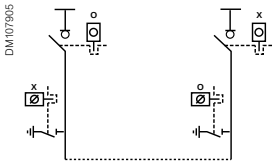


Key interlock type "R1": Semi-crossed locking



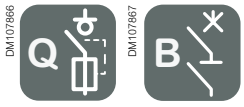
- Prohibits the closing of the earthing switch of the downstream switchgear unless the upstream switchgear is locked in the “open” position
- The functional unit can be mounted as:
  - "R1 feeder" : lock on line (version left on the diagram)
  - "R1 incomer" : lock on earthing switch (version right on the diagram)

Key interlock type "R2": Crossed locking

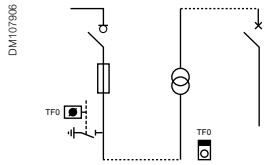


- Prohibits closing of the earthing switches unless the upstream and downstream switchgear are locked in the “open” position

Transformer protection

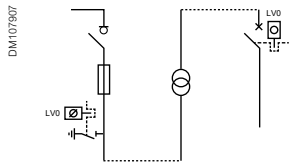


Key interlock type "R7": Transformer



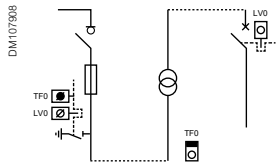
- Prohibits access to the transformer unless the earthing switch has been locked in the “closed” position

Key interlock type "R6": 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

Key interlock type "R8": Transformer/low voltage



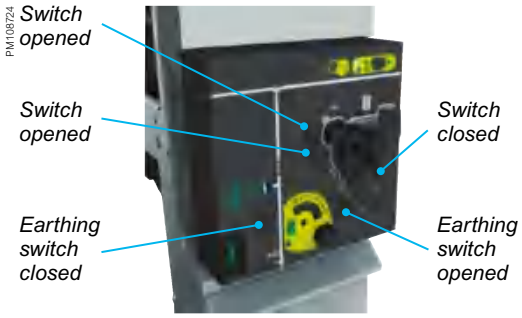
- Prohibits closing of the earthing switch and access to any protection unit fuses unless the main LV circuit breaker has been locked in the “open” or “disconnected” position”
- Prohibits access to the transformer unless the earthing switch has already been “closed”

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Interlocking

Supplementary key interlocks





Key locks ON DISCONNECTOR

Selection mode 2: Individually for each lock

For the most complex key locking systems, a definition of each and every key locking kit is possible:

Example: selecting 2 open-disconnected and 1 Earth open will allow them to be mounted at the factory, and provide a loose key lock to be assembled on the other component to be interlocked.

Locks blocking the disconnector mechanism in position:	Disconnector with CDT Mechanism spring mechanism	Disconnector with CD1 or CD2 Mechanism with 1 or 2 buttons / energy stored mechanisms
OPEN-DISCONNECTED	2	1
CLOSED	1	-
EARTH in OPEN	1	1
EARTHED	1	1



Flat key type



Tubular key type

Flexible: 2 Choices in the key locks

Each key lock system is available with

- Flat key type,
- Tubular key type.

Integrated cable test facility (iCTF)

iCTF stands for “integrated Cable test facility”: it aims at facilitating the tests on Medium voltage cables and separable connectors from the front of RM AirSeT.
Cable compartment access, or dismantling cable terminations are not needed.

PM111221



Fig 1: single line diagram of I functional unit with iCTF.

Principle:

- The iCTF (integrated cable test facility) helps the operator to perform tests thanks to a direct connection to the core of each cable.
- An original test circuit is built in the sealed compartment and connected to the front of the switchgear via iCTF bushings. These iCTF bushings are protected behind a metallic iCTF cover, located at the front of the switchgear under the Earthing switch operating mechanism.
- In normal operation conditions, prior and after tests, the iCTF bushings are solidly earthed: The iCTF bushings do not bear the dielectric constraint, energised parts are not accessible. Once the injection fingers bolted and testing tools connected, the testing engineer can open the earthing bar to perform the test. Once the tests are completed, the earthing bar needs to be closed back, prior to close the iCTF cover.
- As the testing device is straight connected to iCTF bushings, access and of MV separable connectors is not required.
- Type tests as per IEC 62271-200 were performed for values of UCT and tCT shown in the below table (for different values, please consult Schneider Electric).

	VLF 0.1 Hz		DC	
U_r	U_{CT}	t_{CT}	U_{CT}	t_{CT}
12 kV	22 kV	60 min	32 kV	15 min
24 kV	27 kV	60 min	38 kV	15 min

PM111231

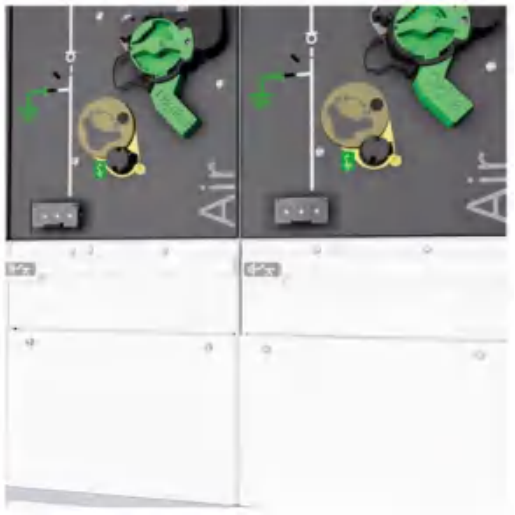


Fig 2: front view with iCTF access cover closed.

Mechanical interlock on the iCTF:

- Opening of the iCTF cover enables the access to iCTF bushings. The iCTF cover can be opened only when the 3-position disconnector is in the Earthed position. It is not necessary to remove the earthed position to perform the tests.
- After the test is completed, the iCTF cover can only be closed after the earth bar is back to its initial position.
- The iCTF cover must be closed to allow the opening of the earthing switch.
- The cable access door is interlocked with the earthing switch (version “standard” described in the chapter “Built-in functional interlocks”): it does not need to be opened for the tests.
- These functional mechanical interlocks do not require the manipulation of any key.

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Integrated cable test facility (iCTF)

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Fig 3: iCTF access cover opened with injection fingers.

Advantages

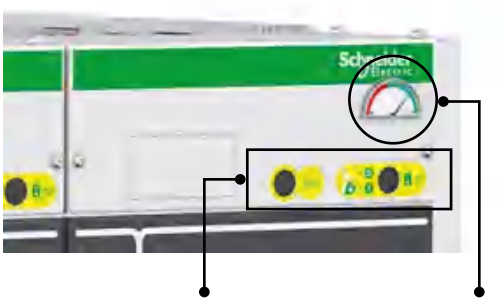
- The operations to perform cables tests are reduced and simplified, helping reducing risks of operational mistake.
- The complete circuit can be tested including MV cables and separable connectors without disconnection of the cable.
- The absence of manipulation on MV separable connectors helps to prevent their aging.
- The iCTF option can be associated with most options in I functional units (including Arc Killer, motorisations,…).
- Compactness: The dimensions of the functional unit are unchanged. The test is performed on the front, without additional clearance on sides or top.
- iCTF fingers (required tool) replace the traditional adapters plugged on the MV cables connectors.

Selection in RM AirSeT:

- The iCTF option is available on the ring functional units (I).
- It is not available on the Q switch-fuse combination or B circuit breaker functional units.
- In case of specific requirement, please consult Schneider Electric.
- iCTF parts must be assembled before the welding of the sealed compartment. They cannot be added after selection of RM AirSeT.
- Functional mechanical interlock can only be “standard” as described in the chapter “Built-in functional interlocks”

Manometer and Earthing Contact visibility

PM109955



Earthing contact visibility *Manometer*

Left hole for light
Right hole for eye control

Manometer

As for existing sealed pressure systems, RM AirSeT can be proposed with the 4 following selections for pressure check:

- Without manometer
- Standard Manometer (relative pressure)
- Manometer Compensated in temperature & altitude
- Manometer Compensated with auxiliary contacts
- AK Indic option*: In case the RM AirSeT is equipped with arc killer, the manometer with auxiliary contacts can comprise a visual indication as well as a remote indication in case of a triggered arc killer

This device is located on the right side of the integrated LV compartment of the RM AirSeT.

(*) Please consult Schneider Electric for availability of AK Indic option.

DM107864 DM107866 DM107867



Earthing Contact visibility

The functions are equipped with clear indicators that provide a certain indication of the position for:

- CLOSE / OPEN (DISCONNECTOR and CIRCUIT BREAKER)
- EARTHED / UN-EARTHED (EARTHING SWITCH)

To provide additional safety by permitting a 2nd check of earth contact position the Earth contact visibility is available as an option.

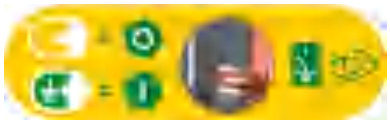
Note:
The portion of the integrated LV compartment available for LV components is reduced by approx. 40 mm.

PM111218



Earthing contact visibility when the three position disconnector is NOT EARTHED

PM111219

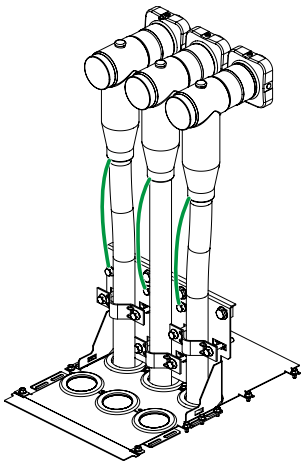


Earthing contact visibility when the three position disconnector is EARTHED

Earthing of cables and separable connectors

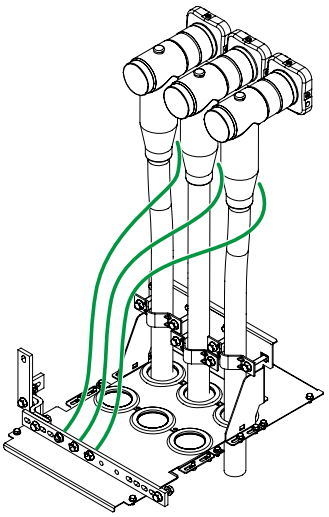
2 methods of earthing cables are proposed in RM AirSeT: standard, or with additional earthing collector.

DM110172



Standard.

DM110177



With additional earthing collector.

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LV compartments

Typical applications

Compartment	Simple integrated LV/ H = 1.625 m	With LV +350/ H = 1.975 m
LV compartment description	• Compact LV wiring duct and simple relaying • Access with bolted cover	• LV cabinet separated from simple integrated LV compartment comprises • LV door on hinges, with handle • The same simple integrated LV compartment is available, with bolted cover
Extended LV cabinet*		
Integrated LV compartment & control mechanism		
Intermediate compartment		
MV Cables compartment (1.4 m)		
Typical application	RM AirSeT standard applications including: Active Plus / Pro	Specific applications requiring more complex LV devices
	Configuration recommended for : • Advanced control & monitoring (PowerLogic T300) • Compact protective relay self- powered (VIP 45/VIP 400/VIP 410) or with Reclosing (P1)	**LV +350 recommended for:** • 1 protective relay P3, P5, P7 or third party • 2 compact devices: 1 P5U20 + 1 PM8000 • 1 Advanced measuring: eg. PowerLogic ION7450 • RTU separated integration
Typical devices housed in the integrated LV compartment		
	• Pressure monitoring device (manometer), access to Earthing contact visibility HMI • 1 T300 Horizontal SC150 (including FPI, controls, HMI... functions) or SC160 (protection, controls, HMI...) and/or LV150 (monitoring) • Fault Passage Indicator (pre-cut provided on front cover for 48 x 96 mm) • Compact measuring device: AMP, or VLT, PM5350... (92 x 92 mm or less) • Electrical Controls & signals (electrical push buttons and/or selector switch and/or signaling LED) • Relaying and terminal blocks	
Intermediate compartment		
	• VDIS, VPIS or VDS (near earthing switch operating mechanism) - Compact or 48 x 96 mm • Live Cables Interlock module	
	• Head Unit (T300 HU250) or Switchgear Power Supply Unit (T300 PS50) with battery (available in I or R functional units)	
	• P1 or VIP protection relay	

The list above provides a general guideline, examples of possible integrations. They require careful and qualified engineering to be wired properly. It considers the Schneider Electric optimal standards of LV wiring, relaying. In case of different standards, some integrations may become impossible.

(*) Please consult Schneider Electric for availability of extended LV cabinet.

PowerLogic™ T300 Remote Terminal Unit

PM111217



PowerLogic T300: the newest generation of remote terminal unit

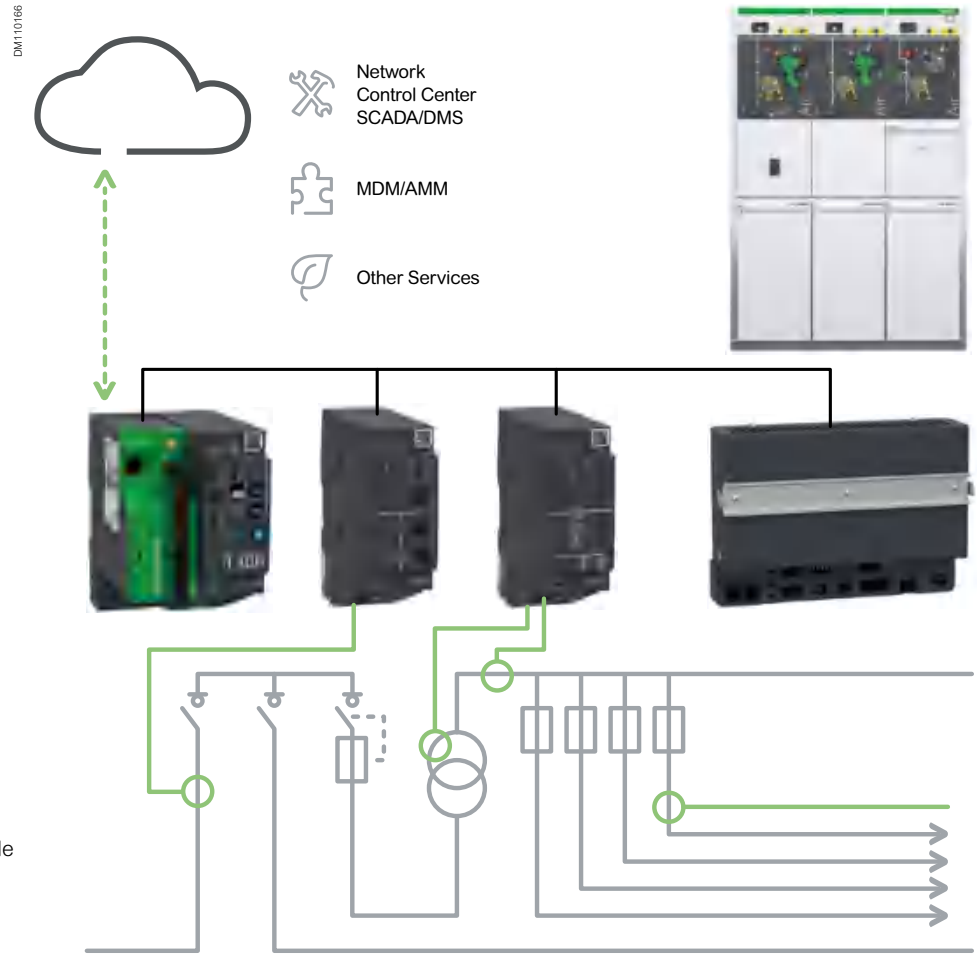
- Modular architecture perfectly adapted for integration in RM AirSeT functional units, a power supply back-up, up to 23 RM AirSeT functions and 3 transformer management.
- Powerful communication with standard and secure protocol, open P2P communication for decentralized automation, easy to upgrade on 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, etc.

Improved Cybersecurity

- Compliant with IEC 62443, IEC 62351 and IEEE 1686
- SCADA communication and Wi-Fi Access security features
- User interface technology with web server compatibility with PC, smartphone and digital tablet.

PowerLogic T300 is modular and application-oriented

DM110166



This open architecture supports different applications, from a single communication gateway to large substation management with third-party devices.

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PowerLogic™ T300 Remote Terminal Unit

Modules

PM104385



Modularity of HU250: Easy insertion of different modems (option)

PM108732

These modules, with their supported applications, are:

PowerLogic HU250 – Head Unit communication gateway

- Flexible communication gateway to control centers and other customer IT applications:
  - Standard and security-focused protocols: IEC 101/104, DNP3, IEC 61850, Modbus
  - Open peer-to-peer communication to self-healing applications
  - Flexible communication media (Ethernet, USB, GPRS, 2G, 3G, 4G)
- Flexible local communication (Ethernet, Wi-Fi, ZigBee, RS232)
- Cybersecurity management in accordance with IEC 62351
- Open to third-party devices with many protocol capabilities
- Built-in webserver for commissioning and maintenance with local and remote access, compatible with PC, tablet and smartphone devices
- Embedded IEC 601131-3 PLC for automation design
- Auto-Transfer-Switch Automation between two switch control modules
- Thermal and environment condition monitoring, with integrated wireless sensor communication

PM111226



PowerLogic SC150 – Switch controller

- Control and monitoring of switch-disconnector, switch-fuse combination or Circuit breakers
- Advanced Fault Passage Indicator (FPI) algorithms:
  - Phase-phase and phase-ground detection ANSI 50/51, 50N/51N
  - Directional phase-phase and phase-ground detection ANSI 67/67N
  - Broken conductor detection (one phase lost) ANSI 47
- MV Voltage monitoring ANSI 27, 59, 59N
- MV Current monitoring ANSI 37
- Large current and voltage measurement capabilities: standard CT, LPVT, VT from the capacitor divider and a voltage presence indicator (VDS, VPIS) for voltage
- Power measurement in accordance with IEC 61557-12
- Power quality in accordance with IEC 61000-4-30 class S:
- Specific application automation: sectionalizer
- Disturbance recording

PM106941



PowerLogic™ T300 Remote Terminal Unit

Modules

PM104381



PowerLogic LV150 – Transformer and Low Voltage monitoring

- Transformer temperature measurement and monitoring
- Power measurement in accordance with IEC 61557-12
- Broken conductor detection (one phase lost MV or LV) ANSI 47
- LV Voltage monitoring ANSI 27, 59, 59N
- Power quality in accordance with IEC 61000-4-30 class S

PM104366



Power Supply for control and monitoring solutions

PS50 is is a power supply dedicated to conditions of MV and MV/LV substations for:

- Switch control: 48 Vdc or 24 Vdc
- Telecom devices: 12 Vdc
- PowerLogic T300: 12 Vdc

PM111227

Find more information, here

Life Is On Schneider Electric

Protection

Overview

Our catalog of Protection Relays provides leading and reliable protection and control for any network application. The latest PowerLogic Protection Relays also offer comprehensive security and dependability for your electrical grid, from overcurrent and arc protection to distance and differential protection of the transmission line. Our range offers solid protection with advanced communications such as the IEC 61850 to give you peace of mind in protecting your grid.

Need help choosing Protection Relays by Range?

Use this simple selector to find the best fit for your needs.

Help Me Choose

Complete offer to reach all your requirements

VIP protection relay

VIP 45, VIP 400 and VIP 410



VIP 45 and VIP 400 are self-powered protection relays requiring no auxiliary power supply for the main protection functions. Self-powered protection relays increase the availability of the MV network and are suited to most applications.

- Designed to respond to voltage drop
- Not dependent on UPS systems
- Less dependent on the external environment (EMC, LV overvoltages) because they require no external connections

VIP 45 protection relay dedicated to transformers. It provides dedicated protection curve to protect against overloads, short-circuits and earth faults with straight-forward settings and basic metering.

VIP 400 protection relay suits to the buildings and MV/LV substation utilities. It provides protection curve to protect against overloads, short-circuits and earth faults with DT (Definite Time) and IDMT (Inverse Definite Minimum Time) standardized tripping curves and thermal overload protection. The functions are completed with mesurement of currents, switchgear diagnostics, multi-language display and a complete set of metering.

VIP 410 protection relay suits to building substations, and MV/LV substation utilities and for power system MV loops with automation. It includes a dual power supply (self-powered plus auxiliary power supply) for communication with remote communication with DMS and RTUs, Remote Control and Alarming, Time stamped events recorded, load history, over-current and breaking profile. It provides same protection functions as VIP 400 completed by cold load pick up detection. It allows remote configuration with setting groups selectable according to the configuration of the MV loop.

PowerLogic protection relay

Our latest Protection Relay range, with the heritage of many brands, our PowerLogic devices offer over 100 years of experience combined with the latest technology, communication and IoT connected concepts. Covering all applications from overcurrent to distance protection, they provide trusted know-how in a scalable range with a modern, digital experience.

PowerLogic P1		Catalog
	Compact protection solution for MV/LV applications. With overcurrent, voltage, frequency, and earth-fault protection (directional as an option), housed in a uniquely small case with a quick fixing method.	
PowerLogic P3		
	Easy-to-use protective relays for Medium Voltage applications with fast delivery, ideal for Panel builders, Contractors, Partners and end users. From overcurrent to more advanced protection, with Arc flash detection, LPCTs, LPVTs and Ethernet communication including basic implementation of IEC 61850.	
PowerLogic P5		
	Protection and control relays with a focus on safety and cyber security. Easy to use for panel builders, system integrators and end users. From overcurrent to differential protection with arc flash protection, LPCTs, LPVTs, redundant Ethernet communication and IEC 61850.	
PowerLogic P7		
	High-end protection and control range for MV and HV applications. It delivers a modular and cybersecure platform, fully prepared for virtualization. It's 7" color touchscreen and new engineering tool helps to configure, test, integrate, operate and maintain, while maximizing your sustainability goals.	

Protection

Selection guide

Available Protection relays for integration in the RM AirSeT intermediate compartment

RM AirSeT		VIP self-powered			PowerLogic P1F
Typical application		**Transformer**	**Transformer, Line**		
	Model	VIP 45	VIP 400	VIP 410	E
Power supply					
Main functions self powered by CT		■	■	■	
Additional functions with auxiliary power (Dual power)				■ (1)	■
Minimal phase current for activation		4 A (2)	7 A (2)	0 A (6)	0 A
Protection functions	ANSI Code				
Phase O/C overcurrent	50/51	■	■	■	■
Earth Fault overcurrent	50N/51N	■	■	■	■
Thermal overload	49		■	■	■
Phase and earth Fault Cold Load Pickup				■ (6)	■
Second harmonic restraint		■	■	■	
Lockout	86	■ (3)	■ (3)	■ (3)	■
Blocking Logic discrimination	68				■
Negative phase sequence overcurrent	46				■
Broken conductor detection	47/46BC		■ (3)	■ (3)	■
Transient/semipermanent faults	79				■
Optimal tripping curves for MV/LV transformer		■	■	■	■ 21
Protection curves		Specific	IEC	IEC	IEC
Number of Overcurrent and earth fault setting group				2	2
HMI and Measure functions					
Local HMI, clear setting menus, password protection		■	■ (5)	■ (5)	■ (5)
Multi Language interface			■ (5)	■ (5)	■
Phase current		■	■ (5)	■ (5)	■ (5)
Earth current		■	■	■	■
Phase peak demand current		■	■	■	■
Thermal overload (in %)					■
Phase and Earth current accuracy		5%	5%	5%	5%
Load bar graph			■	■	
Control and Monitoring					
CB tripping release			Low power (MITOP)		Shunt opening coil (MX)
Trip circuit supervision	74TC	■	■	■	■
Time tagged events	on HMI (5 last trips)		■	■	■
	remote via RS485			■ (6)	■
Trip indication (dry remote contact)		■ (3)	■ (3)	■	■
External tripping input				■	■
Event recording (Cumulative breaking current, number of trip orders)				■	■
Fault recording (O/C and breaking profile, number of phase/EF trips)			■	■	■
Disturbance recording					■
Digital information/ Communication					
Binary input	total number of DI			1	8
Outputs relay	total number of DO			3 (6)	6
remote tripping indication (SDE) - in option		■ 1	■ 1	■ 1	
Serial communication port RS485				■ (4)(6)	■ (4)
Remote setting (lockable)				■ (4)(6)	■ (4)
Setting parameters on front USB port					■
Operating conditions / Maintenance					
Front IP index / Operating Temperature			IP54 -40°C to +70°C		IP54 -25°C to +60°C

(1) DUAL POWERED RELAY: Overcurrent and Earth Fault functions operate in absence of auxiliary power above wake up current
(2) With CT 200 A (with CT 630 A: VIP 45 = 6 A / VIP 400=14 A)
(3) ANSI 86 only applicable with close trip: by external wiring in the switchgear (ANSI 47, 67 and 67N indication available in PowerLogic T300 module SC150)
(4) Modbus / IEC 60870-5-103 selecting through setting on PowerLogic P1 (MODBUS on VIP 410)
(5) Improved ergonomics and friendly user on local HMI for setting, and measures: English, German, Spanish, French, Chinese, Russian,…
(6) Auxiliary power supply needed

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Protection

VIP 45, VIP 400 and VIP 410

Application

- MV distribution substation incomer or feeder protection relay
- Dependent-time phase overcurrent tripping curve dedicated to MV/LV transformer protection
- Definite-time earth fault protection
- Phase current and peak demand current measurement

PM100569



VIP 45

PM100580



VIP 410

Main features

Self-powered operation

- Energized by the CTs: no auxiliary owner supply power needed

Complete pre-tested protection system

- Functional block ready to be integrated
- Setting is as simple as fuse selection
- Maximum setting possibilities consistent with circuit breaker characteristics

Phase overcurrent protection

- Tripping curve optimized for MV/LV transformer protection
- Protection against overloads and secondary and primary short circuits
- Second harmonic restraint
- Only one setting (I>)
- VIP 45 and VIP 400 are a self-powered relays energized by the CTs; they do 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

Main features

VIP 400: Self-powered protection relay

This version is energized 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

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 the following:
  - 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 fails during an MV short circuit, the protection functions are maintained

Protection

PowerLogic™ P1

Application

- Utility and industrial MV switchboards
- Transformers, incomers, bus couplers, overhead and underground MV systems
- Applicable for different neutral systems

PM105643



Models available:

- **PowerLogic P1F** - Feeder protection
- **PowerLogic P1V** - Voltage protection

Proven reliability

- Successor of MiCOM P111, Vamp V11 and Sepam10: more than 200,000 installations across the world
- Easy-to-use overcurrent, earth-fault and voltage-frequency protection relays for essential protection
- Suitable for MV and LV applications
- Robust design, IP54 front panel

Main functions available

Following functions are available depending on Models and options: L, A, N, B, E and E+:

- Phase & E/F overcurrent; Thermal Overload protections and directional earth fault.
- Cold load pickup, Blocking logic discrimination
- Two setting groups (HMI/BI/RS485)
- SOTF, 2nd harmonic blocking,
- Recording: Faults (20), Events (200), disturbance (4s), Counters
- CB diagnosis: Circuit Breaker Failure, TCS, CB condition monitoring, operation time monitoring
- CB Control via RS485/HMI/Input and local/remote mode
- USB port and RS485 with Modbus/IEC 60870-103
- Additional local or remote customisable controls with more inputs (up to 8 Digital inputs)

Ease of use

Save time and money with easy ordering, configuration, and operating processes. Configure through our intuitive HMI and setting tool, and mount in just 10 seconds with our spring clips.

Reliable

Enhanced safety and reliability with an insulated casing, non-volatile memory for settings and records, clock retention for 3 days, low energy consumption, and helps with circuit breaker wear monitoring.

Flexible

Optimized for compact switch gears and graded functionality to tailor to specific applications. Easergy P1 can be used in a variety of new and retrofit installations.

Protection

PowerLogic™ P3

Application

- Feeder and Line
- Motor
- Capacitor bank
- Generator and Transformer protection together with Arc flash detection

Segments

- Commercial Industrial Buildings
  – Non-critical infrastructure
- Power & Grid
  – Power Stations & Renewables
  – High Demanding Distribution Utilities
- Small Industries
  – Energy & Chemicals

P3 Standard
Universal applications

P3 Advanced
Advanced applications with arc flash fault detection





Models available:

- **PowerLogic P3U** - Universal (Feeder/Motor/Capacitor)
- **PowerLogic P3F** - Feeder protection
- **PowerLogic P3L** - Line protection
- **PowerLogic P3M** - Motor & Differential
- **PowerLogic P3G** - Generator & Differential
- **PowerLogic P3T** - Transformer Differential

Solid protection meets unparalleled efficiency

PowerLogic™ P3 products have been designed around user-friendliness, a feature which is proven in our customer feedback day after day.

The PowerLogic™ P3 feeder manager has been developed to cover basic protection needs for commercial and industrial buildings, distribution utilities and industrial applications. Thanks to its cost-effective and flexible design, the P3 provides an alternative for various protection applications.

The P3 relay range combines protection functions for feeder, line, motor, capacitor bank, generator and transformer protection applications

Ease of use

User-friendliness is a key benefit of PowerLogic P3, designed to save time at every step of the project's life-cycle.

A great deal of effort has gone into designing the operational aspects of the P3 products. Setting and download/upload are much convenient thanks to the unique eSetup Easergy Pro setting software which dramatically improves usability.

The informative human machine interface shows the information the user needs, with the support of customized legend texts.

Unparalleled efficiency

- Simple selection and ordering with EcoStruxure Power Build Medium Voltage.
- Faster delivery with on-the-shelf availability of standard configurations. Simplified configuration and virtual signal injection with the eSetup Easergy Pro setting tool.

Better Connectivity

- Simpler operation and maintenance with user-friendly tools.
- All communication protocols including Modbus, DNP 3, IEC 61850 and Profibus.
- Possibility to use two active communication protocols at the same time.
- Increased number of inputs and outputs for more controlling possibilities.

Enhanced safety

- Embedded arc protection.
- Select-execute circuit-breaker control
- Close-by wireless breaker operation
- Compliant to international standards (i.e. IEC 60255-1).

Note:
PowerLogic P3 requires an extended LV cabinet: please consult Schneider Electric for availability.

Protection

PowerLogic™ P5

Application

- HV backup protection
- Primary MV distribution
- In-built arc flash protection
- Automatic (fast) transfer switch
- Advanced IEC 61850 schemes
- Low power sensors (LPCT/LPVT)
- Harsh environment

Segments

- Cloud & Service Providers, Hospitals, Airports
  – Critical Infrastructure
- Power & Grid
  – Power Stations & Renewables
  – High Demanding Distribution Utilities
- Small Industries
  – Energy & Chemicals
- Oil & Gas, MMM, Large Industries
  – Energy & Chemicals

PM108233



PM108232

Models available:

- **PowerLogic P5U** - Universal (Feeder/Transformer/Motor)
- **PowerLogic P5F** - Feeder & Generator protection
- **PowerLogic P5T** - Transformer Differential
- **PowerLogic P5L** - Directional & Line protection
- **PowerLogic P5V** - Voltage/Frequency protection
- **PowerLogic P5M** - Motor protection

All-in-one best-in-class features

The PowerLogic™ P5 presents a major step forward for protection relays, bringing a number of best-in-class features together in one device.

Built-in arc flash protection

Arc-flashes will always exist when switching or during unexpected conditions. If the protection function detects an arc-flash, it isolates the connected circuit breaker within milliseconds, preventing a growing arc-flash energy and thus an unexpected risk of outage.

Advanced cybersecurity

PowerLogic P5 is one of the first protection relays to be third-party certified according to IEC 62443 4-2 standard at Security Level 1. This means reduced exposure to cyber threats and improved operational security.

Intuitive withdrawable design

With a handle built in as part of the design, the P5 can be quickly disconnected or exchanged to speed up maintenance. Wiring, data, communication, and settings (including backup) can be stored with the panel and will be there when the relay is reconnected.

Improved recovery time

When maintenance or testing is required, PowerLogic™ P5 helps dramatically decrease your outage recovery time. The backup memory can automatically restore settings, you can continue your operations in as little as 10 minutes*.

* Result of mean time to repair (MTTR) calculation conducted by Schneider Electric.

Greater connectivity

The protection relay features seven communication protocols. This includes compliance with IEC 61850 ed.1 and ed.2, Modbus (serial/TCP), IEC 60870-5-103, IEC 60870-5-101, Ethernet/IP, and DNP3 (serial/TCP). Additionally, thanks to the P5's modular design, communication ports can be added at any time to enable you to upgrade your device in line with future network upgrades.

Note:
PowerLogic P5 requires an extended LV cabinet: please consult Schneider Electric for availability.

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Protection

PowerLogic™ P7

Application

- Feeder, Transformer-Differential 2/3 winding
- Motor- & Generator-Differential
- Stand-alone Merging unit complying to IEC 61869-9 and -13 & IEC 61850-9-2LE
- Ready for virtualization

Segments

- Cloud & Service Providers, Airports
  – Critical Infrastructure
- Power & Grid
  – Power Stations & Renewables
  – Demanding Distribution Utilities
  – High Demanding Distribution Utilities
  – High Demanding Transmission Utilities
- Oil & Gas, MMM, Large Industries
  – Energy & Chemicals

PM110830



Models available:

- **PowerLogic P7G** - Generator Differential
- **PowerLogic P7M** - Motor Differential
- **PowerLogic P7F** - Feeder Protection
- **PowerLogic P7T** - Transformer Differential 2/3 winding
- **PowerLogic P7S** - Stand-alone Merging unit

Next-gen protection and control for demanding applications

High-end protection and control range for MV and HV applications. PowerLogic P7 delivers a modular and cybersecure platform, fully prepared for virtualization. Its 7" color touchscreen and new engineering tool make it simple to configure, test, integrate, operate and maintain, while maximizing your sustainability goals.

Cybersecurity

Reducing exposure to cyber threats and improving operational security are key requirements for the future of power grids.

Modular design

Installations evolve over time. Additional hardware like I/O cards, communication modules, and accessories like RTD inputs or analog I/O can be added at any time. In addition, the flexible application concept allows you to customize the PowerLogic P7 to your needs at any time of the product life cycle.

Improved recovery time

When maintenance or testing is required, the intuitive 7" colored touch screen HMI with clear and easily accessible device status information, plug-and-play boards, clear and simple slot numbering, and removable wiring interfaces significantly decreases outage time.

Greater connectivity

Communication is key! Multiple communication protocols – including IEC 61850 Edition 2.1, Modbus (serial/TCP), DNP3 (serial/TCP) and IEC 60870-5-103 (March 2025) – with a capability to support up to three Ethernet protocols simultaneously, providing connectivity together with PRP/HSR and RSTP redundancy protocols. Optional SFP Ethernet communication modules (small form-factor pluggable modules) can also be added at any time of the product life cycle to adapt your device in line with future network evolutions.

Strong and sustainable

The robust case design, which offers a versatile operation range for harsh environments from -40 to 70°C (-40 to 158°F), the IK7 impact-strength front panel design of the 7" colored touch screen HMI, and the flexible firmware concept ensure increased sustainability over the complete life cycle of the product.

Note:
PowerLogic P7 requires an extended LV cabinet: please consult Schneider Electric for availability.

Fuses

DM107866

Fuses as per IEC 60282-1 with dimensions as per DIN 43625 with medium loaded striker may be installed.

PM111222



Two lengths of fuse chambers are available for the 2 most popular types.

Fuse chamber for 292 mm fuse-links Note: 292 mm fuse chamber is only available for RM AirSeT 12 kV. (442 mm fuse-links not compatible)		292 mm fuse-links only ✓
Fuse chamber for 442 mm fuse-links (442 mm fuse-links or 292 mm fuse-links with adaptor)	*Adaptor 	292 mm fuse-links with adaptor* ✓
		442 mm fuse-links ✓

For fuse-switch combination unit, refer to the below selection table.
For other type of fuses, please consult Schneider Electric.

Example: for the protection of a 400 kVA transformer at 10 kV, select Fusarc CF fuses rated 40 A.

PM109771



All pictures of the catalogue illustrate the product in an environment close to reality. They were taken off-line. For live operation the P.P.E. (personal protective equipment) must be used in accordance with the regulations of the place of installation.

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Fuse selection table

RM AirSeT Rated voltage

12 kV
24 kV

Length of the fuse chamber

for 292 mm
for 442 mm

Range of the fuse link

292 mm Fusarc from Schneider Electric
292 mm HHD-B from Siba
442 mm Fusarc from Schneider Electric
442 mm from Siba

RM AirSeT 12 kV			Fuse-link selection: Rated fuse current (A)																		
Length of fuse chamber	Rated voltage of fuse	Service Voltage	Power of the transformer (kVA)																		
			25 kVA	50 kVA	63 kVA	80 kVA	100 kVA	125 kVA	160 kVA	200 kVA	250 kVA	315 kVA	400 kVA	500 kVA	630 kVA	800 kVA	1000 kVA	1250 kVA	1600 kVA	2000 kVA
			Uk = 4%													Uk = 5%			Uk = 6%	
for 292 mm (compatible only with Length of fuse of 292 mm)	7.2 kV	3 kV	10 A	25 A	25 A	31.5 A	40 A	50 A	50 A	63 A	80 A	100 A (2)	125 A (1)	-	-	-	-	-	-	-	
		3.3 kV	10 A	25 A	25 A	31.5 A (1)	40 A	40 A	50 A	63 A	80 A	100 A	125 A	160 A (1,2)	-	-	-	-	-	-	
		5 kV	6.3 A	16 A	20 A	25 A	25 A	31.5 A	40 A	50 A	50 A	63 A	80 A	100 A	125 A	160 A (1,2)	-	-	-	-	
		5.5 kV	6.3 A	16 A	16 A	20 A	25 A	31.5 A	31.5 A	40 A	50 A	63 A	80 A	100 A	125 A	160 A (1,2)	-	-	-	-	
		6 kV	6.3 A	10 A	16 A	20 A	25 A	25 A	40 A	40 A	50 A	63 A	63 A	80 A	100 A	-	-	-	-	-	
		6.6 kV	6.3 A	10 A	16 A	16 A	25 A	25 A	31.5 A	40 A	40 A	50 A	63 A	80 A	100 A	125 A (2)	160 A (1,2)	-	-	-	
	12 kV	10 kV	-	6.3 A (1)	10 A	10 A	16 A	20 A	25 A	25 A	31.5 A	40 A	40 A	50 A	63 A	80 A (1,2)	100 A (1,2)	125 A (1,2)	-	-	
		11 kV	-	6.3 A	10 A	10 A	16 A	16 A	25 A	25 A	31.5 A	40 A	40 A	50 A	63 A	80 A (1)	100 A (1,2)	125 A (1,2)	-	-	
for 442 mm (references of fuse-links with 442 or 292 mm length; (extender is required for 292 mm fuse links)	7.2 kV	3 kV	10 A	25 A	25 A	31.5 A	40 A	50 A	50 A	63 A	80 A	100 A	125 A (1,3)	160 A (1,3)	-	-	-	-	-	-	
		3.3 kV	10 A	25 A	25 A	31.5 A (1)	40 A	40 A	50 A	63 A	80 A	80 A	100 A (2)	125 A (2)	160 A (1,2)	-	-	-	-	-	
		5 kV	6.3 A	16 A	20 A	25 A	25 A	31.5 A	40 A	40 A	50 A	63 A	80 A	100 A	125 A	160 A (1,2,3)	-	-	-	-	
		5.5 kV	6.3 A	16 A	16 A	20 A	25 A	31.5 A	31.5 A	40 A	50 A	50 A	80 A	80 A	100 A (2)	160 A (1,3)	160 A (1,2)	-	-	-	
		6 kV	6.3 A	10 A	16 A	20 A	25 A	25 A	31.5 A	40 A	50 A	50 A	63 A	80 A	100 A	125 A (3)	160 A (1,2,3)	-	-	-	
		6.6 kV	6.3 A	10 A	16 A	16 A	25 A	25 A	31.5 A	40 A	40 A	50 A	63 A	80 A	80 A	100 A (2)	125 A (1,2,3)	160 A (1,2)	-	-	
	12 kV	10 kV	-	-	10 A	10 A	16 A	20 A	25 A	25 A	31.5 A	40 A	40 A	50 A	63 A	80 A (1,2)	100 A (2)	125 A (1,2,3)	160 A (1,2,4)	160 A (1,2)	
		11 kV	-	6.3 A	10 A	10 A	16 A	16 A	25 A	25 A	31.5 A	31.5 A	40 A	50 A	63 A	80 A (1)	80 A (2)	125 A (1,2,3)	125 A (1,2,4)	160 A (1,2)	

RM AirSeT 24 kV			Fuse-link selection: Rated fuse current (A)																		
Length of fuse chamber	Rated voltage of fuse	Service Voltage	Power of the transformer (kVA)																		
			25 kVA	50 kVA	63 kVA	80 kVA	100 kVA	125 kVA	160 kVA	200 kVA	250 kVA	315 kVA	400 kVA	500 kVA	630 kVA	800 kVA	1000 kVA	1250 kVA	1600 kVA	2000 kVA
			Uk = 4%													Uk = 5%			Uk = 6%	
442 mm (references of fuse-link with 442 mm length)	24 kV	10 kV	-	6.3 A	10 A	10 A	16 A	20 A	25 A	25 A	31.5 A	40 A	40 A	50 A	63 A (2)	80 A (2)	100 A (2)	-	-	-	
		11 kV	-	6.3 A	10 A	10 A	16 A	16 A	20 A	25 A	31.5 A	40 A	40 A	50 A	63 A	80 A (1)	100 A (1,2)	-	-	-	
		13.8 kV	4 A	6.3 A	6.3 A	10 A	10 A	16 A	20 A	25 A	25 A	31.5 A	40 A	40 A	50 A	63 A (1)	80 A (1)	100 A (1,2)	-	-	
		15 kV	4 A	6.3 A	6.3 A	10 A	10 A	16 A	20 A	20 A	25 A	31.5 A	40 A	40 A	50 A	63 A (1)	80 A (1)	100 A (1)	-	-	
		20 kV	-	-	6.3 A (1)	6.3 A	6.3 A	10 A	10 A	16 A	16 A	25 A	25 A	31.5 A	40 A	40 A	50 A	63 A (2)	80 A (1,2)	100 A (1,2)	
		22 kV	-	-	6.3 A (1)	6.3 A	6.3 A	10 A	10 A	16 A	16 A	25 A	25 A	31.5 A	40 A	40 A	50 A (2)	63 A (1)	80 A (1,2)	100 A (1,2,4)	

(1) With mechanical time-delay device 70 ms
(2) Without transformer overload.
(3) Fuse link length extender is required
(4) This fuse-link can be selected as per the case defined in the IEC 62271-105:2021 9.101.3 page 39: it is only applicable if the "system provider considers that the design of the LV connections between transformer and LV switchgear prevents a solid short-circuit on the secondary transformer terminals". If this condition cannot be met, switch-fuse combination must not be applied.

Fault passage indicators

Self-powered, adjustment-free, with a Clear, comprehensive display including current measure

RM AirSeT is available with the Schneider Electric fault passage indicators: PowerLogic Flair

RM AirSeT is also OPEN: Other devices can be installed: the cut-out allows flush mounting of 48 x 96 mm FPI, and the connector with voltage input from capacitive divider from VDIS VO / VPIS VO is compatible with most products, the connector is compatible with most products.

EMS58351



Flair 21D

PE57784



Flair 22D

PE57787



Flair23DM

PM109952

For details, please refer to PowerLogic Flair 2xD leaflet

Fault current indicators

The PowerLogic Flair (21D - 22D - 23DM) range of fault passage indicators has been improved to provide indicators in compact format that are efficient, self-powered and self-adapting to the network: easy to commission, providing hassle-free installation.
Flair indicators work with all types of neutral networks and benefit from LCDs that act as an information display. Optional outdoor light indicator.disconnecting the MV cables.

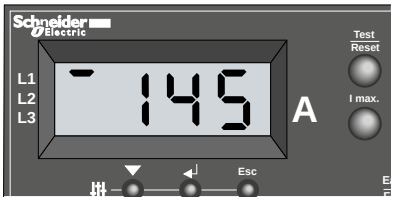
RM AirSeT can also be supplied with Alpha M or Alpha E (Horstmann) type short-circuit indicators.

Clear, comprehensive display

Clear display:

- The load current is displayed on the read-out
- When a fault is detected, the faulty phase is indicated
- Use the buttons on the front panel to scroll through settings and measurements.

DE58715



Display of settings	Flair 21D	Flair 22D	Flair 23DM
Automatic fault detection calibration mode	●	●	●
Short-circuit fault thresholds	●	●	●
Earth fault thresholds	●	●	●
Fault acknowledge time	●	●	●
Type of CT (CT1 or CT2)	●	●	●
Time delay for resetting fault upon current return (or voltage return on Flair 22D, Flair 23D and Flair 23DM)		●	●
Time delay for fault confirmation		●	●
Inrush time delay		●	●
Faulty phase and measurements	**Flair 21D**	**Flair 22D**	**Flair 23DM**
Faulty phase	L1-L2-L3	L1-L2-L3	L1-L2-L3
Load current	●	●	●
MV network frequency	50/60 Hz	50/60 Hz	50/60 Hz
Current maximeter	●	●	●
Residual current	●	●	●

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Fault passage indicators

Self-powered, adjustment-free, with a Clear, comprehensive display including current measure

PM109943



Current sensors around cable bushings

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 energy flow
- Fault passage indication with voltage detection & Modbus communication (Flair 23DM: requires auxiliary supply)

Easy to use and reliable

- Installs automatically on site
- Fault indication by LED, LCD and outdoor light indicator (optional)
- 15 year battery life (Flair 22D)
- Accurate Fault detection by validation of fault with voltage loss using VPIS-VO (except Flair 21D)
- Preassembled in the factory or to be installed on site
- Using split-type current sensors helps on-site adjustment as this avoids disconnecting the MV cables
- Current sensors are RM AirSeT bushing CTs (bushing must be “medium”) or easily upgradeable on site thanks to very convenient split type CTs around the cables.

PM111224



Current sensors mounted at site around single core cables

The PowerLogic Flair integration in RM AirSeT is available with:

- Split type current sensor (to be mounted at site, around the cables)
- Closed CTs around the cable bushings (mounted in factory, without impact on the available space in cable compartment).

When CTs are already required for other function around the cables bushings, the current sensors must be of split type, mounted at site

Fault passage indicators

Self-powered, adjustment-free, with a Clear, comprehensive display including current measure

PM106082



Smart Grid:

Remote Fault Passage and Voltage Detection multi-function simple device

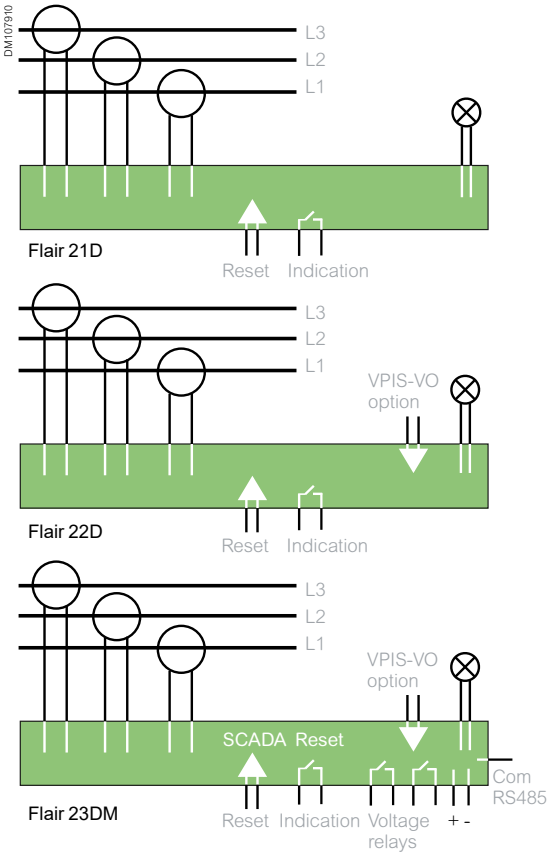
Communicating Fault passage and voltage detection: Flair 23DM compact relay

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

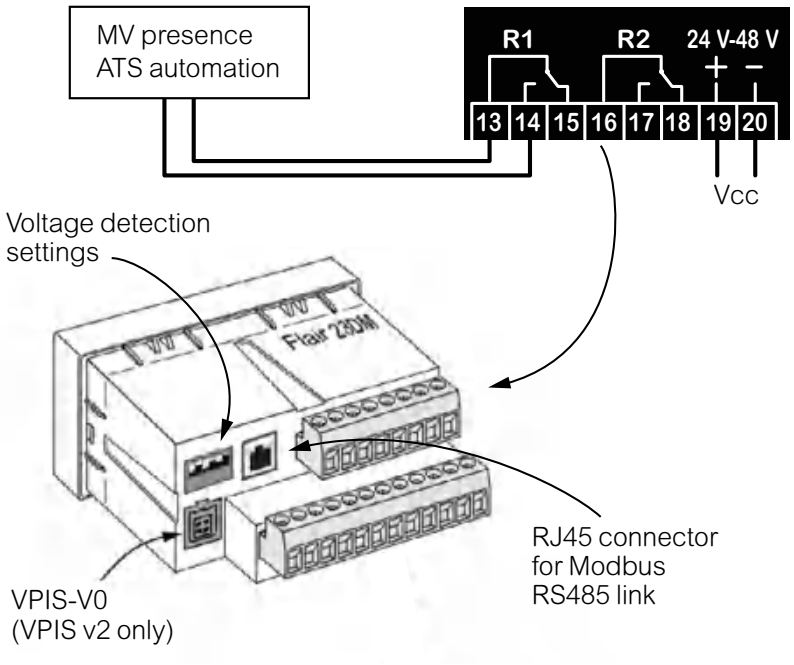
- Combination fault passage indicator and voltage detector
- Ideal for use with an Automatic Transfer of Source System
- Needs a stabilized external DC power supply
- Requires the VPIS-VO option to acquire the information of the mains voltage

Connection diagrams

DM107910



DM107548



Life Is On Schneider Electric

Fault passage indicators

Self-powered, adjustment-free, with a Clear, comprehensive display including current measure

Common characteristics

- 4-digit LCD display
- Ammeter / Maximeter
- Remote / Relay Output (dry contact) for Signal / Scada interface
- Remote / External Reset input

Specific technical characteristics		Flair 21D	Flair 22D	Flair 23DM
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) (3)	Impedance-earthed, directly compensated, isolated (type B, C) (3)

Fault passage indicator with single power supply	
Flair 21D	Detector with autonomous power supply from CTs and super capacitor backup
	External indicator lamp output powered by battery (BVP)
Fault passage indicators with dual power supply	
Flair 22D	Detector with autonomous power supply from CTs and lithium battery backup (Service life: 15 years)
	External indicator lamp output powered by the Flair (BVE)
	Zero sequence CT as option (type B setup)
	Interface with VPIS V2-V0 possible to confirm the fault by voltage absence or to operate on networks with compensated or isolated neutral
Fault passage indicator with dual power supply + voltage presence/absence relay with Modbus communication	
Flair 23DM	Detector with 24-48 Vdc external and autonomous power supply from CTs
	External indicator lamp output powered by the Flair (BVE)
	Zero sequence sensor as option (type B or C setup)
	Voltage presence and absence detector (simultaneous application is possible) R1 = Presence of voltage R2 = Absence of voltage.
	On RM AirSeT, the VPIS-VO V2 is provided for the voltage presence/absence detection relay function, for more reliable fault detection with lower current values and for detection on isolated and compensated neutral.
	Communication on an RS485 serial link in Modbus protocol with access to states and measurements and remote parameter-setting.

Fault passage indicators

Self-powered, adjustment-free, with a Clear, comprehensive display including current measure

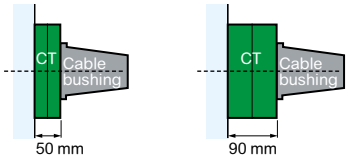
Measurement		Flair 21D	Flair 22D	Flair 23DM
Load	Minimum current	> 3 A	> 3 A	> 3 A
Current (A) (resolution 1 A)	For each phase Accuracy: ± (2 % + 2 digits)	Ammeter Maximeter	Ammeter Maximeter	Ammeter Maximeter
Voltage (% of rated voltage)	With VPIS-VO option Accuracy: ±1 %			Phase-to-neutral or phase-to-phase voltage

Fault detection		Flair 21D	Flair 22D	Flair 23DM
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	∑ 3I + di / dt	∑ 3I + di / dt	∑ 3I + di / dt
	Thresholds	OFF or AUTO or 40, 60, 80, 100, 120, 160 A	OFF or 5 (2) to 30 A (5 A increments) and 30 to 200 A (10 A increments)	OFF or 5 (2) 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 (4) or 5 to 30 A (5 A increments) and from 30 to 200 A (10 A increments) (1)	OFF or AUTO (4) or 5 to 30 A (5 A increments) and from 30 to 200 A (10 A increments)
Fault acknowledge time delay		60 ms	40 to 100 ms (20 ms increments) and from 100 to 300 ms (50 ms increments)	40 to 100 ms (20 ms increments) and from 100 to 300 ms (50 ms increments)
Fault confirmation time delay		70 s	3 s, 70 s or OFF	3 s, 70 s or OFF
Inrush	Time delay	3 s	3 s, 70 s or OFF	3 s, 70 s or OFF
Reset	Automatic	Upon current return 2 A (70 s or OFF)	Upon current return 2 A or voltage return (3 s, 70 s or OFF)	Upon current return 2 A or voltage return (3 s, 70 s or OFF)
	Manual via front panel	Yes	Yes	Yes
	External contact	Yes	Yes	Yes
	Delayed	4 h	1, 2, 3, 4, 8, 12, 16, 20, 24 h Factory setting = 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
Characteristics of "OUT" relay	Maximum load	AC 8 A; DC 5 A	AC 8 A; DC 5 A	AC 8 A; DC 5 A
	Maximum cut-off voltage	AC 380 V; DC 125 V	AC 380 V; DC 125 V	AC 380 V; DC 125 V
	Maximum cut-off power	AC: 2000 VA (8 A 240 V) DC: 150 W (5 A 30 V)	AC: 2000 VA (8 A 240 V) DC: 150 W (5 A 30 V)	AC: 2000 VA (8 A 240 V) DC: 150 W (5 A 30 V)
	Dielectric between open contacts	1 kV - 1 min	1 kV - 1 min	1 kV - 1 min

Voltage detection (with VPIS-VO option)		
Configuration of detection mode		Via microswitches
Detection settings	Measurement type	Phase-to-neutral/ phase-to-phase voltage
	R1 and R2 relay outputs	Direct or reverse
	Measured phases	Measured or not (for each phase)
	Residual voltage	Measured or not
Configuration of thresholds and time delays		Via front panel buttons
Thresholds settings (% of rated voltage) Accuracy ±10 %	Voltage presence (R1)	40 to 90 % (10 % increments)
	Residual voltage threshold	30 to 60 % (10 % increments
	Voltage absence (R2)	10 to 30 % (10 % increments)
Time delay settings	Activation time delay (R1 or R2 direct)	0 to 1 s (0.1 s increments), and from 1 to 21 s (2 s increments), and from 1 to 15mn (1, 3, 5, 7, 10, 15 mn)
	Release time delay (R1 or R2 direct)	0 to 1 s (0.1 s increments), and from 1 to 3 s (0.5 s increments)
Characteristics of relays R1 and R2	Maximum load	AC: 8 A; DC: 8 A
	Maximum cut-off voltage	AC: 400 V; DC: 300 V
	Maximum cut-off power	AC: 2000 VA (8 A, 240 V) DC: 240 W (8 A, 30 V)
	Dielectric between open contacts	1 kV - 1 min

Life Is On Schneider Electric

Current transformers



Standard with CT 50 mm *Long with CT 90 mm*

Fig 1: Bushing length.

RM AirSeT bushings for cable connection

The bushings type C are available in 2 dimensions:

- "standard": compatible with CTs up to 50 mm
- "Long": compatible with CTs up to 90 mm

The distance between axis of bushing is identical in all functional units.

The bushings type A are available only in "standard" length.



Three phases *Single phase*

Fig 2: Toroidal CT.

Current transformers

CT and LPCT are available as per:

- IEC 61869-2: Current Transformers (CT) (replacing IEC 60044-1)
- IEC 61869-10: Low Power Current Transformers (LPCT) (replacing IEC 60044-8)

Toroidal CT dimension for bushing mounting needs to be consistent with the bushing length:

CT type	Standard Bushing	Long Bushing	MV cable
Single phase CT	●		
Three-phases LPCT	●		
Three-phases VIP		●	
Three-phases CT		●	
Cable CT			●





Current transformers 50 mm for mounting on standard bushings

Toroidal single phase CT for FPI and RTU

Part number	Application	Primary current range	Ratio	Accuracy class
CTR2200 59925	FPI Flair	Up to 630 A	2200 / 1 A	For FPI*
EMS58188	RTU PowerLogic T300	Up to 630 A	500 / 1 A	cl 0.5

(*) FPI: Fault Passage Indicator



Toroidal three phases proportional LPCT*
for protection relays PowerLogic P1, P3, P5, P7

Part number	Application	Primary current range	Output	Accuracy class
RMU-LPCT50-STD-ALL	Protection relay	Up to 630 A	22.5 mV at 100 A	cl 0,5 and 5P

The same winding complies the accuracy classes of measure and protection as per IEC 61869-10. This LPCT is convenient for all cases.

(*) Please consult schneider electric for availability

Current transformers

PM109946



Current transformers 90 mm for mounting on long bushings

PM109757



Toroidal three phases sensors
for protection relays VIP 45, VIP 400 and VIP 410

Part number	Primary current range	Accuracy class
RMU-LPCT90-VIP-200	Up to 200 A	cl 1 and 5P30
RMU-LPCT90-VIP-630	Up to 630 A	cl 1 and 5P30

PM109757



Toroidal three phases CT*
for protection relays or meters

These current transformers can be used with protection relays such as PowerLogic P1, P3, P5, P7 or RTU such as PowerLogic T300 or power Meter such as PM...

Part number	Application	Primary current range	Ratio	Accuracy class
RMU-CT90-200-1-D	Protection or metering	20 A to 200 A	200 / 1 A	cl 0,5 s and 5P10
RMU-CT90-600-1-D		60 A to 600 A	600 / 1 A	cl 0,5 s and 5P10

The CT complies the accuracy classes of measure and protection as per IEC 61869-2.
The CT accuracy is insured from 1% to 10 times the rated primary current.

The setting range of main protection relays allow setting of low currents to 10% or less of the primary current.

The 2 above CTs are convenient for most cases (for instance, the above 200/1 A typically allow protection instead of former CTs with primary currents of 50 A, 75 A or 100 A or less).

(*) Please consult schneider electric for availability

Current transformers for mounting around MV cables

PM106399



Split type CT 47 mm for FPI and RTU

Part number	Application	Primary current range	Ratio	Accuracy class
MF1 59963	FPI Flair	Up to 630 A	2200 / 1 A	For FPI
EMS58183	RTU PowerLogic T300	Up to 630 A	500 / 1 A	cl 1

PM108730



Zero Sequence Current transformers

Reference	Diameter	Integration
CSH120: 59635	120 mm	Close ring CT on MV cable (to install in the cable trench)
CSH200: 59636	200 mm	

(alternatively, 1 A or 5 A secondary winding of a Zero Sequence CT can be wired on CSH30)

Life Is On Schneider Electric

Voltage detection

PM110040



VDIS

PM110041



VDIS with voltage output

PM106733



VPIS V3

PM106903



VPIS V2

PM109953

Find more information, here

Voltage sensors

Capacitive dividers are provided in the cable bushing of the functional units.

Voltage indicators

A voltage presence indicating device can be integrated in the functional units. It can be used to check whether or not a voltage is present across the cables.

Three devices are available:

- **VDIS**: Voltage Detecting and Indicating System as defined by IEC 62271-213 with option for Voltage output (VDIS-VO). They can be used for operation in ambient temperature from -25…65 °C.
- VPIS: Voltage Presence Indicating System, as defined by standard IEC 62271-206. The VPIS from Schneider Electric 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 Interlock (LCI, to provide a live-cable earthing switch lockout), etc.
- VDS: Voltage Detecting System, as defined by standard IEC 61243-5 the cutout allows the mounting of devices of 48 x 96 mm. The connectors to the capacitive dividers are compatible with ranges of VDS (VDS LRM, WEGA, CAPDIS...).

The connectors to the capacitive dividers are compatible with several ranges of Schneider Electric or third party devices (VPIS, VDS or the latest VDIS).
The dimensions of the cutout allow the mounting of common devices of 48 x 96 mm.

In the case of horizontal type of voltage indicating system, the mounting must be done in the LV compartment.

Voltage transformers

PM108344



*Note: LPVT is available for **type C connector - Tee shape only** (it is not adapted for Type A or Elbow connector)*

LPVT voltage sensors

The RM AirSeT is available with compact Low Power Voltage Transformers (LPVT)

LPVT is a flexible technology of instrument transformers for secondary electrical distribution

- **DOUBLE CLASS**: Up to Class 0.5 accuracy levels for metering & 3P for protection
- Linear **wide measuring voltage range**
- **Excellent harmonic** performance recommended for Power Quality monitoring
- Absence of ferroresonance phenonema
- Helping improving reliability.

Well adapted to the new generation of electronic protection or measuring devices

- The LPVT is **OPEN**: Complies international recommendation IEC 61869-11. It can be used with Schneider Electric or **other manufacturers' relays**.

Recommended to take **full benefit of PowerLogic P3, P5 or T300 power quality features**

LPVT is installed on the cable termination after the installation of cables

- Easy to install (pre wired and with LV connectors), operate and test
- A **plug & play kit with the 3 phases is available** for connection to PowerLogic T300
- No need to disconnect for cable testing up to 42 kV/15 min.

Life Is On Schneider Electric

PowerLogic™ measuring devices

Schneider Electric is Recognized for the advanced systems in all fields.

In complete Electrical distribution metering **EcoStruxure™ Advanced Metering Operation** and **EcoStruxure™ Smart Metering Advisor** are the solutions from Schneider Electric (please contact your Schneider Electric Sales correspondent for more details).

Unique consistency of efficient ADVANCED measuring devices

As part of all VIP and Powerlogic protection relays, or in Flair indication devices, indications of measures are available on the front display. RM AirSeT Active Plus provides measuring capabilities of PowerLogic T300.

The PowerLogic range can be customised for Energy & Power Quality Metering solution in LV cabinet of RM AirSeT.

PE86153



PowerLogic Ion6200

PM108737



PowerLogic PM5000 series

PB115151



PowerLogic Ion7420

PowerLogic™

- Provides an enhanced choice of consistent, accurate, reliable and powerful measuring instruments for Medium Voltage
- It can also be used for Low Voltage installation to enhance the functions AMP & VOLT for local reading with simple analog measuring
- Class 0.5S or 0.2S energy meters with wide range of additional features applicable to all sectors (**ION 6200, PM5300, PM5500**)
- **ION 7400** sets a world's reference in Utilities for advanced metering and quality management Electrical Distribution networks
- **PM8000** or **ION9000** adapted to most advanced metering and quality management functions to **enhance the power efficiency of Critical buildings and industries**.

PM109954

Find more information, here

Installation and connection

Cable connections **79**

Selecting bushings and connectors 79

Cable compartment 80

1 cable per phase – Bushing Type A 82

1 or 2 cables per phase – Bushing Type C 83

Dimensions **84**

Civil engineering **85**

Dimensions of the substation 85

Cable connections

Selecting bushings and connectors

- The profiles, contacts and dimensions of RM AirSeT connection are defined by the IEC 60137 (“Insulated bushings“) and as per EN 50181 (“Plug-in type bushings”).
- 100 % of the epoxy resin interfaces undergo dielectric testing at power frequency and partial discharge tests.
- MV Cables can be connected with ELBOW or TEE connectors from various manufacturers, as indicated in next pages.
- A MV insulated connector must be used in order to guarantee the dielectric performance over time, for ALL functions. When not connected to cables, insulated caps shall cover MV connections.
- The RM AirSeT standard cable access door and dimensions of cable compartment are adapted to receive 2 cables or 1 cable+1 surge arrester per phase with most connectors.
- An optional deeper cable access door is available and required only when 2 cables + 1 surge arrester per phase.

RM AirSeT cable bushings

There are 2 types of bushing:

- **Type A** (available for Switch-Fuse combination only):
  200 A: 12.5 kA 1 s (plug-in)
- **Type C**:
  630 A: 20 kA 1 s, 3 s (disconnectable M16).

“Standard bushing”

The standard bushing is intended to receive

- 50 mm bushing CT from Schneider Electric
- or 50 mm LPCT from Schneider Electric
- and most of the fault passage indicator sensors.

It is applicable to most applications with I, Q, functional units.

It is applicable to functional units with PowerLogic T300, P3, P5 or P7 using LPCT.

“Long bushing”

The Long bushing is required for:

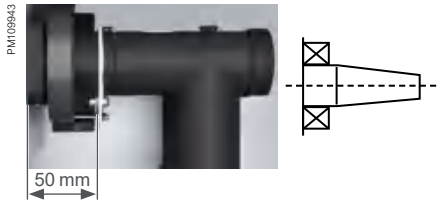
- 90 mm bushing CT from Schneider Electric.

The mounting of CT 50 mm on long bushing is not standard and requires an adaptation of fixing plates with Schneider Electric.

Two lengths are available: standard and long

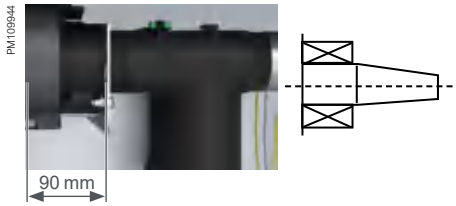
Standard for 50 mm CT

Current transformers 50 mm are mounted on standard bushings with a supporting plate.



Long for 90 mm CT

Current transformers 90 mm are mounted on standard bushings with a supporting plate.



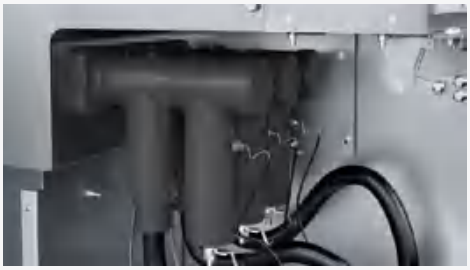
Cable connections

Cable compartment

RM AirSeT switchboard is equipped with 200 A and 630 A plug-in bushings:

Cable connectors:

PM109958



PM109959



PM109960



Cable compartment

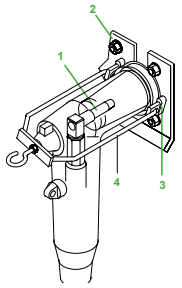
The cables connection compartment has been designed to accept connection systems that are:

- Shielded connectors
- Non-shielded connectors.

Cable support mountings are adjustable horizontally and vertically to enable installation of various cable systems.

Bushing connector cones in accordance with EN-50181:

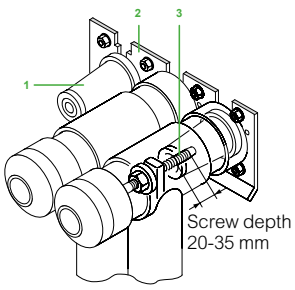
DM107911



Connector cone Type A	
Switchboard function	
I	–
Q	•
B	–

1. Sliding contact pin
2. Support plate
3. Mounting flange
4. Mounting device

DM107911



Connector cone Type C	
Switchboard function	
I	•
B	•

Up to Ir 630 A and Ik 20 kA 1 s.

1. Cross member - Male
2. Support plate
3. Screw contact

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Cable connections

Cable compartment

Type of connection

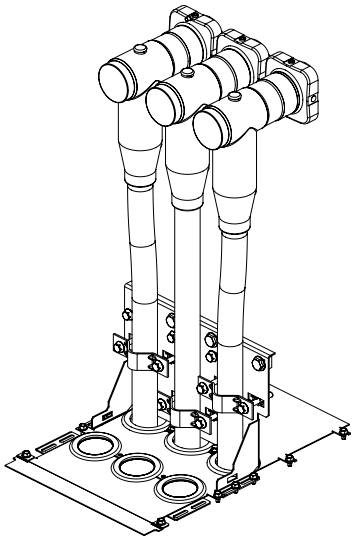
RM AirSeT cable compartment is spacious and allows for various connections (cf. § Selection of cables):

- Single cable per phase
- Two cables per phase
- Single cable per phase + surge arresters
- No cable - bushing must be protected by insulating plug.

A deeper cable access door is required for 2 cables + 1 surge arrester per phase.

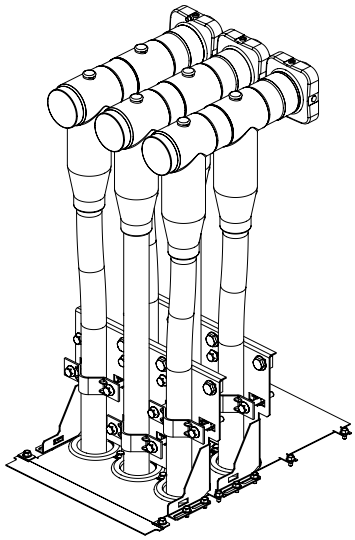
Please consult Schneider Electric for availability.

DM110170



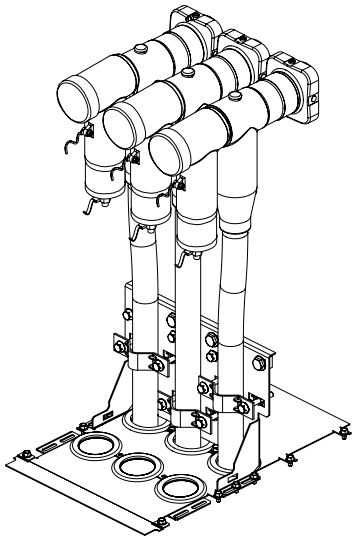
1 single core cable per phase

DM110173



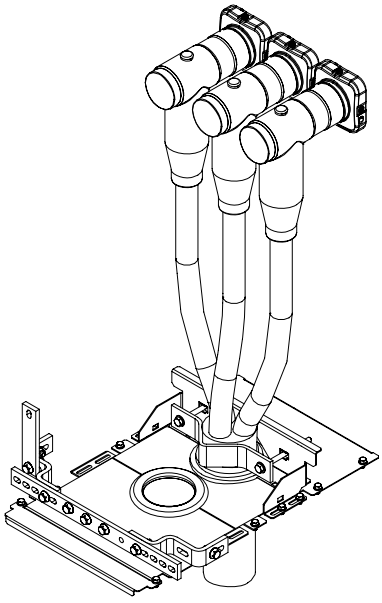
2 single core cables per phase

DM110175



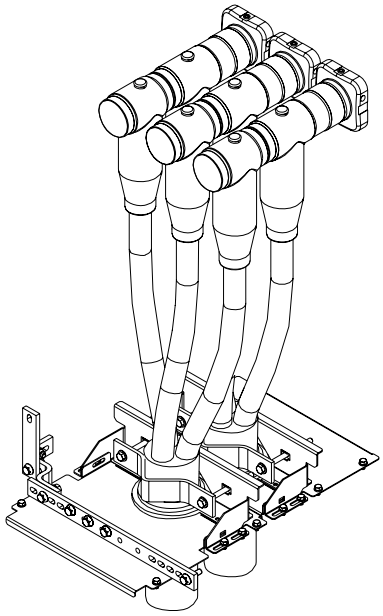
1 single core cable per phase + surge arrester

DM110171



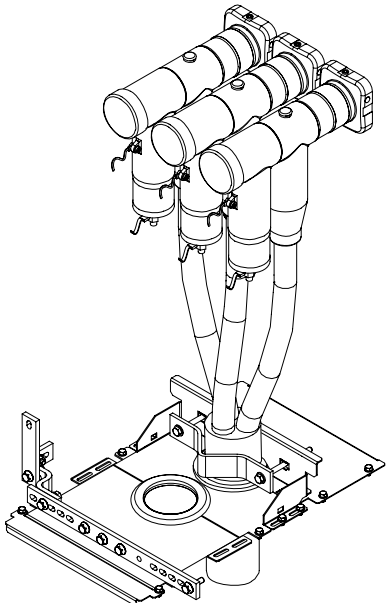
1 three core cable per phase

DM110174



2 three core cables per phase

DM110176



1 three core cable per phase + surge arrester

Cable connections

1 cable per phase – Bushing Type A



250 A ELBOW PLUG-IN type A connector as per EN 50181.
External cone with male contact Ø 7.9 mm.

Indicative list, for other brands please consult us.

Connector type	Manufacturer	Reference of connector	Shape	For cable cross section
Shielded	NEXANS - Euromold / Elastimold	200LR (1)	Elbow	25 to 150 mm²
	PRYSMIAN- Pirelli	FMCE 250	Elbow	16 to 95 mm²
	NKT cables	EASW 12/250 A	Elbow	25 to 95 mm²
	NKT cables	CE 24-250 CSE-A 250	Elbow Elbow	25 to 95 mm²
	3M	93-EE 605-2	Elbow	25 to 95 mm²
	TE Connectivity - Raychem	RSES-52xx		16 to 120 mm²
	Südkabel	SEW 12 / 24	Elbow	25 to 150 mm²
Not Shielded / Heat Shrinkable (2)	TE Connectivity – Raychem	EPKT + EAKT + RSRB	-	16 to 150 mm²

(1) 120 or 150 mm² on request.
(2) Heat Shrinkable MV bushing boots / Insulating Shrouds are not safe to touch when energized: Only bushing CTs can be used: no cable CTs.

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Cable connections

1 or 2 cables per phase – Bushing Type C



- Up to 630 A ELBOW OR TEE PLUG-IN type C connector as per EN 50181. Screw type contact with M16 x 2 internal threading
- Maximum number of cable per phase is 2: The cable clamps need to be selected accordingly (standard cable access door for most connectors)
- Only TEE connectors are adapted to be used for 2 cables per phase.

Connector type	Manufacturer	Reference of connector	Shape	For cable cross section
Screened	NEXANS - Euromold / Elastimold	480TB/800PB (or old 400TB)	Tee	Up to 300 mm²
		484TB/804PB	Tee	Up to 630 mm²
	PRYSMIAN - Pirelli	FMCEAs-630	Tee	70 to 300 mm²
	NKT cables	CB 12 / 24-630	Tee	25 to 300 mm²
	3M	93-EE 705	Tee	25 to 300 mm²
	TE Connectivity - Raychem	RSTI-58xx	Tee	25 to 300 mm²
		RSES-54 / 57	Elbow	25 to 300 mm²
	Südkabel	SET 12 / 24	Tee	50 to 300 mm²
Not Screened / Heat Shrinkable (2)	NKT cables	AB 12-630	-	25 to 300 mm²
	TE Connectivity - Raychem	RICS-51xx	-	25 to 300 mm²
	TE Connectivity – Raychem	RSRB	-	16 to 300 (1) mm²
	NEXANS	15TS-NSS	-	35 to 300 (1) mm²

Indicative list, for other brands please consult us.
(1) Consult us for higher cable cross section.
(2) Heat Shrinkable MV bushing boots / Insulating Shrouds are not safe to touch when energized: Only bushing CTs up to 12 kV can be used: no cable CTs.

Surge arresters for cable connector



Type C TEE connectors

- The RM AirSeT standard cable access door and dimensions of cable compartment are adapted to receive 1 cable + 1 surge arrester per phase with most of previously listed Tee connectors type C
- A deeper cable access door is available as an option when 2 cables + 1 surge arrester.

Indicative list, for other brands please consult us.

Connector type	Manufacturer	Reference of surge arrester (1)	Shape
Screened	NEXANS - Euromold/ Elastimold	800SA	For Tee
	NKT cables	CCSA 12	For Tee
	3M	MUT 23	For Tee
	TE Connectivity - Raychem	RSTI-SA	For Tee
Not Screened / Heat Shrinkable (2)	NKT cables	ASA 12	-
	TE Connectivity - Raychem	RDA 24	-

(1) Interface connection accessories are required by some manufacturers.
(2) Heat Shrinkable MV bushing boots / Insulating Shrouds are not safe to touch when energized: Only bushing CTs can be used: no cable CTs.

Dimensions

RM AirSeT dimensions and weights (1)

Number of functional units	Width (mm)	Depth (mm)	Height (mm)			Weight (kg)
	(L) (2) / mm	(D) / mm	Type	MV (H)	Bushing (b)	(W) (3) / kg
1	420	780	Standard 1.6	1625	650	260 to 365
2	770					300 to 425
3	1120		Version 1.4	1400	430	400 to 560
4	1470					500 to 700

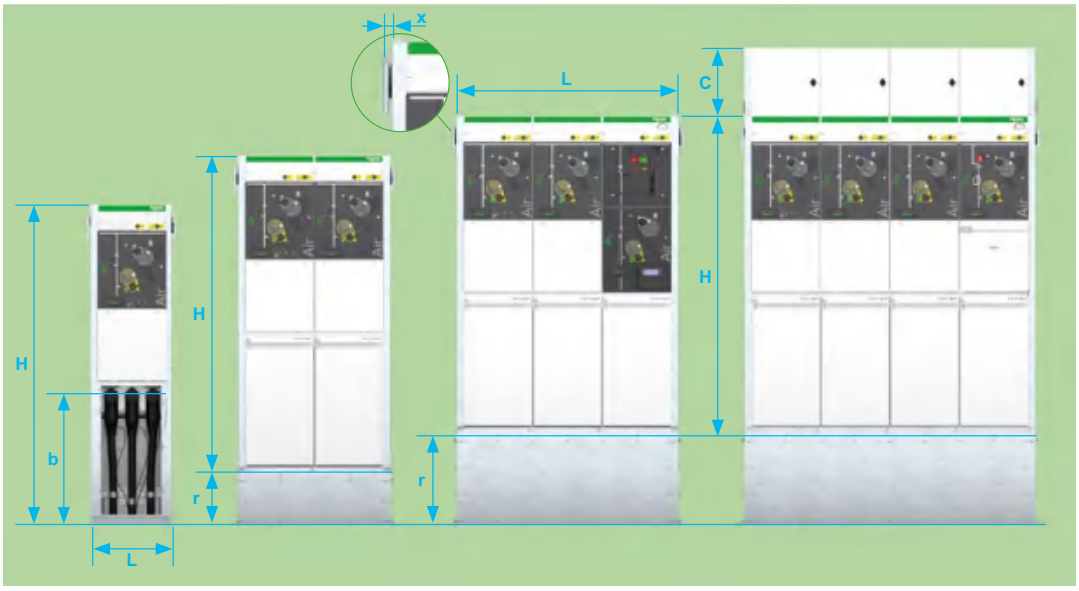
(1) The dimensions L, D and H are identical to all RM AirSeT with functional units I, Q or B.The total height is increased if a raising plinth or a LV cabinet is used: please see the table below.

(2) The width of the frame (L) is identical with extensiblity or without (RE, LE, DE or NE).It is essential that cover.s with insulating caps are mounted on any busbar extension bushing not connected toanother RM AirSeT before energising a switchgear: Each cover additional width (x) is +20mm. It is removed whenthe next switchgear is assembled.

(3) The weight depends on configuration and options.

(4) Consult Schneider Electric for availability.

PM111129



Optional Raising Plinth



Height with optional raising plinth or LV cabinet

Options	Height (mm) (4)					
	(r)	(r + H)	(r + b)	(c)	(H + c)	(r + H + c)
Standard 1.6	250	1875	900	350	1975	2225
	450	2075	1100			2425
Version 1.4	250	1650	680		1750	2000
	450	1850	880			2200

Note: Please consult Schneider Electric for availability of extended LV cabinet

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Civil engineering

Dimensions of the substation

The distances are the **same for all RM AirSeT range for 12 kV and 24 kV**.

Distances to the walls - location of fixing points

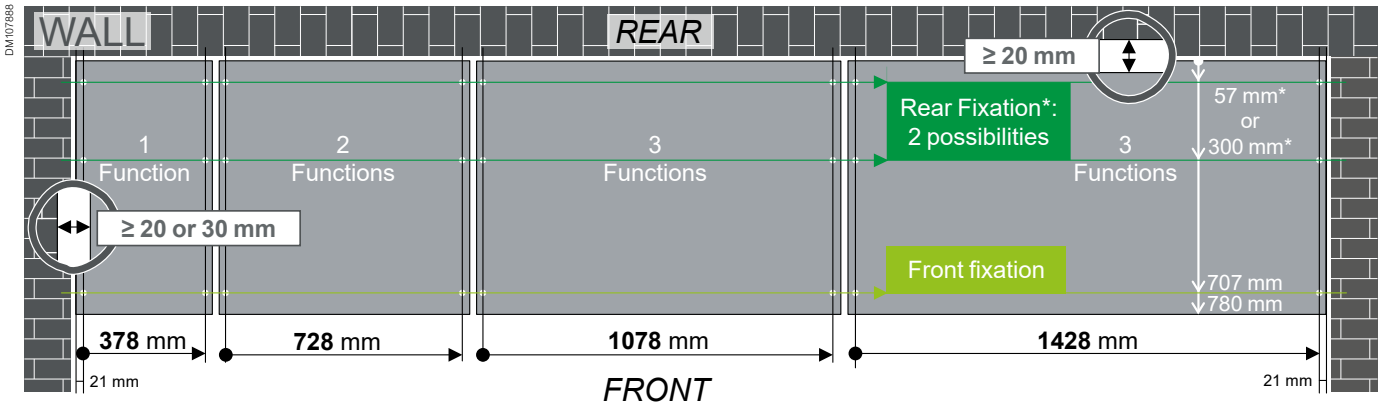


Fig. 1: principle top view diagram - electrical room dimensions and fixing points.

** 2 possibilities: The most convenient row of rear fixing points can be selected*

Extensibility	NE	LE	RE	DE
LEFT	≥ 20 mm	≥ 30 mm	≥ 20 mm	≥ 30 mm
RIGHT	≥ 20 mm	≥ 20 mm	≥ 30 mm	≥ 30 mm
REAR	≥ 20 mm	≥ 20 mm	≥ 20 mm	≥ 20 mm

Fig. 2: table of Minimal distance from RM AirSeT side to the wall of the electrical room.

- The Fig. 1 and 2 provide the minimal distances and fixing principles required when RM AirSeT is **standalone**. When extensible RM AirSeT must be assembled, additional clearance are required (see next page)
- Minimal distances on "left and right" depend on the extensibility version of RM AirSeT, (see Fig. 2).
- 4 fixing points must be used for each RM AirSeT unit on the left, right, front and rear.
- Rear fixation can be selected in 3 positions for each side:
  - 2 holes in the base frame located at 57 mm or 300 mm from the rear.
  - Alternative fixing bracket at 57 mm from the rear (Fig. 3)

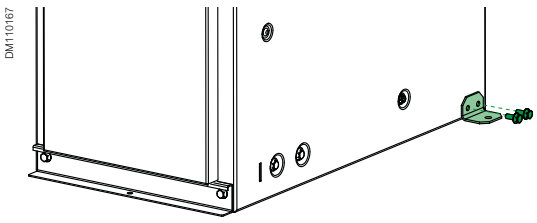
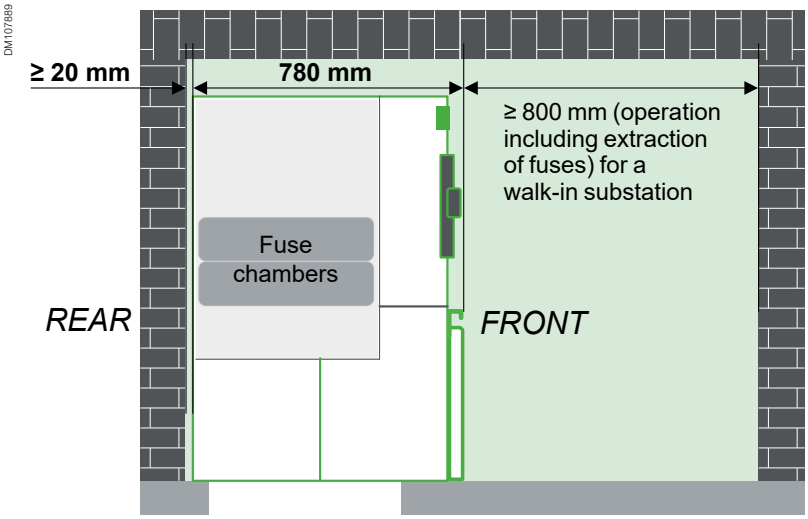


Fig. 3: Alternative fixing bracket.

Side view: Walk-in substation, minimal distance required in the front.



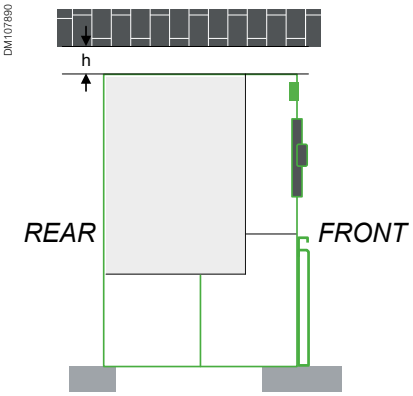
Please consult us for shorter distances.

Civil engineering

Dimensions of the substation

The distances are the same, for all RM AirSeT range for 12 kV and 24 kV, whatever their number of functions.

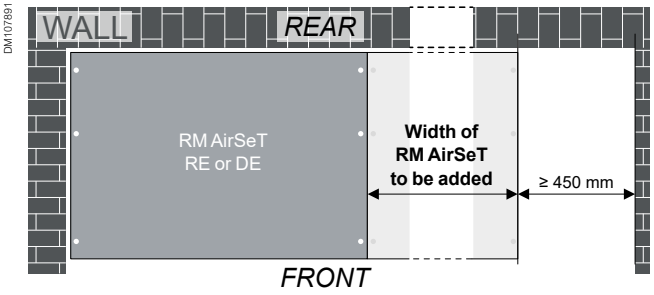
Side view: Minimal distance required to the ceiling



The distances are the **same for all RM AirSeT range for 12 kV and 24 kV**.

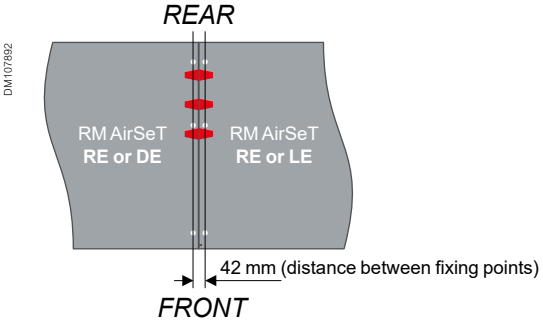
- For **RM AirSeT mounted standalone**: the distance shall be **h ≥ 20 mm**
- To **allow side extensions**, the recommended distance is **h ≥ 100 mm**.

Top view: Distances required for side extension of 2 extensible RM AirSeT



To allow side extensions, we recommend a distance of extensible side to the wall or equal to 450 mm. Please consult us for shorter distances.

Top view: Distance between fixing points of RM AirSeT extensible units



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Civil engineering

Dimensions of the substation

Cables Mechanical characteristics vary depending on manufacturing, conductor and insulation materials, shields, sheath, voltage... As a consequence, bending radius (r) of each cable is different.

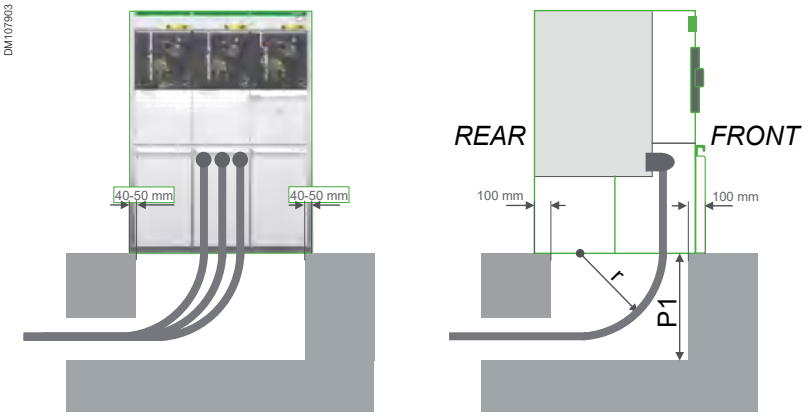
The heights of cable trench (P1) and bending radius (r) indicated in the table are typical: the engineers designing the substation must adapt the dimensions of civil works to the actual cables, the routing and installation mode. The bending radius (r) indicated by the cable manufacturer must be respected to adapt properly the height of the cable trench (P1) of the substation.

Recommended sizing of the cable trench

The following instructions apply to the civil engineering for I, Q, and B RM AirSeT functional units.

The routing of cables inside the cable trench can be from the front, the rear, the left or the right.

Example for a RM AirSeT with 3 functional units with height of 1.625 m



Front view | Side view

Determining typical height of cable trench (P1)

Connection	Cable insulation	Cable	Cross section (mm^2)	Typical bending radius (mm)	Height of cable trench (P1) (mm)
Plug-in sockets draw-out sockets	Dry insulator	Single-core	≤ 50	370	320
			70 to 95	440	390
			120 to 150	500	450
			185 to 240	590	570
			300	640	590
Heat-shrinkable ends	Dry insulator	Single-core	≤ 50	370	320
			70 to 95	440	390
			120 to 150	500	450
			185 to 240	590	570
			300	640	590
		Triple-core	≤ 95	550	710
			150	610	770
			185	650	820
	Paper impregnated with non-draining material	Triple-core	≤ 50	550	710
			95	635	800
			150	670	840
			240	775	950
			300	735	1 020

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Helping you design MV products according to IEC standards

- Our talented electrical distribution experts share their industry-leading knowledge of technological developments and evolving medium-voltage standards.

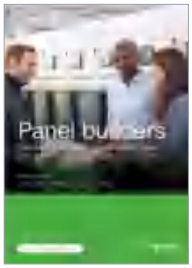
MV Technical Guide



Build your MV network

- Discover Schneider Electric products and MV components for your MV network with the extensive Panorama guide.

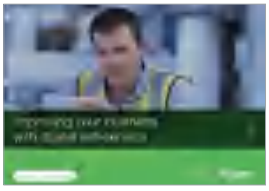
MV product paranoma



Component for MV switchgear

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