

Eco<sup>2</sup>truxure™  
Innovation At Every Level

SeT Series

# RM AirSeT

Ring Main Unit & Modular Switchgear

Catalog 2021

Secondary Gas Insulated Switchgear  
Up to 24 kV

Innovation is in the Air!

[se.com/RMAirSeT](https://se.com/RMAirSeT)

Life Is On

**Schneider**  
Electric

AirSeT is a consistent range  
Insulation with PURE AIR – Breaking-switching with vaccum

SM AirSeT

PM10540



RM AirSeT

PM105430



GM AirSeT

PM109452



Modular –  
Secondary AIS

Air & vaccum  
Air Insulated Switchgear

**AIS: Busbar in ambient Air**

RMU –  
Secondary GIS

Air & vaccum  
Gas\* Insulated Switchgear

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

Primary GIS

Air & vaccum  
Gas\* Insulated Switchgear

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

# Your concerns

# RM AirSeT 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 and produces no toxic by-products; it eliminates the need for costly and complex end-of-life treatment

## Safety



- Disconnection and insulation performance, preserved from ambient conditions in an IP67 enclosure
- A genuine three-position switch-disconnector with Shunt Vacuum Interruption (SVI)<sup>™</sup> technology for switching

## 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
- Stainless Steel tank, sealed for life, requiring no refill with improved mechanism and auxiliaries with longer life
- Condition based maintenance with sensors connected to EcoStruxure asset management software
- Integrated Live Cable Interlock (optional)

## Flexibility



- Free combination functional units
- 1 to 4 functional units in 1 sealed enclosure
- Switch-fuse or vacuum circuit breaker
- Customize locally or on site: opening/closing releases-coil, auxiliary contacts, motors added in shorter time thanks to pre-wired kits
- Architecture suitable for kiosk manufacturers and partners

## Connectivity



- Sensors for Control Monitoring
- Distributed Telecontrol Unit DTU Easergy T300
- IT & OT technologies integration, for real time monitoring
- Allowing asset preventive and predictive maintenance
- 3D models available for accurate substation design

# General contents

## RM AirSeT

PM109793



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Our purpose is to

empower all to make the most of our energy and resources



Find more information [here](#) 

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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.**

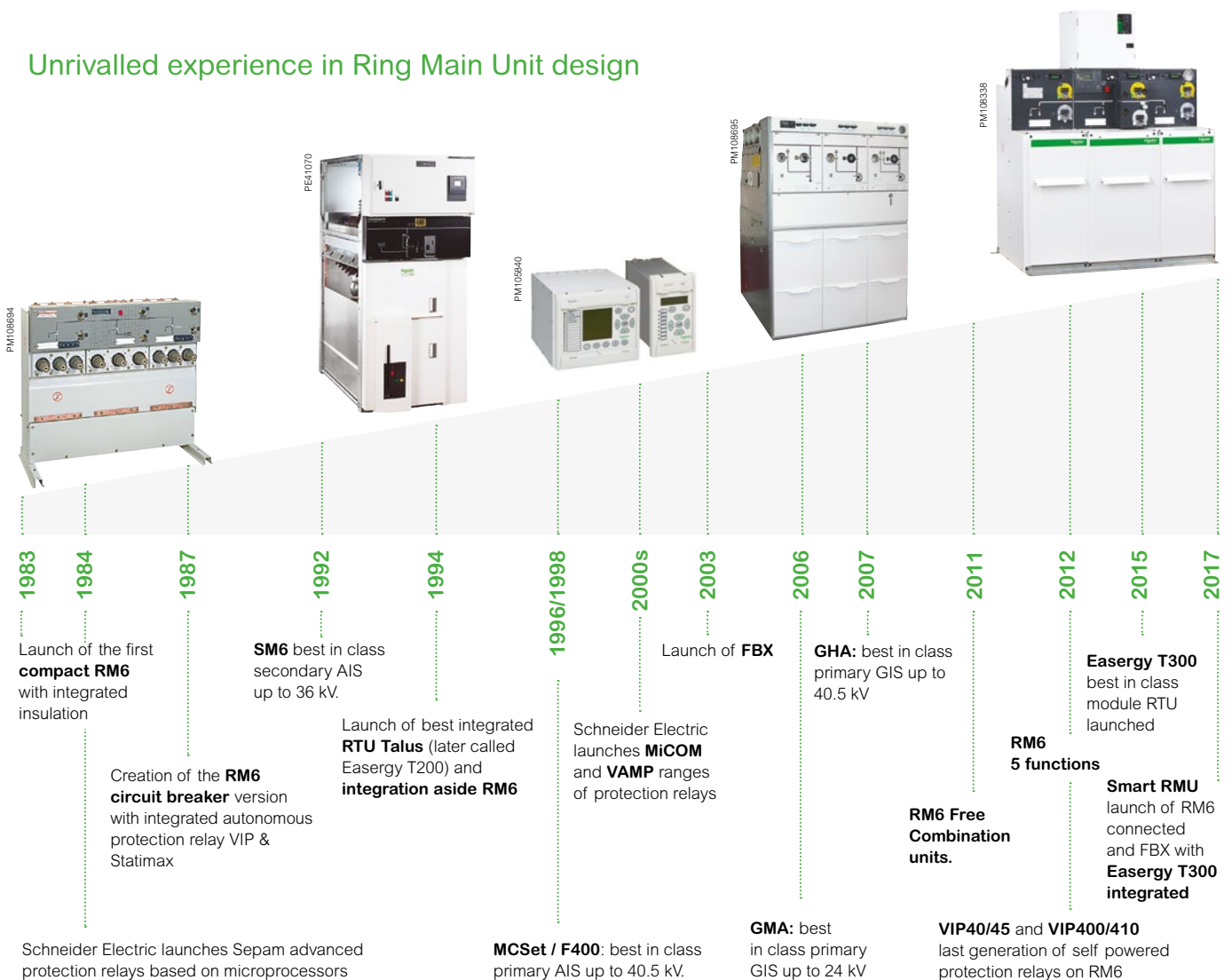
At Schneider Electric, we are also proud of achievement of our former brands, such as Merlin Gerin, Magrini Gallileo, MESA, Yorkshire Switchgears, Square D, Alstom-Areva, AEG, Delixi, Telvent, Sorhodel, Modicon, Telemecanique, Invensys, etc.

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



# RM AirSeT: GREEN & DIGITAL Secondary Distribution GIS

Ring Main Unit (RMU) & Modular Switchgear up to 24 kV



## Sustainability & Safety

### Operational and environmental safety first

- Stable performance of the pressurized pure air for disconnection and insulation
- A 3-position switch-disconnector: CLOSED / DISCONNECTED / EARTHED
- No toxic by-products with Shunt Vacuum Interruption (SVI)<sup>TM</sup>
- Air simplifies the end-of-life treatment: air can be released in to the atmosphere



## Reliability

### Optimized for use

- Operation procedures do not change
- No refilling: sealed pressure system



## Connected

### Smart-grid-ready

- Direct connection to DMS with integrated Easergy T300 RTU
- Intermediate versions also available
- A range of current sensors allowing various application



## Flexibility

### Fuse or circuit breaker

- Switch-Fuse available
- Circuit Breaker\* with rapid auto-reclosing duty



### Compact & flexible

- Footprint similar to usual GIS RMU
- Free combination of functions



### Plug-and-play in workshop and on-site

- Prewired Motor kits, Contacts and operating coils
- Prewired Bushing Mounted CTs for measurement & protection
- Simple on-site adaptation
- Easy busbar extension



## Connected

### Asset management

- Condition monitoring
- Wireless sensors automatic pairing through NFC tag
- On-site monitoring via free app



## Reliability

### Temperature & pollution

- IP67 stainless steel tank protecting main circuits from ambient air conditions - Gas Insulated Switchgear
- CompoDrive mechanism: reliability enhanced by high-tech composite materials



# Pure air is immune from future regulation, no Global Warming Effect

Pure air is made by filtering ambient air in order to remove humidity and impurities. It provides the following:

- Insulation properties
- Protected from ambient conditions in a sealed compartment
- Validated by type tests as per IEC 62271-200
- Enhanced safety in the disconnected position

Over more than 10 years, Schneider Electric filed more than 114 patents on SF<sub>6</sub>-free technologies patents.

## Switch: Shunt Vacuum Interruption (SVI)<sup>TM</sup>

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

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

- Breaking by vacuum interrupter
- Disconnecting in air gap
- Breaking and disconnecting in one operation as current SF<sub>6</sub> 3-position switch
- Earthing and making in one operation as current SF<sub>6</sub> 3-position switch

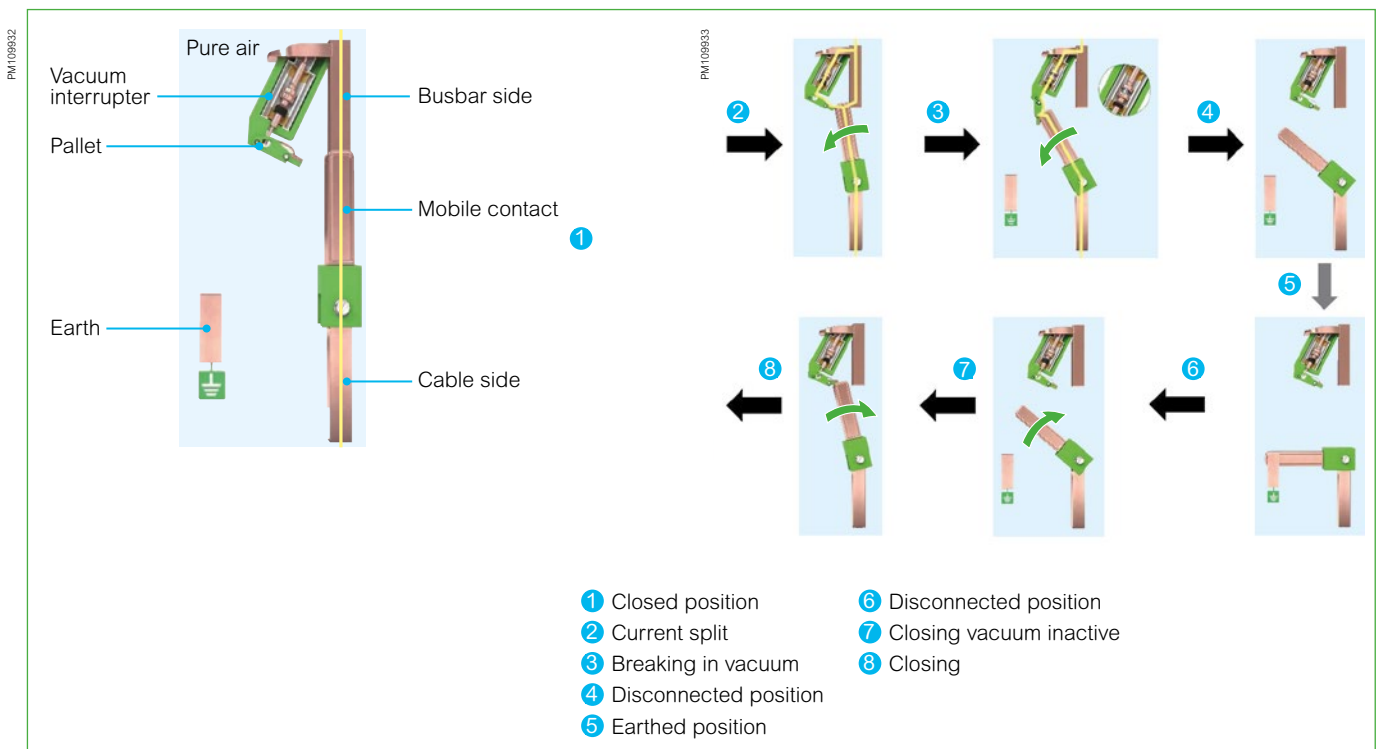
## Circuit breaker: short circuit breaking\*

- Circuit breaker is compliant to IEC 62271-100 for capability to interrupt short circuit current
- The arc quenching is achieved by a vacuum interrupter, in which the arcing contacts ensure conductivity.

(\*) Please consult us for availability.

## Principle diagram of three-position switch-disconnector: Shunt Vacuum Interruption (SVI)<sup>TM</sup>\*

A smart combination of proven technologies



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

# Overview

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# Fields of application

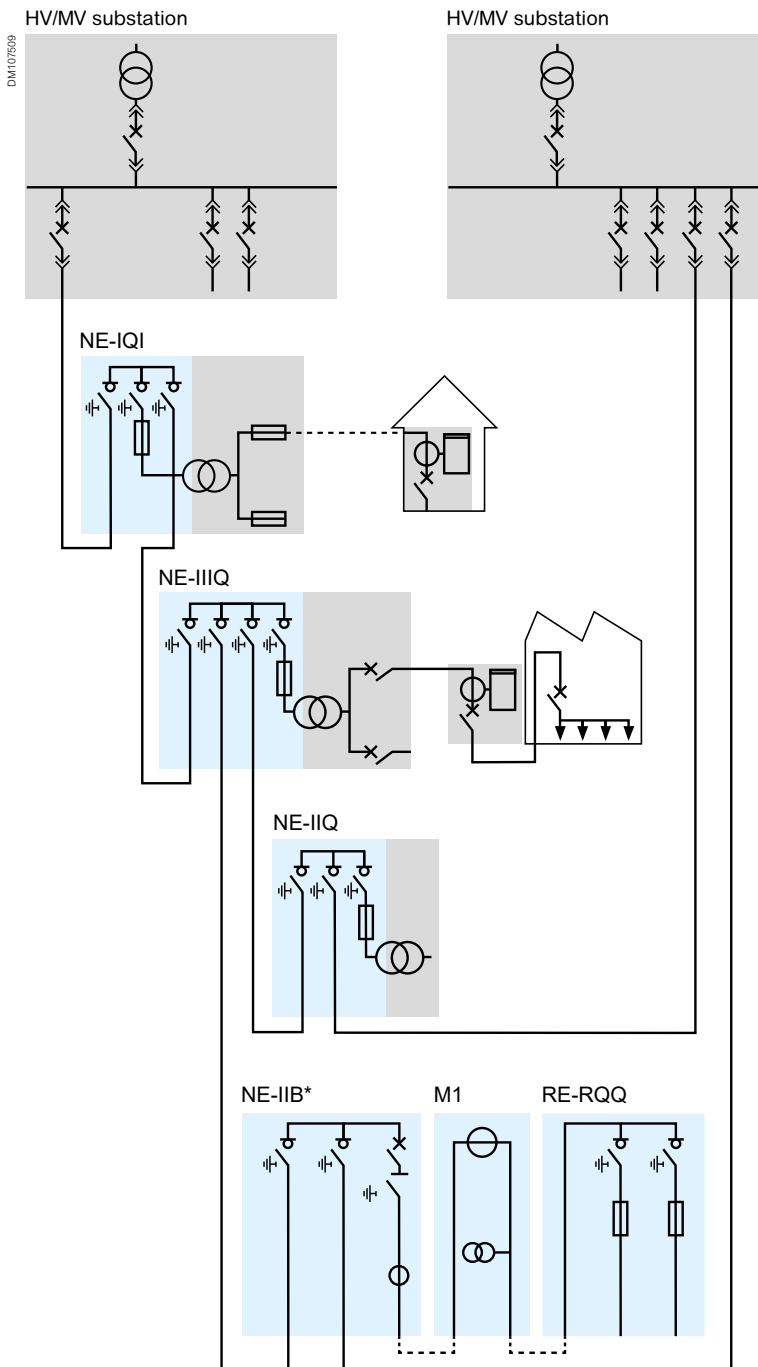
## Distribution and public electrical networks

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)\*



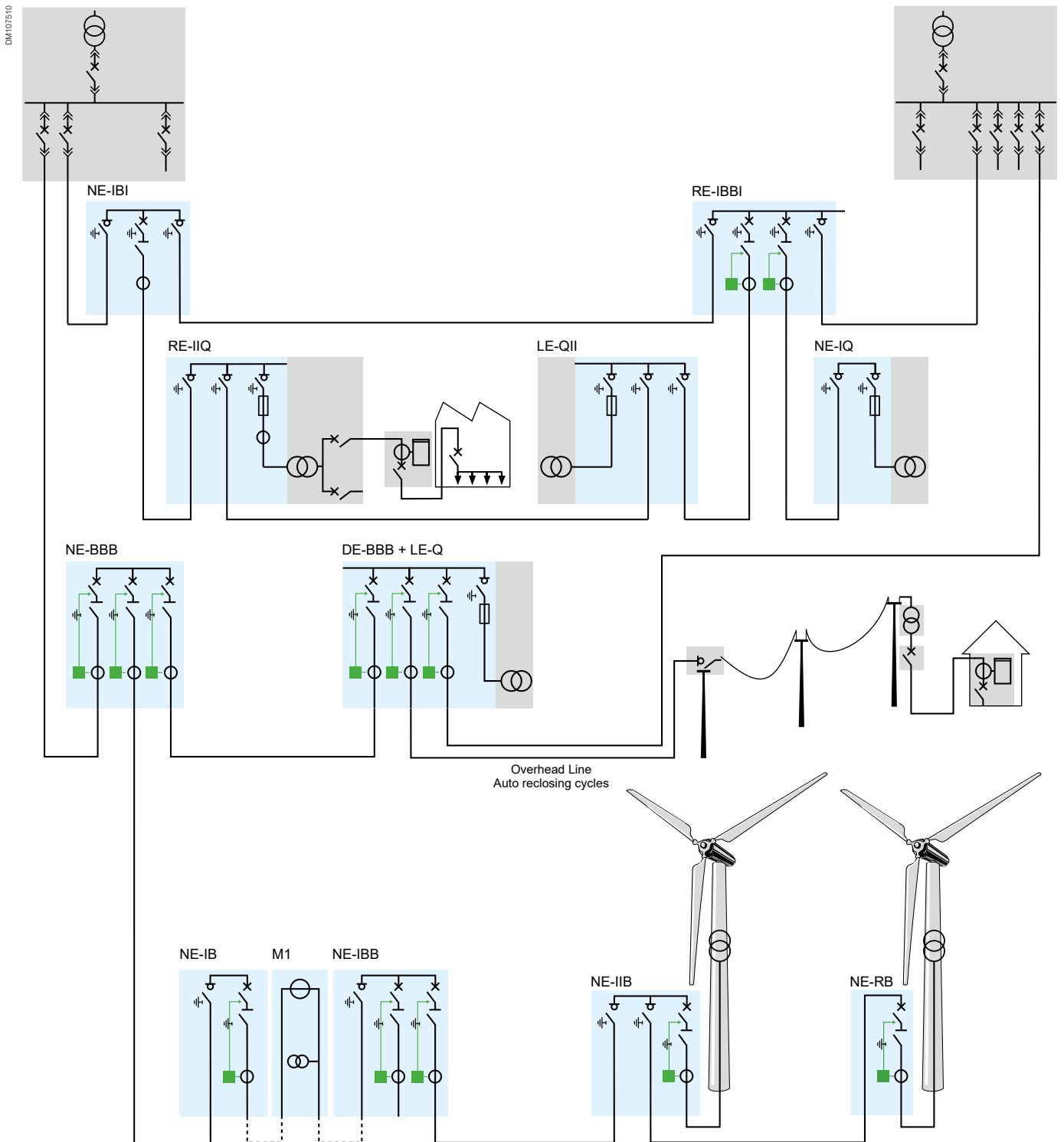
(\*) Please consult us for availability.

# 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



# Fields of application

## Typical applications


### Critical applications (hospitals, data centers...)



PM1107079  
DM1107851

NE-IIB M1 RE-RQQ


### Wind turbines



PM1108687  
DM1107852

NE-RB NE-BI RE-B LE-I


### MV/LV Distribution substation - Dense urban area



PM1108698  
DM1107893

RE-IIQ LE-QII


### Industrial substations



PM1108699  
DM1107853

LE-IBIQ NE-IIB M1 RE-RQQ


### Building and Industries



PE59313  
DM1107864

NE-IIB M1 RE-RBB

### MV satellite substations



PM1107860  
DM1107865

NE-BBB



# 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<sub>2</sub> 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<sub>2</sub> 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)



# ...SUSTAINABILITY READY



## 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 Easergy 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

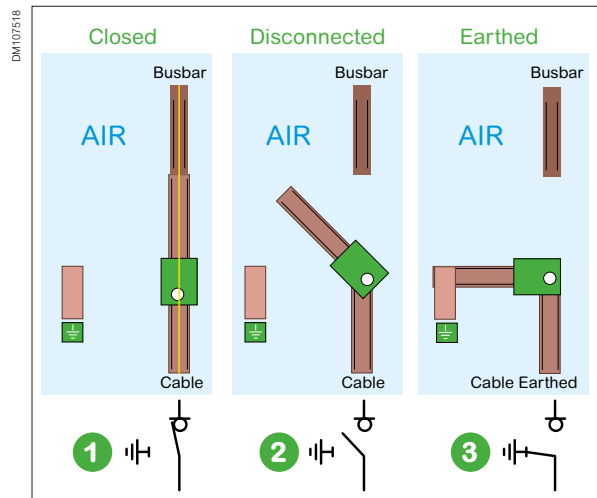
## Architecture: the safety of a 3-positions disconnecter in pure air

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

Three position switch-disconnectors are commonly used:

Most safety managers have adopted 3-position disconnecters for decades in their switchgears. Compared to separated apparatus, this architecture natively prevents a live busbar from earthing, as the main contact of each phase cannot be simultaneously in different positions: Earthed **3**, Disconnected **2**, or Closed **1**.

In RM AirSeT, the operating lever can only be inserted if the service status permits it.



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# Flexibility

## Free combination

**RM AirSeT:** more flexible for any substation configuration.

- Traditional RMU and multifunctional block: several functions in 1 tank as complete switchgear
- Modular switchgear still possible: unitary functions can be assembled together
- Semi Modular switchgear: combining both

### 1 RM AirSeT can comprise:

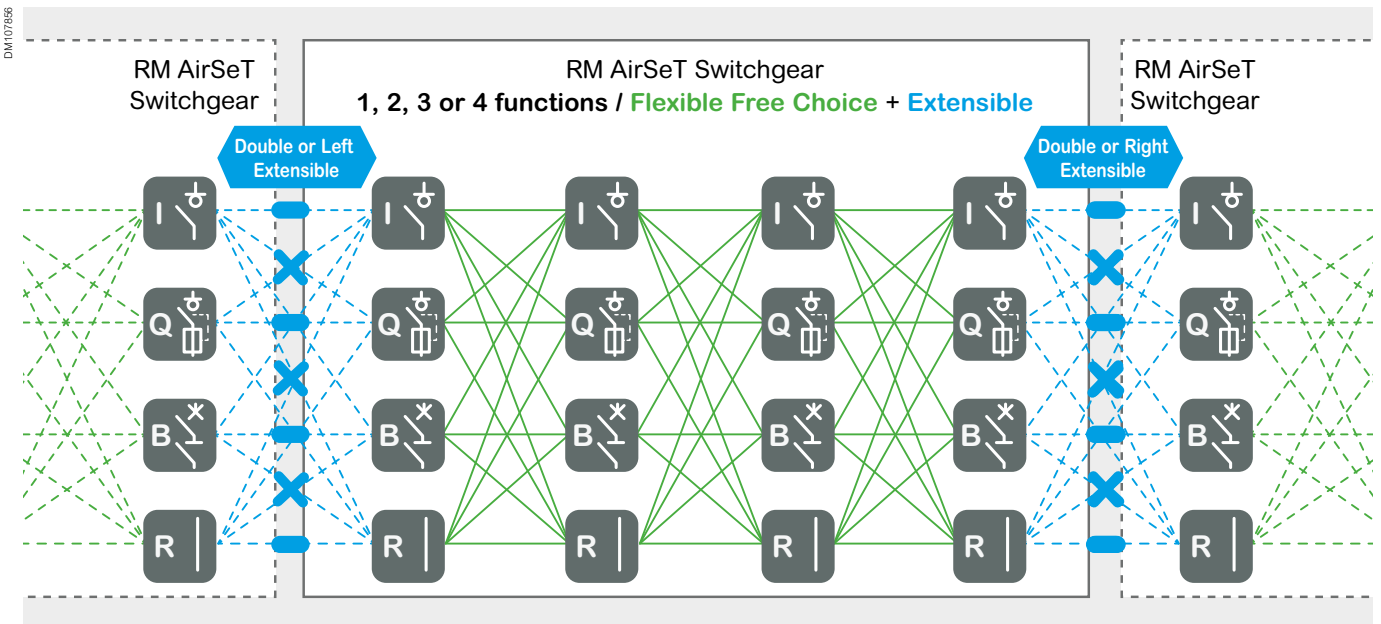
- 1 function: I, Q, B...
- 2 functions: II, IB,...
- 3 functions: IIQ, IQI, QQQ...
- 4 functions: IIII, BBBB, QRIB...

All can be either compact Non-Extensible (NE) or lateral extensible units: LE / RE / DE to combine with other switchgear.

### RM AirSeT: Free Combination of functions in 1 switchgear <sup>(1) (2)</sup>

Most combinations can be proposed inside a sole tank.

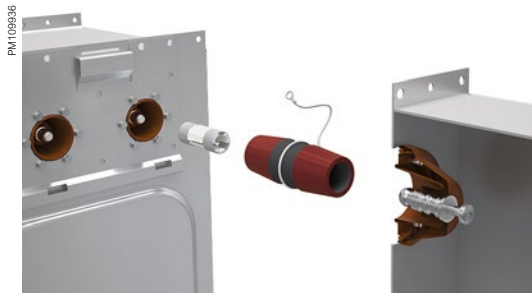
- **Free combination:** all the options for each function
- **Easier, faster installation, more cost-efficient** than adding several single extensible functions
- **Compactness preserved:** each function has same dimensions



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

# Flexibility

## Extensibility



### The RM AirSeT extensibility in a nutshell:

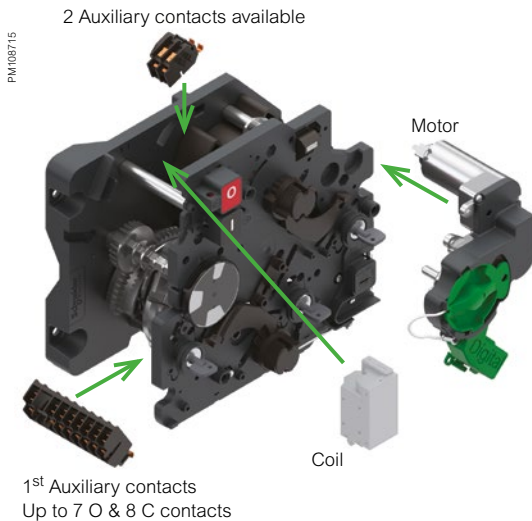
- **Easy system:** the proven "A-link"
- **Compact:** no gap between 2 switchgears
- Available on all the range, **on both sides:**
  - Right-extensible only
  - Left-extensible only
  - Double-extensible (left & right)

#### Extension on site

**RM AirSeT can easily be extended on site without specific preparation of the floor.**

The extension on the left or right hand side of your RM AirSeT with one or more functional units can be carried out by simply adding modules that are connected to each other at busbar level by shielded connectors. This very simple operation can be carried out on site:

- Without handling any gas
- Without any special tooling
- Without any particular preparation of the floor
- Up to 630 A



#### Accessories for easy upgrade



**Kits including motorization are available for:**

- Switch-disconnectors (I)
- For Switch-fuse combination (Q)
- For Circuit Breakers (B)



## Understanding and managing the complexities of your operations

### Service Lifecycle Management

Connected switchgear is a foundational element of EcoStruxure, Schneider Electric, open, and interoperable system architecture.

Connectivity offers customers greater visibility of their facilities and more control over operational health.

#### How to improve site safety

Electrical Safety Training



- Detect any knowledge gaps and attend appropriate e-learning, practical and hands-on electrical safety training courses.

Electrical Distribution Consulting Services



- Our consulting services portfolio offers asset health analysis for your site and recommends preventive actions.

#### How to improve protection your new installation

Service Plans



- Knowing your installation with the right service plan.

Maintenance Services



- A complete solution to maintain your equipment. Helping ensure service continuity and peace of mind at every step.

#### How to modernize aging infrastructure

Digitized Modernization



- Modernize your electrical distribution switchgear with pre-engineered retrofit service solutions.

SF<sub>6</sub> Recovery Services



- Peace-of-mind for your transition to SF<sub>6</sub>-free medium voltage switchgear.

Spare Parts Management



- Spare part availability and reduced downtime.

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Find more information [here](#)

# EcoStruxure™ ready solutions

## What is EcoStruxure™?

# 500 000

EcoStruxure™ has been deployed in almost 500 000 sites with the support of 20 000+ developers, 650 000 service providers and partners, 3 000 utilities, and connects over 2 million assets under management.

### EcoStruxure™ ready



#### Efficient asset management

Boost your efficiency and reduce downtime using predictive maintenance tools



#### 24/7 connectivity

Make better informed decisions with real-time data that is available everywhere, anytime



#### Enhanced safety

Advanced features designed-in and based on well-known designs, experience and technology.

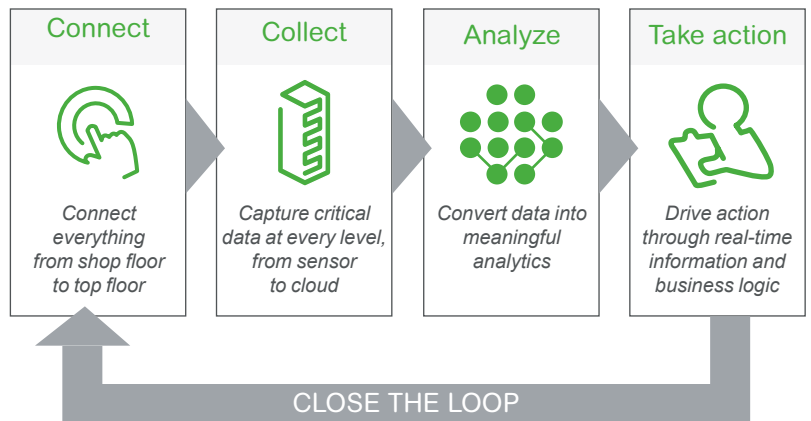
EcoStruxure™ is our open, interoperable, IoT-enabled system architecture and platform. EcoStruxure delivers enhanced value around **safety**, **reliability**, **efficiency**, **sustainability**, and **connectivity** for our customers. EcoStruxure leverages advancements in IoT, mobility, sensing, cloud, analytics, and cybersecurity to deliver Innovation at Every Level. This includes Connected Products, Edge Control, and Apps, Analytics & Services which are supported by Customer Lifecycle Software.

### Turn data into action

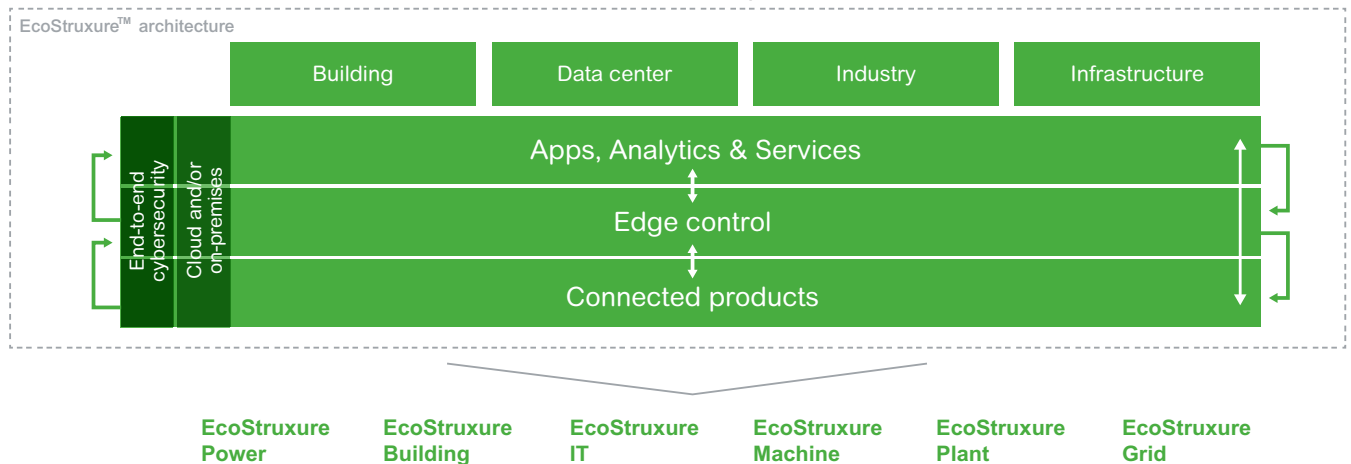
EcoStruxure™ architecture lets customers maximize the value of data.

Specifically, it helps them:

- Translate data into actionable intelligence and better business decisions
- Take informed decisions to secure uptime and operational efficiency thanks to real-time control platforms
- Gain visibility to their electrical distribution by measuring, collecting, aggregating, and communicating data



## EcoStruxure™ Innovation At Every Level



# RM AirSeT digital connectivity

Answering your challenges of today and tomorrow with EcoStruxure™

Electrical distribution networks must transition to next-generation technology in order to face the challenges of modern grid applications, such as growing energy demand, stricter CO<sub>2</sub> emission limits, and tight constraints on operational expenditure (OpEx).

PM104489



## Grid evolution

Support the integration of distributed energy resources (DER) and electric vehicles (EVs).

## Downtime tolerance

Minimize power supply interruptions and manage increasing energy demand.

## Quality requirements

Help to ensure grid performance meets customer and regulatory needs.

DB407609



## Cost optimization

Maintain aging infrastructure while expanding installations and operations.

## Need for efficiency

Manage base and peak load consumption effectively.

## Cyber threats

Comply with the latest standards and help protect your business from cyber attacks.

PM109790



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# EcoStruxure™ ready solutions

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

**Electrical distribution companies:**

- Easier integration to Scada by reducing the connection works at site
- Interoperable
- Ecostruxure ADMS modules are available to collect data for condition-based maintenance

**Building, critical infrastructures:**

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

## Active Plus features

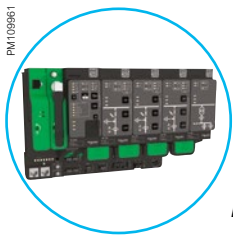
Effective asset management, enhanced safety, 24/7 Real time connectivity for network management

The **RM AirSeT Connected Advanced** solution is designed to leverage solution benefits, in addition to bringing the best IoT capabilities for reliable and efficient asset management.

The solution contributes to an open and transparent information solution for smart grid medium voltage distribution networks.

It is a complete integrated solution:

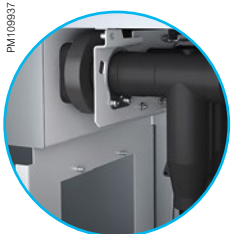
- A proven and robust RM AirSeT RMU with voltage and current sensors
- An RTU (T300) located in an LV cabinet, on top of the RM AirSeT
- A fully tested solution for peace-of-mind
- Plug-and-play installation



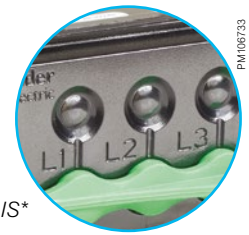
Easergy T300



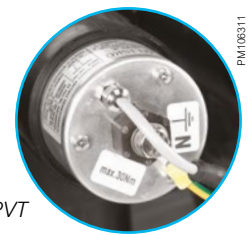
Thermal sensor



Bushing CT



VPIS / VDIS\*



LPVT



Cable mounted CT

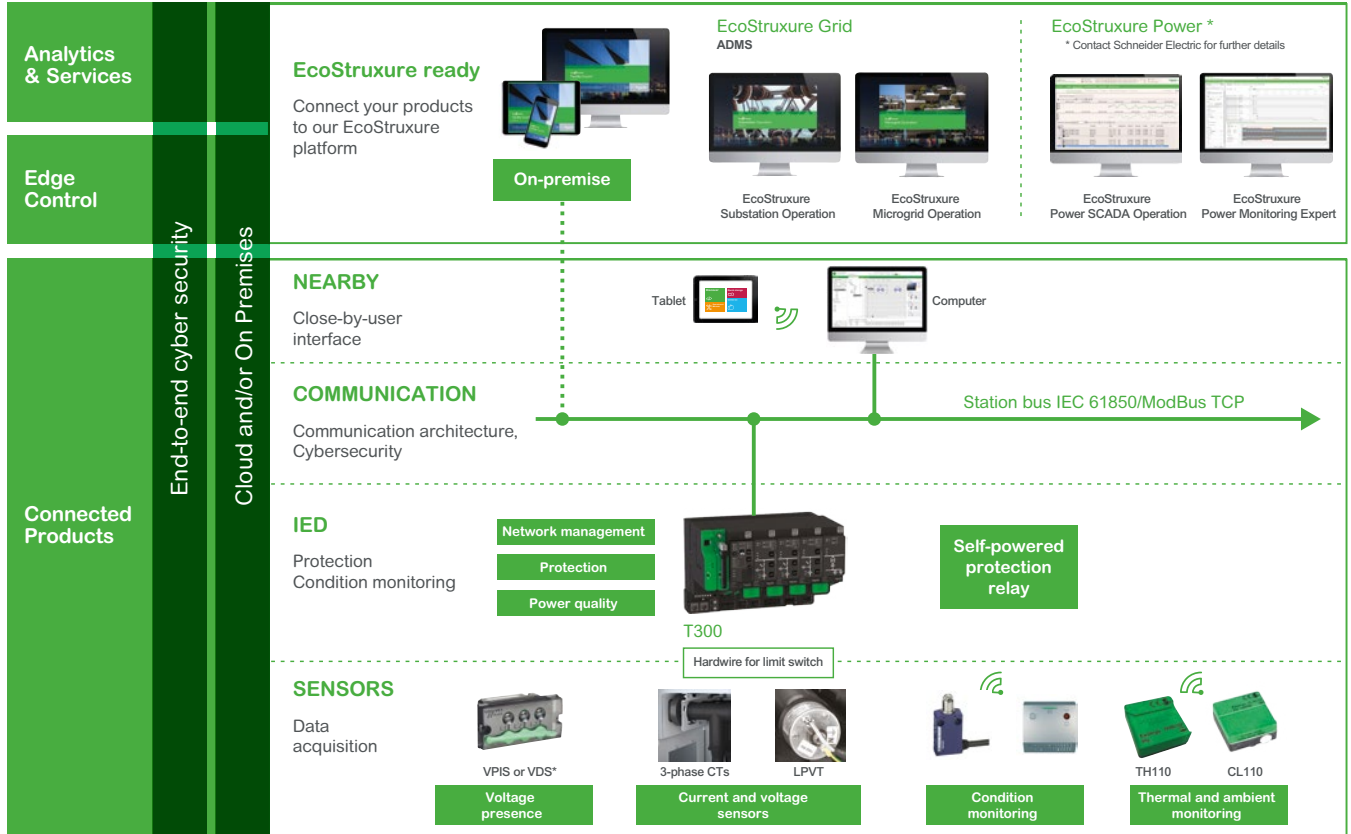
(\*) Please contact us

# EcoStruxure™ ready solutions

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



DM1107442



PM1109769



PM1109763



(\*) Please contact us

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# EcoStruxure™ ready solutions

## EcoStruxure™ ADMS

PM108703



### Improve reliability and resiliency

Increase customer satisfaction and maintain compliance with the latest regulations.

#### Fault management processes

Manual and automated FLISR (fault location, isolation and supply restoration) that is seamlessly integrated with an OMS (outage management system) to help incident location and reduce restoration times.

#### Network instability forecasting

Near-term forecasting of load and storm impact, enhanced with historical analysis, and integrated weather services.

#### Regulatory compliance

Network operation visibility and improved regulatory indices on distribution grid supporting regulatory audits.

### Optimize network operations

Operational efficiency is greatly improved thanks to EcoStruxure ADMS. System automation, smart forecasting, and remote capabilities make it easier to achieve more with less:

- Advanced DMS analysis to optimize network
- Field-proven SCADA system for monitoring and control
- EMS for transmission operations
- Embedded OMS for improved resiliency and reliability

### Increase energy efficiency and quality

Ensuring the optimal level of efficiency and quality has a direct impact on any utility's bottom line. We can help you make gains in both areas through:

- Reduced energy losses
- ADMS introduces innovative functions for reducing technical and commercial power losses, thanks to advanced optimization algorithms.
- Voltage and VAR profiling
- Advanced functions allow you to provide the highest quality of power and optimal voltage levels.
- Demand side management
- ADMS supports various types of demand side management programs, allowing optimization of prioritized objectives.

PM106289



### Reduce total cost of ownership and capital investment

An ADMS not only improves operational and energy efficiency, but also enhances cost efficiency thanks to:

#### Common platform

EcoStruxure™ ADMS offers a common user experience, data model and structure, integration framework, training simulator, and operator training

#### Modular architecture

Deploy individual ADMS components, lowering initial deployment costs, and add other components as needed, utilizing the same architecture

#### Easy integration

Standards-based CIM integration with external systems such as GIS, advanced metering infrastructure, customer information systems, and weather services.

# EcoStruxure™ ready solutions

## EcoStruxure™ ADMS

PM108704



### The next evolution of control room technology

EcoStruxure™ ADMS (advanced distribution management system) is an ideal answer to modern electric utility challenges. It combines advanced distribution management system (DMS) analysis to optimize network operations, a field-proven SCADA system to help address cybersecurity requirements, and an embedded outage management system (OMS) for improved resilience and reliability.

All of this comes together in one comprehensive, modular network management solution providing enhanced situational awareness.

PM108705



### A modular, flexible platform

EcoStruxure™ ADMS offers utilities a modular and flexible platform with a common user experience, data model, integration framework, and secure infrastructure. It integrates energy efficiency, demand response, and distributed energy resource technologies to enable synchronized and automated approaches to demand management.

EcoStruxure™ ADMS also provides automation through closed loop control, advanced apps for volt/VAR optimization (VVO), demand management/peak shaving, and fault location, isolation and supply restoration (FLISR).

PM108706



### Enhanced situational awareness

EcoStruxure™ ADMS solution presents clear and consistent real-time forecasts, as well as historical views of the distribution network. It allows system operators, dispatchers, planning engineers, reliability analysts, and managers to work better as a team, accessing the same as-operated representation of network grid information.

This enhanced situational awareness provides efficient and reliable management of grid operations in the face of a diverse, and rapidly changing environment.

DM107857



DM107858



## 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 many customers and approved organizations.

But it is above all its strict application that has enabled recognition to be obtained by an independent organization: The **French Quality Assurance Association (FQAA)**.

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

G9A1436



## 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.

G9A1437



PM103938



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.



# Range description

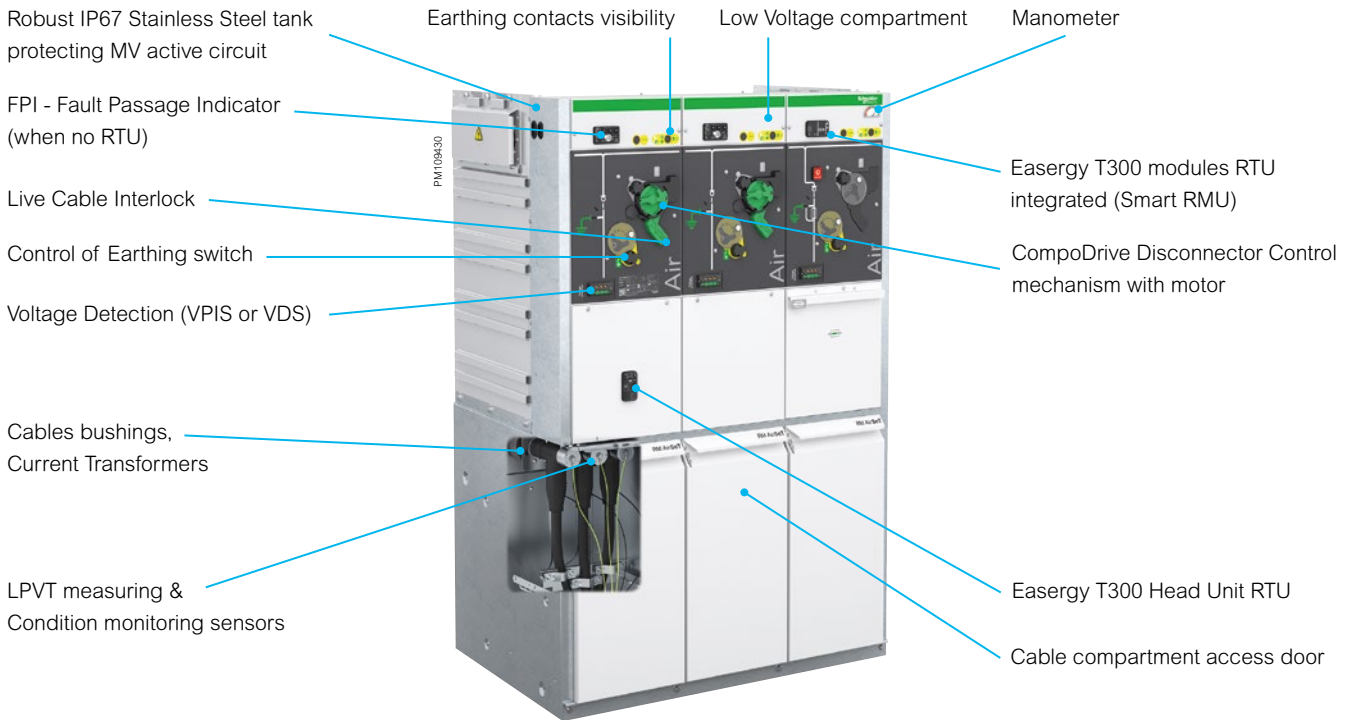
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<b>Internal arc fault withstand</b>	<b>34</b>
<b>Low Voltage cabinet</b>	<b>36</b>

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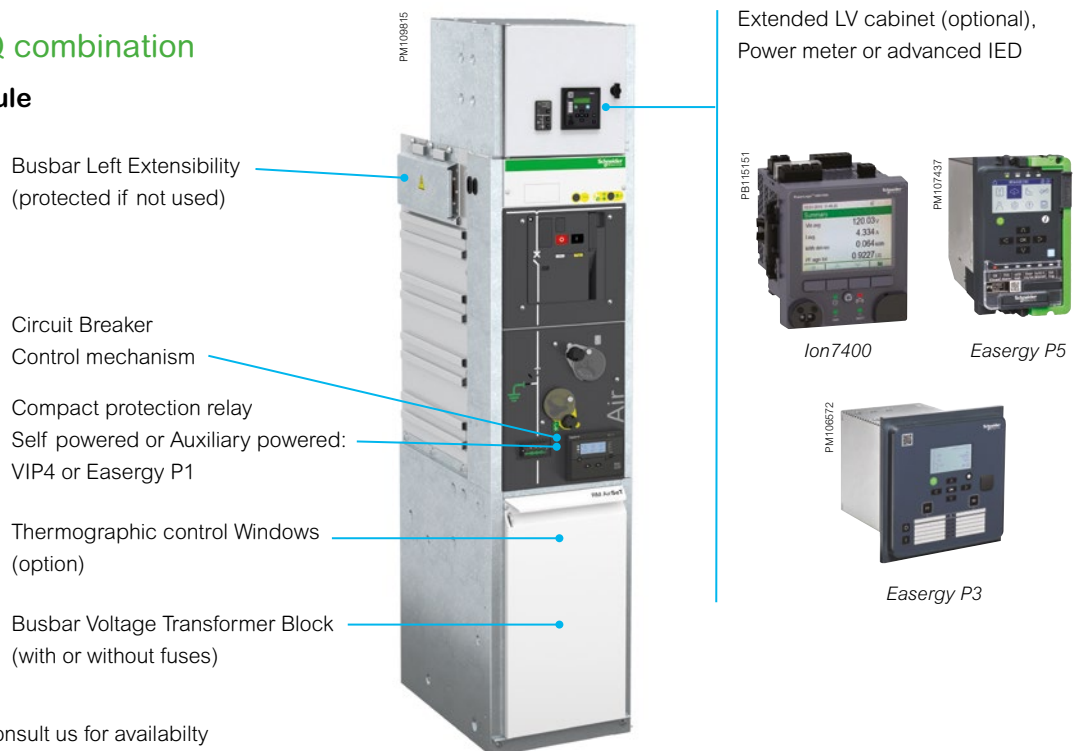
## RM AirSeT with Digital features

### 3 functions: Example of DE-IIQ: 2 switch-disconnectors + 1 switch-fuse combination



## RM AirSeT - example of RE-IIQ combination

### Single function module



Example of DE-B; please consult us for availability

Insulation level - voltage withstands				
Rated voltage	$U_r$		kV	<b>12</b>   <b>24</b>
Rated frequency	$f_r$		Hz	50/60 <sup>(1)</sup>
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 $\mu$ s)	75   125
		Across the Isolating Distance		85   145
Insulation and switching				
Insulation medium	Busbar, Disconnectors, Earthing switch...			<b>Pure Air <sup>(2)</sup></b>
Air relative filling pressure	At 20 °C		MPa	0.04   0.15
Disconnecting principle	In pure air, compartment sealed from ambient conditions			Three position disconnecter
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	$I_k$		kA	20
Duration	$t_k$		s	1 s or 3 s
Rated peak withstand current	$I_p$		kA	50 / 52.5
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: higher safety: 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			<b>40 years</b>	
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	

(1) For 60 Hz, please consult us.

(2) Pure air is obtained by filtering natural breathable air in order to remove humidity and impurities (ISO 8573-1). Refilling of air is not needed under normal service conditions defined by the IEC 62271-1.

### A flexible secondary GIS switchgear

**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

**Better adapted to any substation configuration**

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

**RM AirSeT: Free Combination in 1 tank (1) (2)**

Many combination can be proposed inside a sole tank.

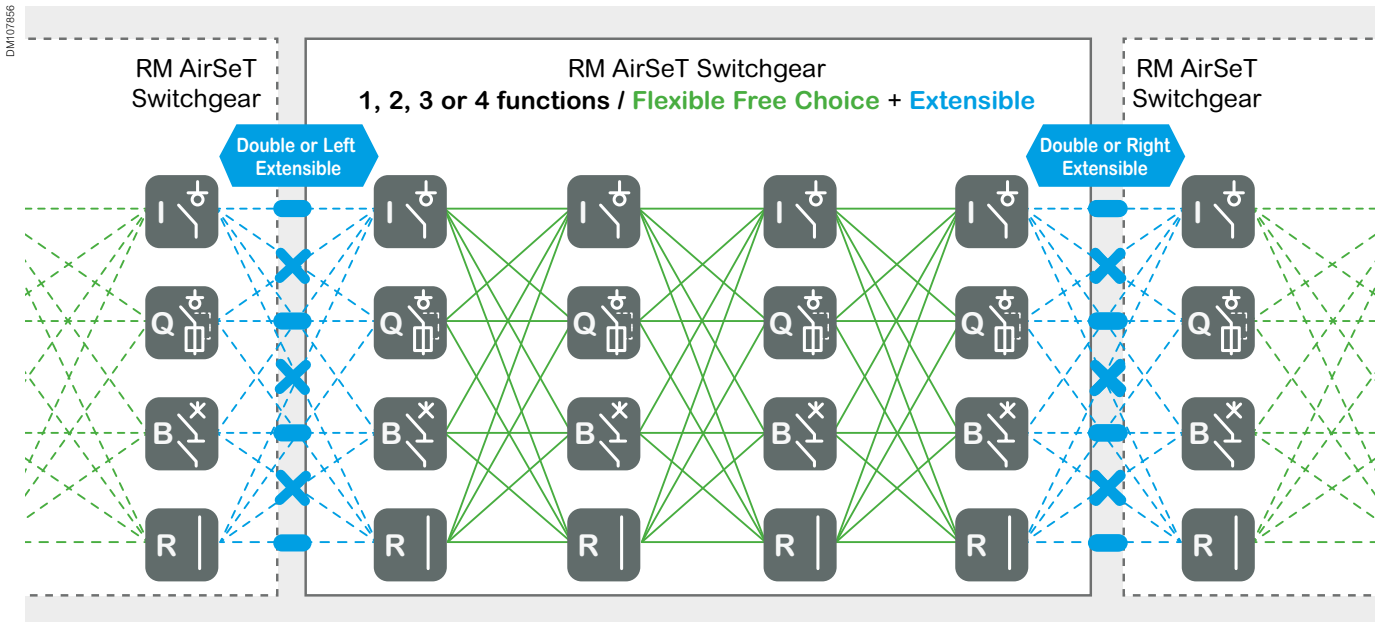
- **Free Combination:** all the options for each function
- **Easier, faster installation, cost saving** than adding several single extensible functions
- **Compactness preserved:** each functions has same dimensions

**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, QRIB...

**All extensibility configurations**

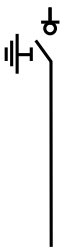
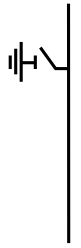

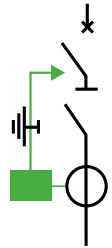
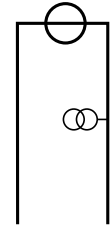





- **Non-Extensible NE**
- **Extensible**
  - RE: Right Extensible
  - LE: Left Extensible
  - DE: Double Extensible



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

# Functional overview

## Choice of functional units

Name	I	R	Q	B (1)	M1 (2)
Function	Network connection		Transformer protection	Network or Transformer protection	Metering
Main Device	"Three-position switch"	Direct incomer/feeder	"Three-position Switch-Fuse combination"	Vacuum Circuit Breaker (1)	Cables Metering
					
Disconnecting	Switch-Disconnecter with SVI®	N/A (direct Busbar)	Disconnecter Switch-fuse combination with SVI®	Three-position Disconnecter	N/A (direct Busbar)
Earthing	Cable Earthing Switch		Cable Earthing Switch	Cable Earthing Switch	
Short name, comment	Load-Break-Switch (LBS)	(optional ES)	Fuse-switch	Circuit breaker (1)	AIS metering
Symbol					

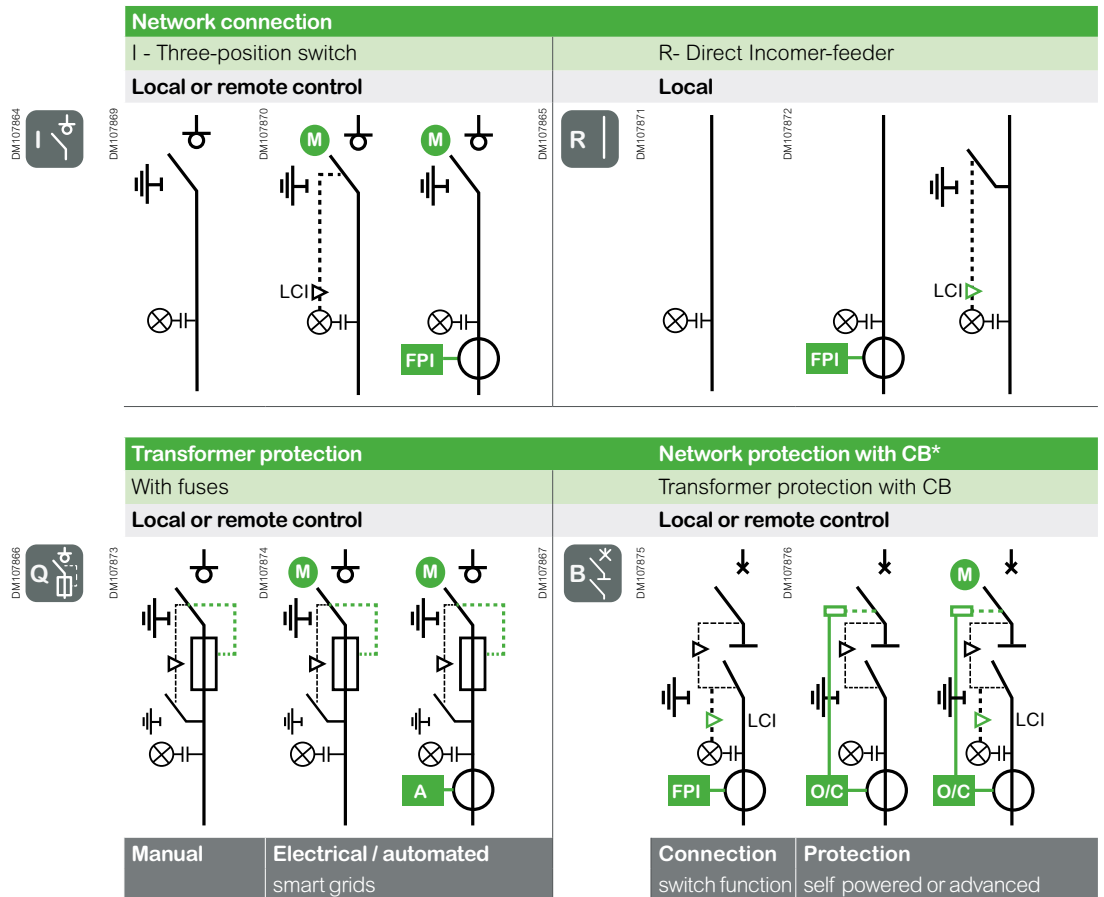
(1) Please consult us for availability.

(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



### Legend

- Motor
- Protection relay
- Fault passage indicator
- Measuring
- Live Cable Interlock
- Tripping coil

(\*) Please consult us for availability



**RM AirSeT Active Plus:**  
Easergy T300 modules including PSU and battery are integrated.

## NETWORK MANAGEMENT

RM AirSeT integrates Easergy T300 RTU to digitize secondary substations: the efficient link from secondary equipment to upper Distribution Control Centers

- Electrical Distribution network Centralized and decentralized MV and LV distribution network management: fault location, isolation, and service restoration. Underground and overhead lines
- Private network management (MV loops):
  - Automatic reconfiguration: autonomous Self-healing network management
  - Automatic Transfer Switch
- Volt/VAR optimization support for Renewable & Distributed energy integration
- MV and LV power and quality measurement according to standard EN 50160
- Helps to reduce MV and LV outage durations (SAIDI); Supports improved Asset management



EasergyT300

### Easergy T300 is:

#### Efficient for Secondary Substations

- Integrated all-in-one solution for MV/LV control and monitoring
- Design for MV/LV substations conditions: EMC, harsh environment...
- Easily plugged to equipment of existing substations

#### Powerful

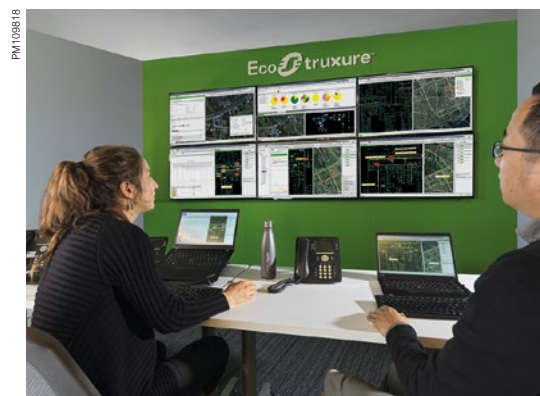
- Can manage 24 RM AirSeT functions, 3 transformers, relays & sensors
- Enables condition-based maintenance, by sensor and automation
- Future-proof systems with latest open protocols; scalable connectivity

#### Simple & Flexible

- Compact, plug & play: Simple installation and commissioning
- Powerful and flexible structure in Modules can manage 24 switches

#### Secure

- Helps securing controls and data acquisition for the operation including cyber security of the substation
- Provided with monitored, integrated power supply / battery charger



### RM AirSeT units meet the following recommendations and standards:

- IEC standards.



PM1108289

## 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.



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.  
Please consult us for availability of option of -40 °C.

### Altitude

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

For Q functions adequate fuses selection shall integrate on altitude and temperature conditions.

### 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 <b>I, R, and B</b>		A	630	600	570	540	510
Function <b>Q</b>		A	(1)	(2)	(2)	(2)	(2)

(1) Depends on fuse selection

(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

## 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 help reduction of internal reduce default probability. 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 default 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 IA 20 kA during t A 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.

## 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):

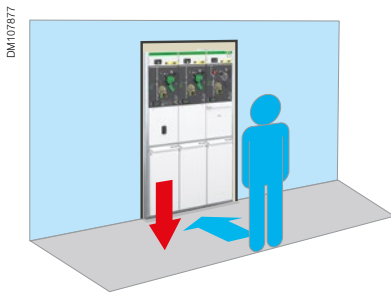
- With front access only
- With front and lateral access
- Or with front, lateral and rear access.

# Internal arc fault withstand

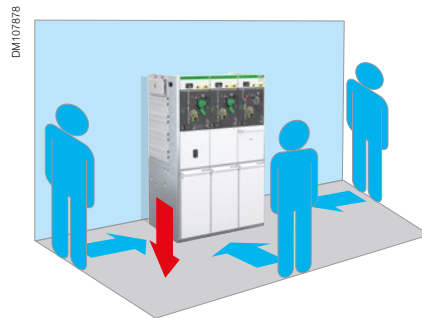
The evacuation of the gases shall be provided at the bottom of the substation (typically in the cable trench). Civil engineering with an adequate volume is necessary. More details depending on the size of the switchgear are provided in the civil engineering and installation manual.

## Front access

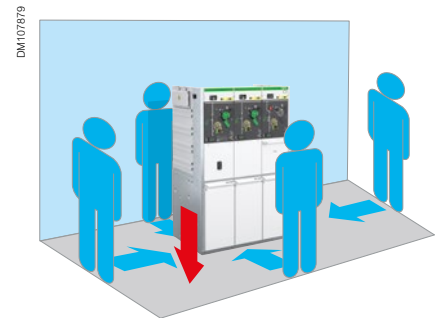
### 3D view



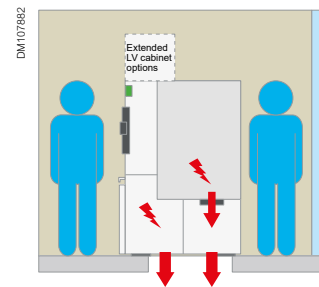
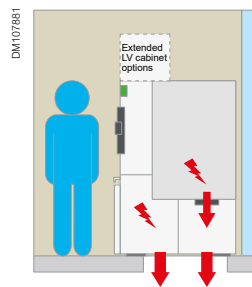
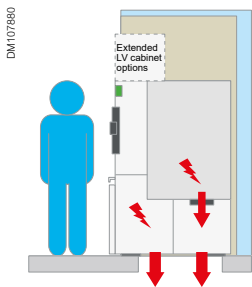
## Front & lateral access



## Front, lateral and rear access



### Side view



# Low Voltage cabinet

The LV compartment and the optional LV cabinets are accessible, with cables and busbars energized, without de-energising the substation.

### RM AirSeT is available in 3 configurations:

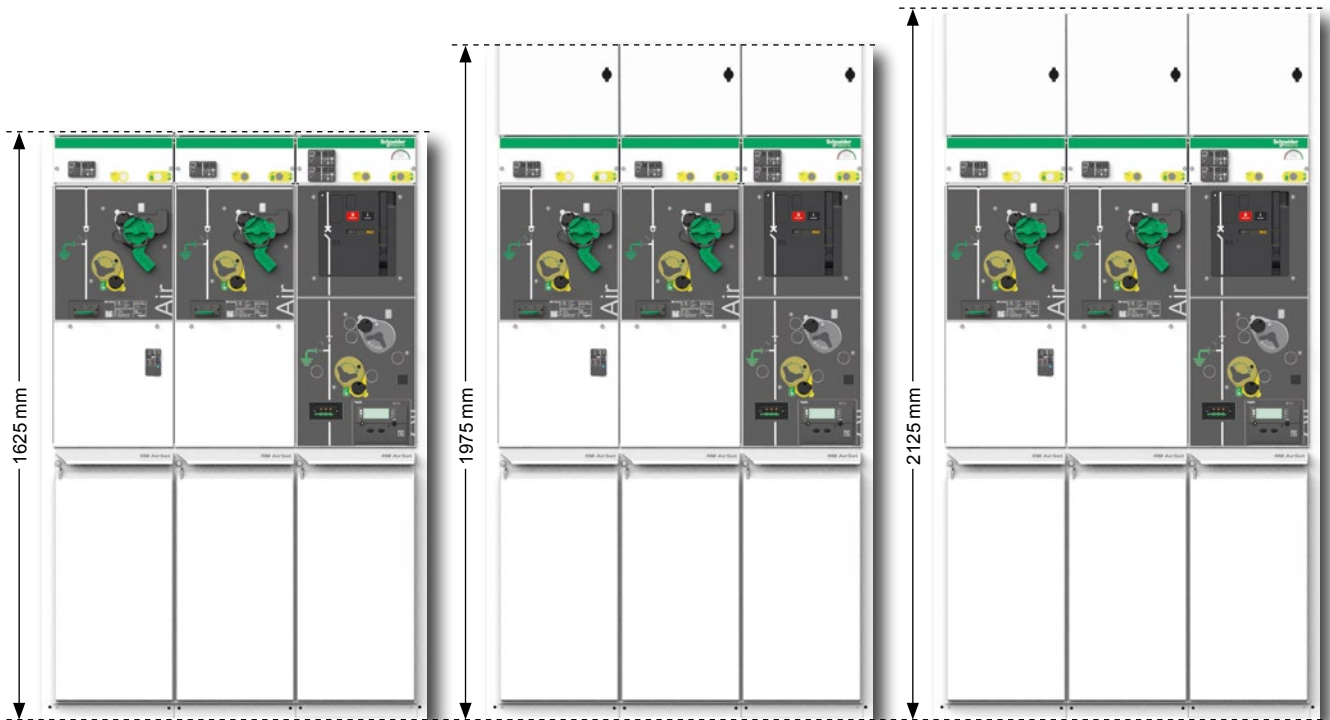
- with basic integrated LV compartment (native)
- with extended LV cabinet of 350 mm\*
- with extended LV cabinet of 500 mm\*.

(\* ) The depth of LV cabinets is 400 mm. The basic integrated LV compartment is available when the extended LV cabinets are requested. available when the LV cabinets are used.

### Intermediate compartment, below operating mechanisms:

- in a Switch-Disconnecter (I) functional unit equipped with Easergy T300, the power supply unit, the battery and the Head unit are located in the intermediate compartment, below the operating mechanism
- in a Circuit Breaker (B) functional unit, the compact protective relay VIP4 and Easergy P1 is located at the right of the voltage detection device (VDIS/VPIS).

PM109809



#### A Basic integrated LV

This design enables architectures with a large selection of Low voltage devices such as fault passage indicator, Easergy T300 RTU, Easergy P1, PM5350...

Height: 1625 mm

#### B Extended LV + 350

This design enables architectures with:

- 2 protection & measuring devices
- Recommended for P3 Advanced
- Advanced protection relays
- Additional specific relaying

Height: 1975 mm

#### C Extended LV + 500

This design enables architectures with:

- 2 protection & measuring devices
- Recommended for P3 Advanced
- Advanced protection relays
- Additional specific relaying

Height: 2125 mm

# Function/module description

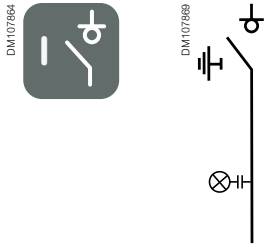
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<b>Functional overview</b>	<b>38</b>
I function: 3-position switch-disconnector Load Break Switch	38
Q function: 3-position Switch-Fuse combination	40
B function: Vacuum Circuit Breaker with three position Disconnector	42
R function: Direct Incomer-Feeder	43
M1 function: Air Insulated Metering Connection by cable	44

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# Functional overview

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



## Characteristics

Insulation and switching				
Switching	Switch-disconnector: Shunt Vacuum Interruption (SVI) <sup>TM</sup>		<b>SVI</b>	
Disconnecting principle	In pure air, sealed compartment from ambient conditions		Three position disconnecter	
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 <sup>(1)</sup>	
Switching contacts - Breaking Medium			<b>Vacuum interrupter <sup>(1)</sup></b>	
Insulation medium	3 positions: Closed-connected/Open disconnected/Earthed		<b>Pure Air <sup>(2)</sup></b>	
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	U <sub>r</sub>	kV	<b>12      24</b>	
Rated frequency	f <sub>r</sub>	Hz	50/60	
Rated short-duration power-frequency	U <sub>d</sub>	Phase-to-Phase & Phase-to-Earth	kV (1 mn RMS)	28      50
		Across the Isolating Distance		32      60
Rated lightning impulse	U <sub>p</sub>	Phase-to-Phase & Phase-to-Earth	kV (1.2-50 μs)	75      125
		Across the Isolating Distance		85      145
Current				
Rated current	I <sub>r</sub>	Functional unit	A	630
		Busbar	A	630
Short time withstand current	I <sub>k</sub>		kA	20
Duration	t <sub>k</sub>		s	1 or 3 s
Rated peak withstand current	I <sub>p</sub>		kA	50
Breaking capacity	I <sub>load</sub>	Switch-Disconnecter (Load-Break-Switch)	A	630
Making capacity	I <sub>ma</sub>	Switch-Disconnecter	kA	50
		Earthing Switch	kA	50
Bushing	Type			C

(1) Using the SVI<sup>TM</sup> 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. It is pressurized.

# Functional overview

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

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

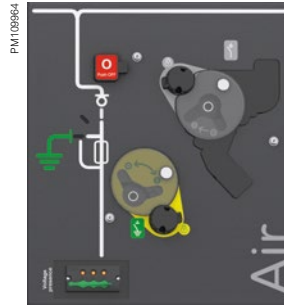
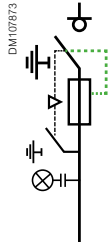
(1) In conformity with the definition of "Switch-Disconnecter", Load-Break-switch insuring Operation on rated current, Closing on short-circuit and insulation between open contacts. More operations are possible for Automatic Transfer or Smart Grid thanks to the M2 endurance class (similar to a Circuit-Breaker).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



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

# Functional overview

Q function: 3-position  
Switch-Fuse combination



## Characteristics

Insulation and switching				
Switching	Switch-disconnector: Shunt Vacuum Interruption (SVI) <sup>TM</sup>		<b>SVI</b>	
Disconnecting principle	In pure air, sealed compartment from ambient conditions		Three position disconnector	
Switch-disconnector class	Extended mechanical endurance as per IEC 62271-103		<b>YES</b>	
Interrupting Capability on rated current	To CLOSE / to OPEN		<b>YES / YES</b>	
Interrupting Capability on Short-Circuit	To CLOSE / to OPEN-TRIP: IEC 62271-105		<b>YES / NO</b>	
Switching contacts - Breaking Medium			<b>Vacuum interrupter<sup>(1)</sup></b>	
Insulation medium	3 positions: Closed-connected/Open disconnected/Earthed		<b>Pure Air<sup>(2)</sup></b>	
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	U <sub>r</sub>	kV	<b>12      24</b>	
Rated frequency	f <sub>r</sub>	Hz	50/60	
Rated short-duration power-frequency	U <sub>d</sub>	Phase-to-Phase & Phase-to-Earth	kV (1 mn RMS)	28      50
		Across the Isolating Distance		32      60
Rated lightning impulse	U <sub>p</sub>	Phase-to-Phase & Phase-to-Earth	kV (1.2-50 μs)	75      125
		Across the Isolating Distance		85      145
Current				
Rated current	I <sub>r</sub>	Functional unit	A	200
		Busbar	A	630
Short time withstand current	I <sub>k</sub>		kA	20
Duration	t <sub>k</sub>		s	1 or 3 s
Rated peak withstand current	I <sub>p</sub>		kA	50
Breaking capacity	I <sub>load</sub>	Switch-Disconnector (Load-Break-Switch)	kA	20
Making capacity	I <sub>ma</sub>	Switch-Disconnector	kA	50
		Earthing Switch	kA	50
Bushing	Type			A or C

(1) Using the SVI<sup>TM</sup> 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.



# Functional overview

Q function: 3-position  
Switch-Fuse combination

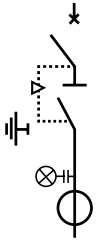
Switch-Disconnecter Endurance classes				
Classification of mechanical endurance	M1 = 1 000 M2 (extended) = 5 000 operations		M1 O (CD2)	M2(5000) ● (CD1)
Classification for current breaking	E1 = 10 - 2   E2 = 30 - 3 E3 = 100 cycles at $I_{load}$ and 0.7p.f. - 5 at $I_{ma}$	E1	E2	E3 ●
Classification for capacitive switching and probability of restrike	C1 = capacitive switching C2 = capacitive switching restrikes improbable		C1	C2 ●
Earthing Switch Endurance class				
Classification of mechanical endurance	M0 (normal) = 1 000 M1 = 2 000 CO cycles		M0	M1 ●
Classification short circuit making	E1 = 2 E2 = 5 at $I_{ma}$		E1	E2 ●
Recycling considerations				
Specific procedure of handling for operation/recycling of gases				No hazardous gas (Air Only)
SF6-free technology				YES
Service life		years		40



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

# Functional overview

B function: Vacuum Circuit Breaker with three position Disconnecter



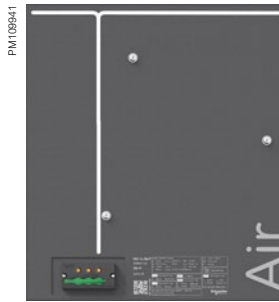
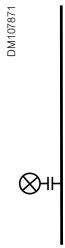
## Characteristics

Please consult us for availability of this functional unit.

Insulation and switching					
Name of the technology	Vacuum Circuit-Breaker CB <sup>(1)</sup>			Please consult us for availability	
Commutation principle	1 CB + 3 position disconnecter				
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			<b>Pure Air</b> <sup>(1)</sup>	
Earthing of cable					
Heavy duty Earthing switch	Making capability (closing on short-circuit)			YES <sup>(2)</sup>	
Earthing switch class	Extended endurance (IEC 62271-102)			YES	
Circuit for Earthing of cables				Independent of vacuum interrupter <sup>(2)</sup>	
Insulation level - voltage withstands					
Rated voltage	$U_r$	kV	<b>12</b>	<b>24</b>	
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 $\mu$ s)	75	125
		Across the Isolating Distance		85	145
Current					
Rated current	$I_r$	Functional unit	A	630	
		Busbar	A	630	
Short time withstand current	$I_k$		kA	20	
Duration	$t_k / t_{ke}$		s	3 s / 1 s	
Rated peak withstand current	$I_p$		kA	50	
Breaking capacity	$I_{sc}$	Circuit-breaker	kA	20	
		Switch-Disconnecter	kA	50	
Making capacity	$I_{ma}$	Earthing Switch	kA	50	
Bushing	Type			C	

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

(2) The cable is directly EARTHED by the 3 position disconnecter (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.



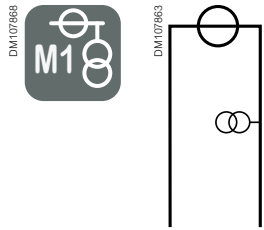
## Characteristics

Insulation and switching					
Name of the technology		Solidly fixed busbar			
Insulation medium		3 positions: Closed-connected/Open disconnected/Earthed		Pure air <sup>(1)</sup>	
Insulation level - voltage withstands					
Rated voltage	$U_r$	kV	<b>12</b>	<b>24</b>	
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 $\mu$ s)	75	125
		Across the Isolating Distance		85	145
Current					
Rated current	$I_r$	Functional unit	A	630	
		Busbar	A	630	
Short time withstand current	$I_k$	kA	20		
Duration	$t_k$	s	1 or 3 s		
Rated peak withstand current	$I_p$	kA	50		
Bushing	Type				C
Recycling considerations					
Specific procedure of handling for operation/recycling of gases			No hazardous gas (Air Only)		
SF <sub>6</sub> -free technology			YES		
Service life			years	40	

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

# Functional overview

M1 function: Air Insulated Metering  
Connection by cable



## Introduction

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

## Characteristics

Insulation level - voltage withstands				
Rated voltage	$U_r$		kV	<b>12</b> <b>24</b>
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 $\mu$ s)	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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# Three position switch-disconnector

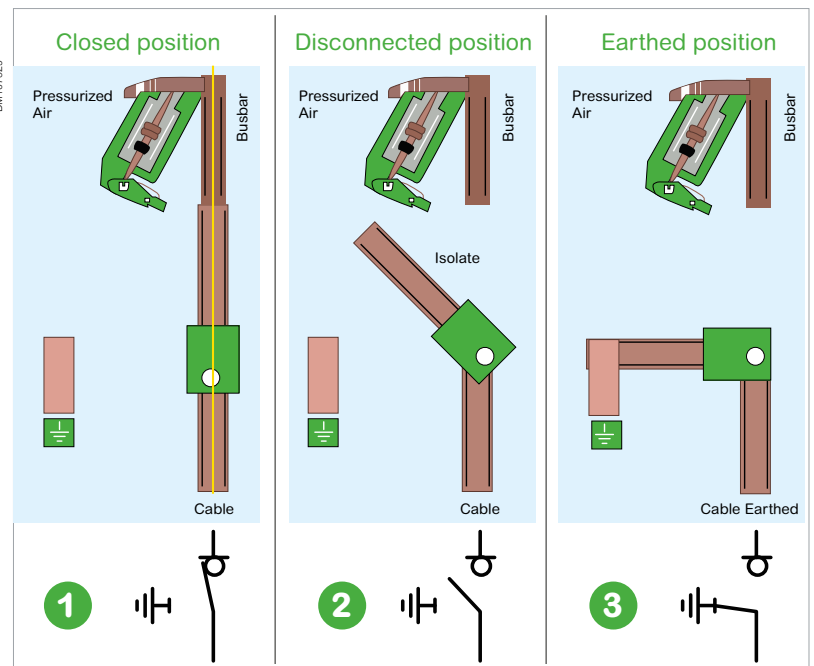
Shunt Vacuum Interruption (SVI)<sup>TM</sup>

## SVI technology at a glance:

Same operating mode as SF6 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.

## Functions I and Q: Air and Vacuum 3-position switch-disconnector



## Principle

Shunt Vacuum Interruption (SVI)<sup>TM</sup> 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 as current SF6 3 positions switch.

## 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
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

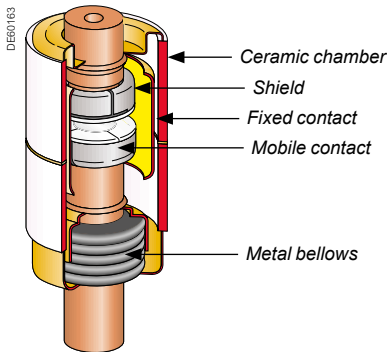


Fig. 1: vacuum interrupter components

**Every type of RM AirSeT circuit breaker has been subjected to the following type tests, as defined by the IEC standard 62271-100:**

- Mechanical endurance tests
- Electrical endurance tests
- Capacitive current switching tests:
  - Line-charging current switching test
  - Cable-charging current switching test
  - Single capacitor bank switching tests
- Dielectric tests
- Measurement of the resistance of the main circuit
- Temperature rise tests
- Short-time withstand current and peak withstand current tests
- Additional tests on auxiliary and control circuits
- Mechanical operating test at ambient temperature
- Short-circuit making and breaking tests
- Out-of-phase making and current switching tests

The type tests are witnessed by a third party certification body, which has the authority to issue a certificate of conformity according to ISO/IEC 17065 standard.

## More than 60 years of experience in MV 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

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.

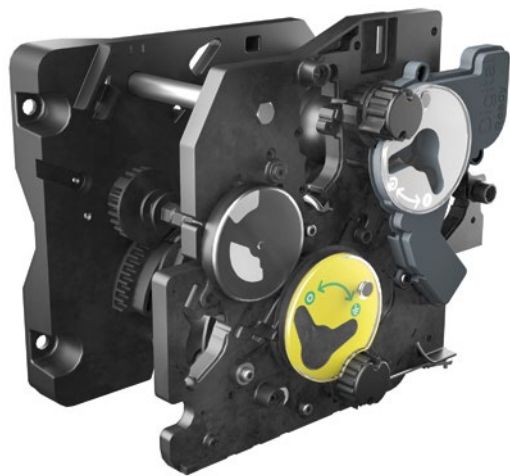
Consult Schneider Electric for availability

PM109713



CompoDrive in 2009

PM109161



Resulting from decades of experience, the operating mechanisms of Schneider Electric are renowned for their reliability.

First introduced in 2009, CompoDrive forms a comprehensive mechanical set with the mobile active parts for long term performances.

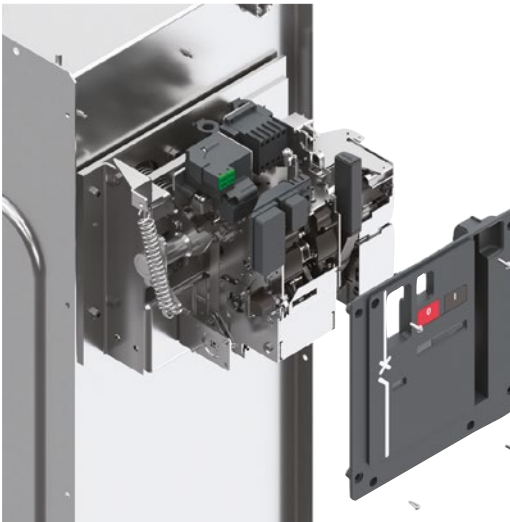
### CompoDrive: more endurance and flexibility, less maintenance

RM AirSet integrates the modern CompoDrive operating mechanism for Disconnecter, Switch-disconnector and Switch-Fuse functions. This new version integrates enhanced "Smart" and "Digital" features required for more efficient and later flexible upgradeable Grids.

A set of Complete Kits is available for a Plug & Play adaptation in workshop or on site of motorization, coils, auxiliary contacts...

Natively equipped with padlocking capabilities, additional key locks are also available.

PM109962



### Operating mechanism of circuit breakers

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

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

The disconnecter 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 disconnecter 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")
- **The controls easily accessible.**



# Operating mechanism

## Description



### CompoDrive: Adapted to **all** cases of secondary distribution

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

- Tumbler mechanisms: opening / closing time are independent of the lever speed
  - Without latching: CDT
  - With 1 latching system: CD1
  - With 2 latching systems: CD2.

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



### Double-function operating mechanism CDT

#### Switch function

Operation-independent opening or closing by lever or motor.

#### 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.



### Double-function operating mechanism CD1

#### Switch function

Operation-independent opening or closing by lever or motor.

- Operation-independent opening by pushbutton (O) or trip units.  
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.

# Operating mechanism

## Descripton



### Double-function operating mechanism CD2

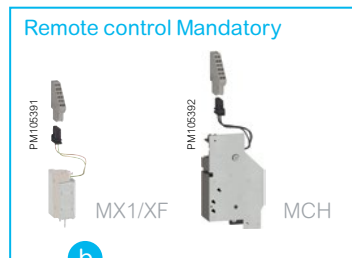
#### Switch function

- Operation-independent closing in two steps:
  - 1 – Operating mechanism recharging by lever or motor
  - 2 – Stored energy released by pushbutton (I) or trip unit
- Operation-independent opening by pushbutton (O) or trip units

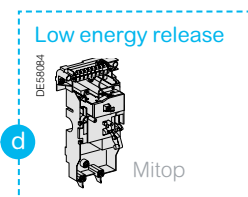
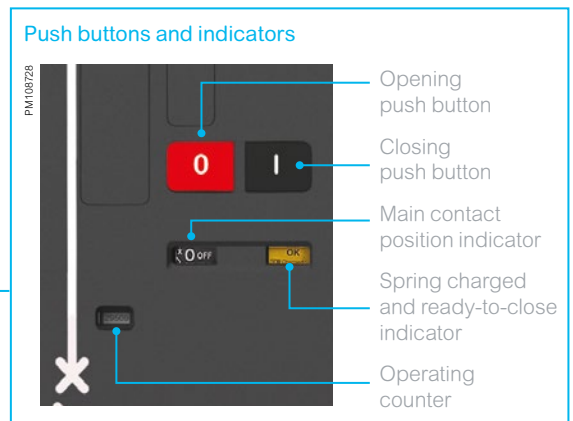
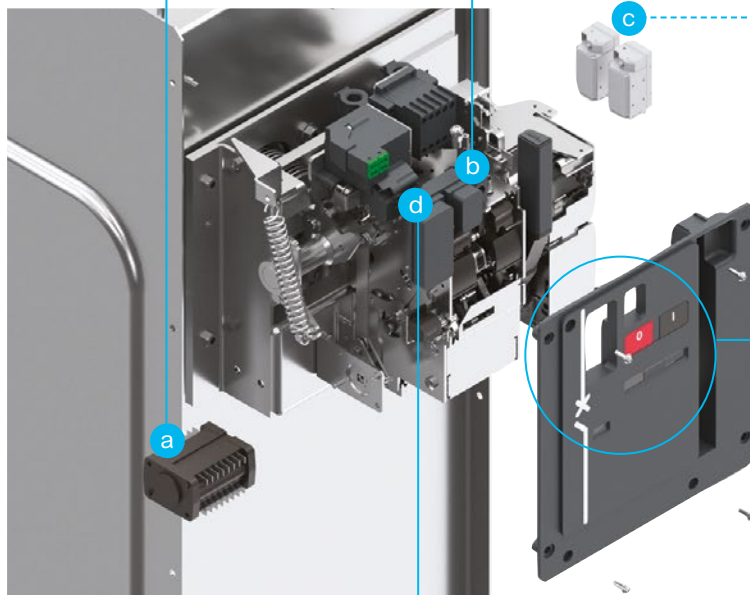
#### Earthing switch function

- 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

### Circuit breaker operating mechanism: available kits

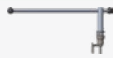

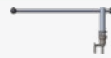



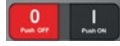














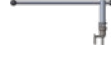
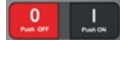


PM108727



#### Basic function

Consult Schneider Electric for availability

Functional unit	Operating mechanism	Disconnecter / Switch-disconnecter CompoDrive Mechanism			CB mechanism	
		Type	CDT <sup>(0)</sup>	CD1 <sup>(1)</sup>	CD2 <sup>(2)</sup>	CDT + CB <sup>(3)</sup>
		Mechanism principle	Spring mechanism <sup>(2)</sup>	Energy stored (O)	Energy stored (C & O)	Disconnecter + energy stored (C & O)
Speed of operation		Independent from operator				
<b>Available operations: Local/remote - Manual/Electrical</b>						
Local Operation mode	Operating lever					
	Mechanical push buttons	-				
Motor option availability						
Coil/releases option availability	Opening/Tripping Release	-				
	Closing	-	-			
<b>Switch-Disconnecter</b>						
Switch-Disconnecter: manual simple use		●	-	○ <sup>(4)</sup>	-	
Switch-Disconnecter: controlled from remote via RTU		○ (motor)	-	○ (coils & motor)	-	
Switch-Disconnecter used for Automatic transfer system (ATS):		○ (motor)	-	○ <sup>(3)</sup>	-	
<b>Switch-fuse</b>						
Transformer protection with Switch-fuse combination		-	● <sup>(4)</sup>	○ <sup>(2)</sup>	-	
Trip by fuse		-	○ (coil)	○ (coil)	● (coil)	
Trip by relay		-	○ (coil)	○ (coil)	○ (coil)	
Trip by transformer integrated protection: Buchholz, Pressure, Temperature		-	-	-	○ (coil)	
Transformer feeder: controlled from remote via RTU		-	○ (coil or coil & motor)	○ (coils & motor)	-	
<b>Circuit Breaker with three position Disconnecter</b>						
Disconnecter (breaking by circuit breaker)		●	-	-	●	
Circuit Breaker with fast auto-reclosing operating sequence		-	-	-	●	
(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-Disconnecter. 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-Disconnecter. 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 disconnecter.						
Interlock equipped to prevent operation of Disconnecter when CB is in closed position.						
(4) Please consult us.						

Legend:

●: Standard / ○: Option / -: Not Available

# Operating mechanism

## Upgrade



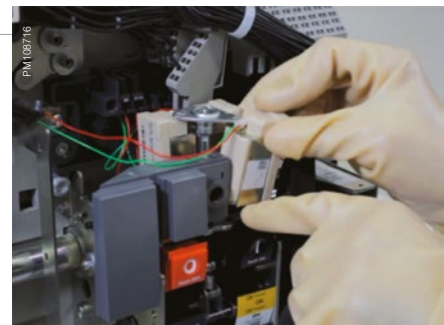
### Digital ready: customize when you want in a few minutes

Operating mechanisms of Disconnecter – Switch and of Circuit Breaker provide an unprecedented, consistent set of accessories that can easily be added after delivery from the Schneider Electric plant.

The kits are prepared and available: the references are open, and can be found on the Schneider Electric website [www.se.com](http://www.se.com) or from Schneider Electric partners. The literature, and adaptation support tools allow a more open adaptation by the customer, the contractor, the partner...

The use of these kits is supported by a set of videos to help installation, and further upgrade:

- Available by flashing the QR code on the switchgear
- Or at [www.se.com](http://www.se.com).



Example: "how to video" demonstrating the adaptation of opening coil on the circuit breaker mechanism.

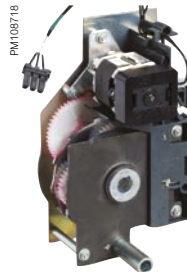
### Examples of kits:



Opening/closing release (applicable for both switch and circuit breaker)



CompoDrive Motor kit with its wiring



Circuit Breaker Motor kit with its wiring



Auxiliary contacts kit



CompoDrive Control Terminal Block

# Compodrive: Switch and disconnectors 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

The accessories can be mounted in factory (as for usual ranges).

In addition, Schneider Electric paid a special attention to allow upgrades in customers, 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](http://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, DTU/RTU...

### Easier spare parts management:

References + common between switch and Circuit breaker:

- Shunt releases for Opening (MX) and closing (XF) are the same\*
- The Undervoltage (MN) and Shunt releases (MX, XF) are common to:
  - Circuit breaker operating mechanism
  - Switch-Disconnecter operating mechanism

\* there are several references to select according to auxiliary voltage

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# 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.

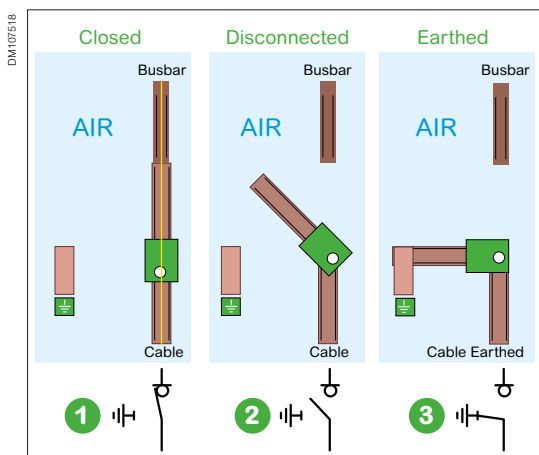
In addition, RM AirSeT provides supplementary systems adapted to the various principles adopted by Electrical Distribution Companies and Private Operators for protections of personnel and assets: Padlocking, Key locking, Live Cable Interlocking or combinations of them.

### 4 levels of interlocks

Each function\* is equipped with the following features:

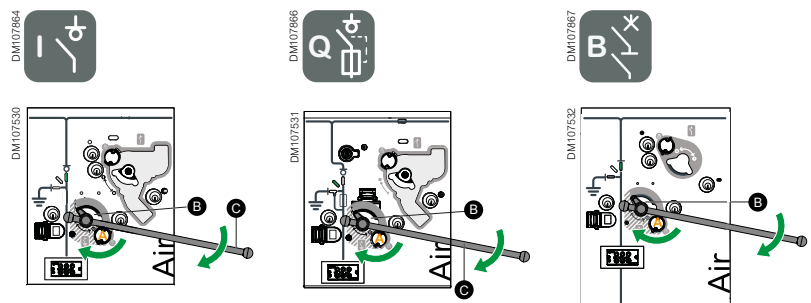
- Native Architecture and built-in functional interlocks:
  - Mechanical prevention inherent to 3 position disconnectors
  - Access to the cable compartment and to the fuses is only possible if the appropriate outgoing feeder is connected to earth.
- Padlocking capabilities
- Supplementary key interlocking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

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



### Consistent operation in various functions

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



Same operating lever for Switch-disconnector and Earthing Switch.

### Cable Access Door



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

- 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/Disconnecter 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.

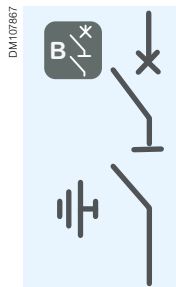
When operation is based on procedures, excluding interlock on the cable access door, the Cable Access Door interlocks are removed. In this case, the cable access door is not interlocked with earthed position.

### Fuse Access Door



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

### Circuit breaker



Operation of the disconnecter 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.



Key interlocks are optional. They provide an unprecedented flexibility: simple and 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:

**Mode 1:** FUNCTIONALLY, by DIRECT SELECTION Preconfigured key interlocking system for the most common interlocking logics.

**Mode 2:** INDIVIDUALLY FOR EACH KEY LOCK for specific requirement.

**Legend:**

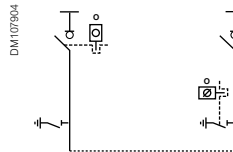
		: no key
		: free key
		: captive key

### Selection mode 1: Functional Preconfigured key interlocking

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

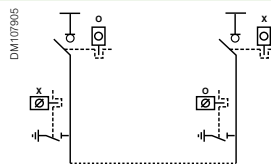
### Network connection

#### 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

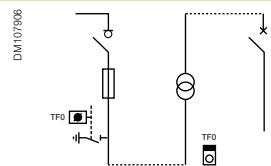
#### Key interlock type "R2": Crossed locking



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

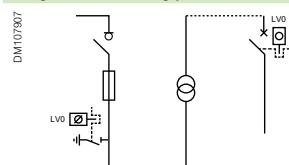
### Transformer protection

#### Key interlock type "R7": Transformer



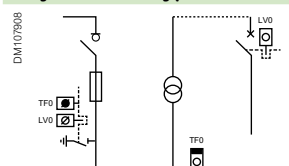
- Prohibits access to the transformer unless the earthing switch has been locked in the "closed" position

#### 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

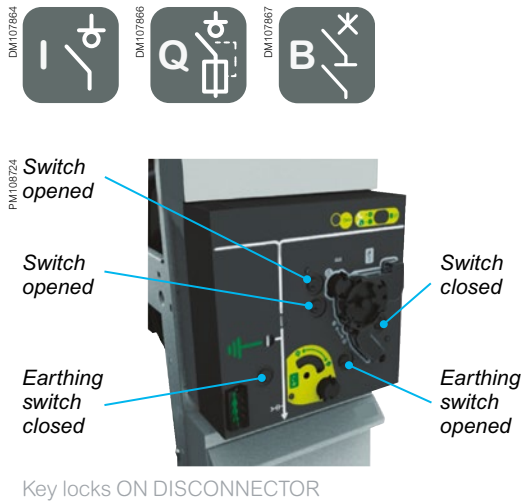


- Prohibits closing of the earthing switch and access to any protection unit fuses unless the main LV circuit breaker has been locked in the "open" or "disconnected" position
- Prohibits access to the transformer unless the earthing switch has already been "closed"



# Interlocking

## Supplementary key interlocks



### 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 Mechanism without latching	Disconnector Mechanism with 1 or 2 buttons / energy stored mechanisms
OPEN-DISCONNECTED	2	1
CLOSED	1	-
EARTH in OPEN	1	1
EARTHED	1	1



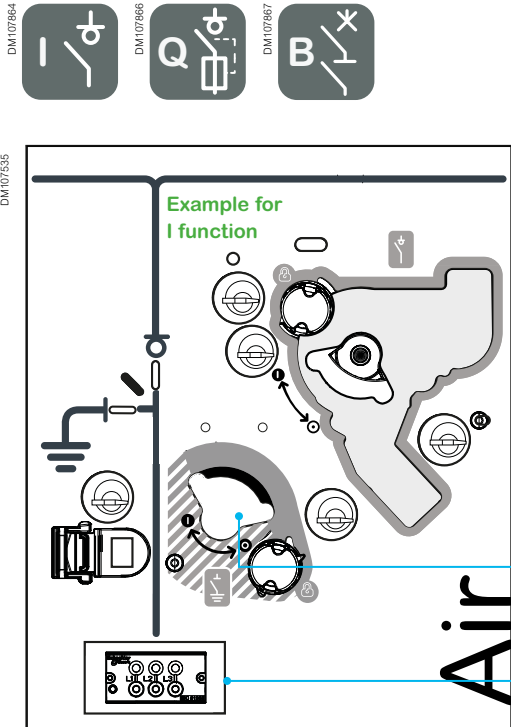
### Flexible: 2 Choices in the key locks

Each key lock system is available with

- Flat key type,
- Tubular key type.

# Interlocking

## RM AirSeT Live Cable Interlock «LCI»



### RM AirSeT design: Prevention of abnormal earthing

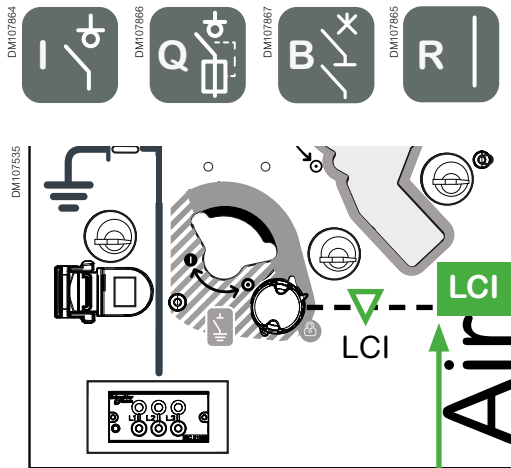
The earthing of live cable creates a short circuit and a shutdown on the complete line. Even if this constitutes an abnormal operation, the RM AirSeT earthing contacts are designed and type tested as defined in IEC 62271-102/103 to withstand this situation: **The functions have the short-circuit making capacity in case of earthing.**

### RM AirSeT location of Voltage Presence/ Detection indicators

Voltage detection device (VPIS, VDIS...) is just below the mechanism: the operator has a clear view of the cables voltage indication before Earthing.

Mechanism for earthing

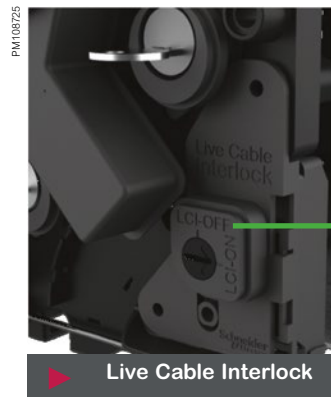
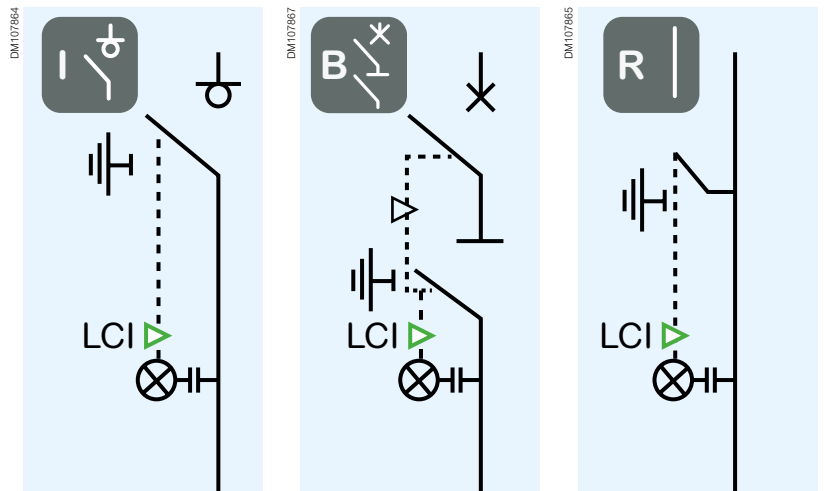
Location of Voltage detection device (VPIS, VDIS...)



### RM AirSeT Live Cable Interlock (option): An additional prevention of line shutdown

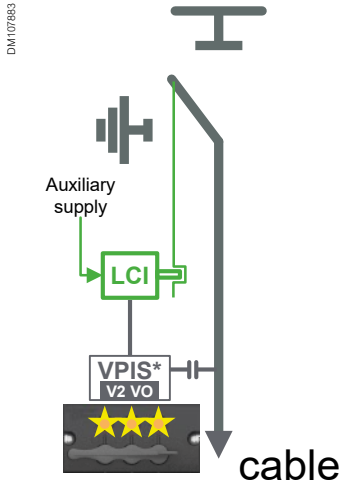
A **Live Cable Interlock (LCI)** reduces the probability of earthing of live cable: The "live cable interlock" function is an electrical interlock helping to prevent the operator from closing the earthing switch on live cables.

#### Example for I, B or R functions



# Interlocking

## RM AirSeT Live Cable Interlock «LCI»



(\*) Voltage Presence Indicating System with Voltage Output:  
Please consult us for other voltage detection devices.

### Principle

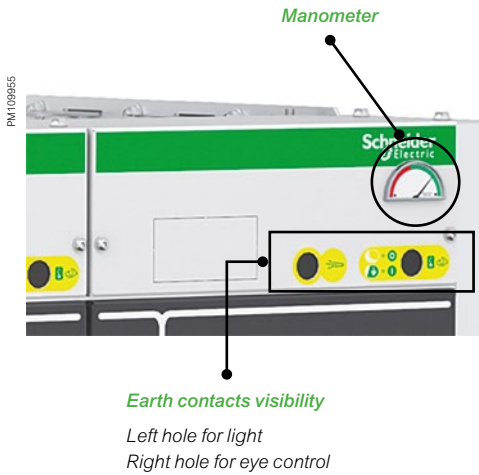
The system is composed of:

- A mechanical locking assembly acting directly on the earthing-switch mechanism, including A DEACTIVATING SYSTEM (that can be used to bypass the locking device)
- An undervoltage coil for operation of the mechanical lockout system (see MN)
- A dedicated electronic auxiliary-powered voltage relay (ESL)
- A VPIS indicator on the cable side, with a voltage output (VPIS-VO), to detect and send the voltage signal to the relay.

### Operation

- Normal case: The system is powered by auxiliary power. It is then impossible to move the selector from "line" to "earth", as long as voltage is detected on the cable by the VPIS.

# Manometer and Earth Contacts visibility



## Manometers

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

- Without manometer
- Standard Manometer (relative pressure)
  - Simple pressure indicator
  - With several scales allowing the right indication depending on temperature
- Manometer Compensated
  - Pressure indicator
  - Independent of temperature & altitude
- Manometer Compensated with 2 Contacts
  - Pressure switch with 2 alarm levels
  - Independent of temperature & altitude

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



## Earth Contacts 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 2<sup>nd</sup> check of earth contacts position the Earth contacts visibility is available as an option.

**Note:**

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



Earthing visibility contact when the three position disconnecter is NOT EARTHED



Earthing visibility contact when the three position disconnecter is EARTHED

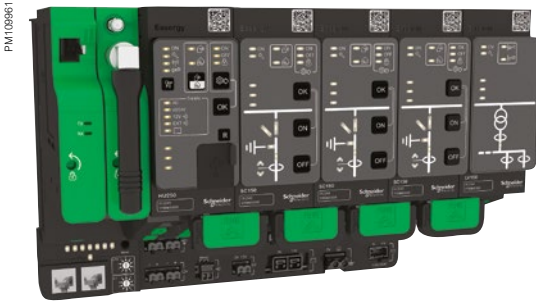
# LV compartments

## Typical applications

Compartment	Simple integrated LV/ H = 1.625 m	With LV +350/ H = 1.975 m	With LV +500/ H = 2.125 m
<b>LV compartment description</b>	<ul style="list-style-type: none"> <li>Compact LV wiring duct and simple relaying</li> <li>Access with bolted cover</li> </ul>	<ul style="list-style-type: none"> <li>LV cabinet separated from simple integrated LV compartment comprises</li> <li>LV door on hinges, with handle</li> <li>The same simple integrated LV compartment is available, with bolted cover</li> </ul>	
<b>Extended LV cabinet</b>	PM109939		
<b>Basic integrated LV compartment &amp; control mechanism</b>			
<b>Intermediate compartment</b>			
<b>MV Cables compartment</b>			
<b>Typical application</b>	RM AirSeT standard applications including: Active Plus / Pro	Specific applications requiring more complex LV devices	
	<b>Configuration recommended for :</b> <ul style="list-style-type: none"> <li>Advanced control &amp; monitoring (Easergy T300)</li> <li>Compact protective relay self- powered (VIP40/VIP45/VIP400/VIP410) or with Reclosing (P1)</li> </ul>	<b>LV +350 recommended for:</b> <ul style="list-style-type: none"> <li>1 protective relay P3, P5, P7 or third party</li> <li>2 compact devices: 1 P5U20 + 1 PM8000</li> <li>1 Advanced measuring: eg. PowerLogic ION7450</li> <li>RTU separated integration</li> </ul>	<b>LV +500 recommended for:</b> <ul style="list-style-type: none"> <li>Up to 2 protection &amp; measuring devices</li> <li>Large third party protection relays</li> <li>Additional specific relaying</li> </ul>
<b>Typical devices housed in the basic integrated LV compartment</b>			
	<ul style="list-style-type: none"> <li>Pressure monitoring device (manometer), access to Earthing contact visibility HMI</li> <li>1 T300 Horizontal SC150 (including FPI, controls, HMI... functions) or SC160 (protection, controls, HMI...) and/or LV150 (monitoring)</li> <li>Fault Passage Indicator (pre-cut provided on front cover for 48 x 96 mm)</li> <li>Compact measuring device: AMP, or VLT, PM5350... (92 x 92 mm or less)</li> <li>Electrical Controls &amp; signals (electrical push buttons and/or selector switch and/or signaling LED)</li> <li>Relaying and terminal blocks</li> </ul>		
<b>Intermediate compartment</b>			
	<ul style="list-style-type: none"> <li>VDIS, VPIS or VDS (near earthing switch operating mechanism) - Compact or 48 x 96 mm</li> <li>Live Cables Interlock module</li> </ul>		
	<ul style="list-style-type: none"> <li>Head Unit (T300 HU250) or Switchgear Power Supply Unit (T300 PS50) with battery (available in I or R functional units)</li> </ul>		
	<ul style="list-style-type: none"> <li>P1 or VIP relay</li> </ul>		

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.

# Easergy T300 Remote Terminal Unit



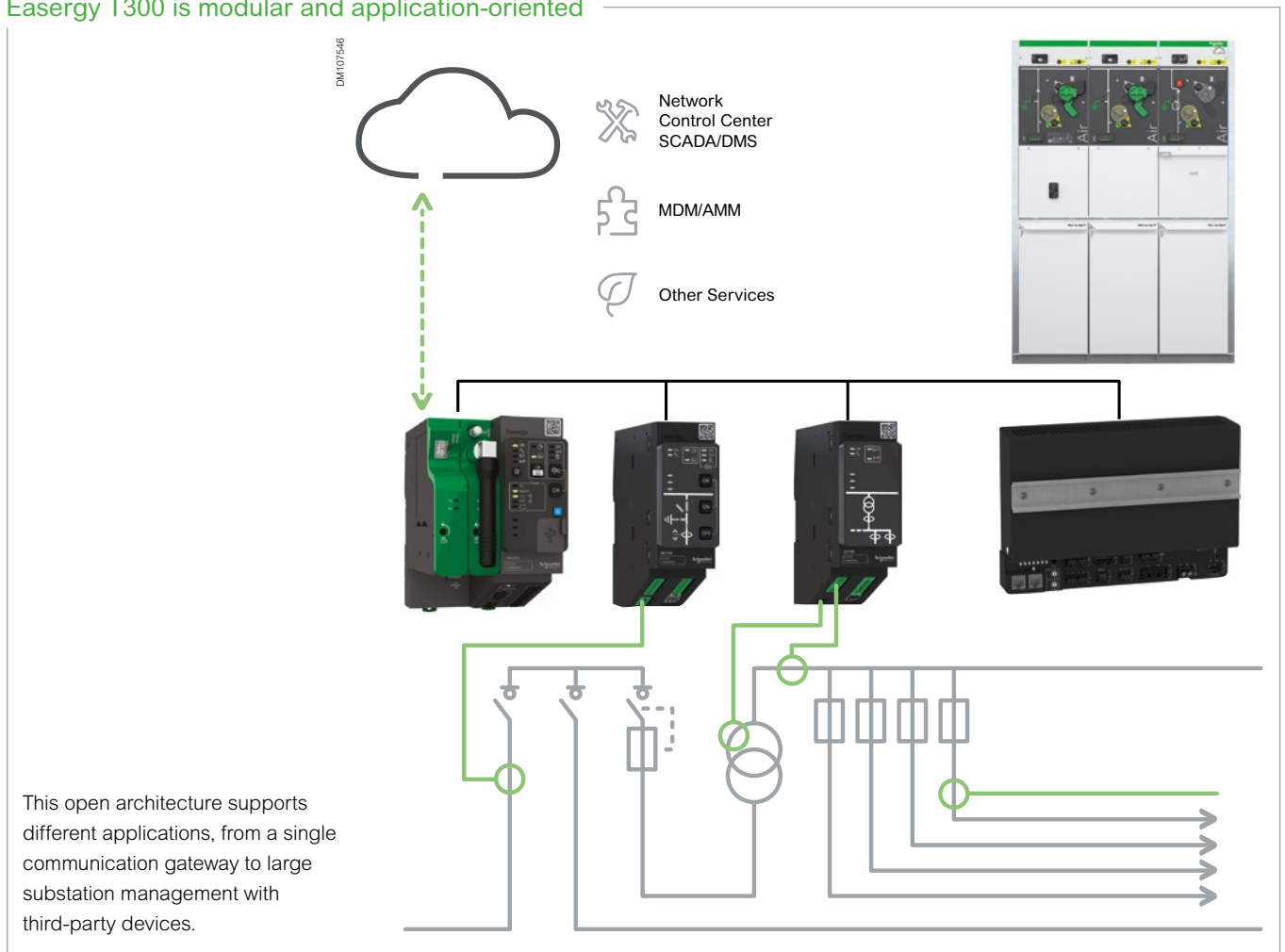
## Easergy T300: the newest generation of remote terminal unit

- Modular architecture perfectly adapted for integration in RM AirSeT functional units, a power supply back-up, up to 24 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.

## Easergy T300 is modular and application-oriented



# Easergy T300 Remote Terminal Unit

## Modules

These modules, with their supported applications, are:

### Easergy 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



### Easergy SC150 – Switch controller

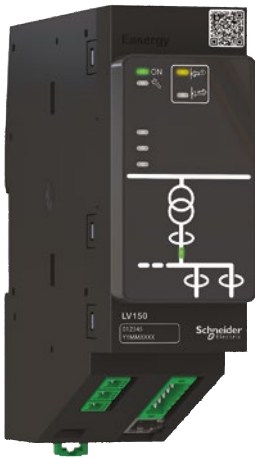
- Control and monitoring of switch-disconnector, switch-fuse combination or Circuit breakers
- Advanced Fault Passage Indicator (FPI) algorithms:
  - Phase-phase and phase-ground detection ANSI 50/51, 50N/51N
  - Directional phase-phase and phase-ground detection ANSI 67/67N
  - Broken conductor detection (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



# Easergy T300 Remote Terminal Unit

## Modules

PM104386



## Easergy 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



## Easergy PS50 – Power Supply for control and monitoring solutions

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

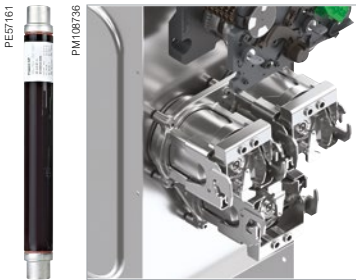
- Switch control: 48 Vdc or 24 Vdc
- Telecom devices: 12 Vdc
- Easergy T300: 12 Vdc

PM109947

Find more information, here







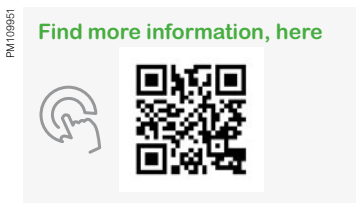
Fuse ratings for RM AirSeT protection units depend, among other things, on the following criteria:

- Service voltage
- Transformer rating
- Fuse technology (manufacturer).

Fuses as per IEC 60282-1 with dimensions as per DIN 43625 with medium loaded striker may be installed. Two lengths of fuse chambers are available for the 2 most popular types.

- **292 mm**
- **442 mm.**

442 mm fuse chambers can also be used for 292 mm fuses, by adding a fuse extender (optional).



Find more information, here

For fuse-switch combination unit, refer only to the selection table and reference list of fuses (please refer to RM AirSeT installation or user manuals). For other type of fuses, consult us.

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

Please check the RM AirSeT installation or user manual for fuse selection table.



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

# 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: Easergy Flair

RM AirSeT is also OPEN: Other devices like Alpha M, Alpha E, or other third party devices can be installed: the cut-out is the same, the connector is compatible with most products.

## Fault current indicators

The Easergy Flair (21D - 22D - 23D - 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.



Flair 21D



Flair 22D



Flair 23DM

### 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.



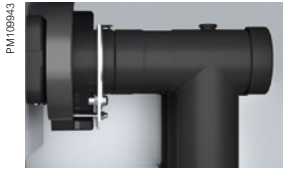
For details, please refer to Easergy Flair 2xD leaflet



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	•	•	•

# Fault passage indicators

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



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.

## The Easergy 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



Current sensors mounted at site  
around single core cables

# Fault passage indicators

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



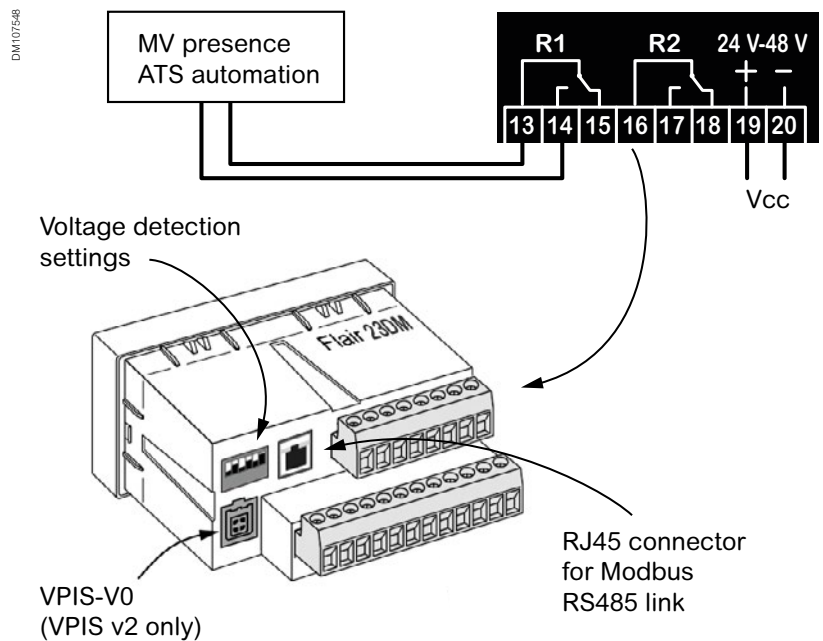
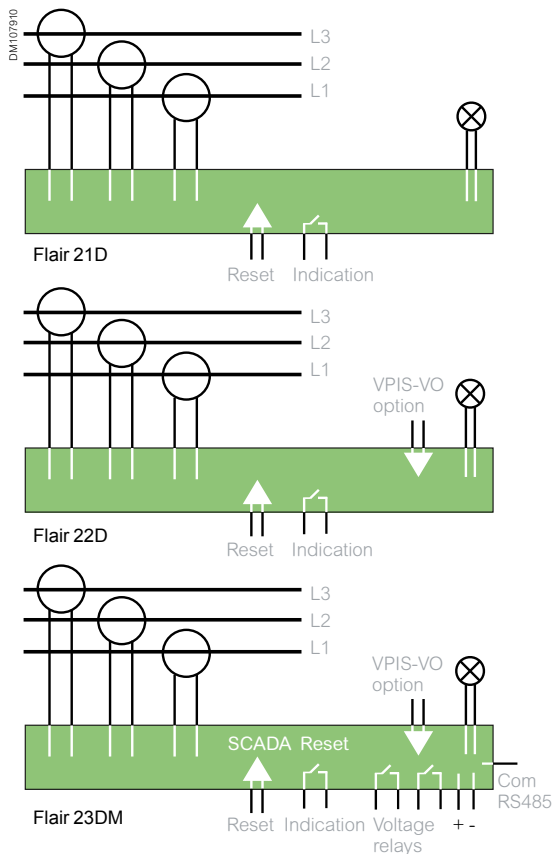
## Smart Grid: Remote Fault Passage and Voltage Detection multi-function simple device

### 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



# 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) <sup>(3)</sup>	Impedance-earthed, directly compensated, isolated (type B, C) <sup>(3)</sup>

## Fault passage indicator with single power supply

<b>Flair 21D</b>	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

<b>Flair 22D</b>	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

<b>Flair 23DM</b>	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-V0 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: $\pm (2\% + 2 \text{ digits})$	Ammeter Maximeter	Ammeter Maximeter	Ammeter Maximeter
Voltage (% of rated voltage)	With VPIS-VO option Accuracy: $\pm 1\%$			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 $\pm 10\%$	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 $\pm 10\%$	Auto-calibration	Yes	Yes	Yes
	Algorithm	$\sum 3I + di / dt$	$\sum 3I + di / dt$	$\sum 3I + di / dt$
Earth fault With zero sequence CT Accuracy $\pm 10\%$ or $\pm 1 \text{ A}$	Auto-calibration	–	No	No
	Thresholds	–	OFF or AUTO <sup>(4)</sup> or 5 to 30 A (5 A increments) and from 30 to 200 A (10 A increments) <sup>(1)</sup>	OFF or AUTO <sup>(4)</sup> 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 $\pm 10\%$	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

## Compact and Accurate Current sensors

Plug&Play, easy mounting, easy wiring, efficient wiring & connections

### Standards

- IEC 61869-2 inductive current transformers updating, completing and replacing IEC 60044-1
- IEC 61869-3 inductive voltage transformers updating, completing and replacing IEC 60044-2
- IEC 61869-10 low power current transformers updating, completing and replacing IEC 60044-7
- IEC 61869-11 low power voltage transformers updating, completing and replacing IEC 60044-8.



## RM AirSeT current transformers on the cable bushings

Bushing CTs require a length on the RM AirSeT cable bushing to be mounted

**Two lengths are available: standard and long**

### Standard (50 mm)

**Bushing CTs for 50 mm can be mounted**



Standard with 50 mm CT + start LV wiring

### 90 mm cable bushings


**Bushing CTs for 90 or 50 mm can be mounted**



Long with 90 mm CT + start LV wiring

## Bushing LPCT/CT (3-phase block): wide Current range Double Class (measure and protection) for Easergy T300, P3, P5

### RTU, Protection IEDs or Advanced metering units

Applicable functions	Reference	Common application	Rated continuous thermal current with accuracy class	Measure		Protection		Bushing min. length
				Measure	Protection	Measure	Protection	
	I, Q, R	3 x CTR2200 59925	For Easergy Flair FPI	Up to 630 A (inductive CT ratio 2200/1A)		-	-	50 mm
	I, Q, R	3 x MF1 59963	For Easergy Flair FPI	Up to 630 A (inductive CT ratio 2200/1A)		-	-	Split CT mounting on cable
	I, Q, B, R	3 x EMS58188	For RTU such as Easergy T300...	Up to 630 A (inductive CT ratio 500/1A)		cl 0.5	-	50 mm
	I, Q, B, R	RMU-LPCT50-RTU-ALL*	For RTU such as Easergy T300...	Up to 630 A (LPCT)		cl 0.5	5P	50 mm
	B	RMU-LPCT50-STD-ALL**	For protection relay such as Easergy P3, P5, ...	Up to 630 A (LPCT)		cl 0.5	5P	50 mm

\* Recommended for Easergy T300: includes wiring & connector for direct connection on Easergy T300 / SC150-SC160 module.


\*\* Recommended for Easergy P5: includes wiring & connector for direct connection on relay.

### DOUBLE CLASS: Measure AND Protection

(1 same CT accurate for protection & accurate for measure at the same time !)


This specific range is proposed for advanced measuring or RTUs functionalities such as Easergy T300, comprising power quality features.

Recommended to use measuring functionalities of advanced protection relays such as Easergy P3 or P5

Applicable functions	Reference	Rated primary current for accuracy class	Ratio	1 secondary: DOUBLE CLASS		Bushing min. length	
				Measure	Protection		
	I, Q, B, R	RMU-CT90-200-1-D	2 A up to 2000 A	200/1	2.5 VA cl 0.5S	2.5 VA 5P10	90 mm
	I, Q, B, R	RMU-CT50-600-1-D	6 A up to 6000 A	600/1	2.5 VA cl 0.5S	2.5 VA 5P10	90 mm

## Bushing LPCT/CT (3-phase block): wide Current range Double Class (measure and protection) for VIP40/45, VIP 400 and VIP410

### VIP40, VIP45, VIP400, VIP410

Applicable functions	Reference	Operating range: minimal to rated continuous thermal current with accuracy class	2 accuracy classes (LPCT)		Bushing min. length	
			Measure	Protection		
	B	RMU-LPCT90-VIP-200	VIP40/45: 4 A (1) VIP400: 7 A (1) VIP410: 0 A (1) to 200A	cl 1	5P30	90 mm
	B	RMU-LPCT90-VIP-600	VIP40/45: 8 A (1) - VIP400: 14 A (1) - VIP410: 0A (1) to 630 A	cl 1	5P30	90 mm

(1) Minimal / wake up current for VIP relay



## Cable mounting current transformers

For specific cases, below cable CTs are available with 5A and rated outputs superior to 2VA (auxiliary powered or CT powered).

If cl 0.2s metering is needed, we also recommend the cable CTs from our «ARC» series.

Schneider Electric can propose a full range of CTs for Cable mounting.

These CTs can be positioned around the cables in the cable compartment (please consult us).

With modern devices the range of bushing CT presented in previous pages provide more compactness, easier further adaptation in case the load is changing.

PE91031



**ARC2, ARC3, ARC5 and ARC6** can be proposed

- They combine compact dimensions
- They can be mounted on 1 phase (single core cables or three core cables, with separation of the 3 phases in cable trench)
- More compact, and better preserved from ambient conditions than MV CT blocks thanks to the principle of LV insulation (insulation by MV cable)
- They are easier to access and modify than MV CT block

**Common accuracy classes:**

- CI 0.5S
- CI 0.2S
- 5P20

## Zero sequence CT / Core Balanced CTs

PM108731



**VIP410 sensitive earth fault: input from a Zero sequence CT with secondary 1A or 5A**

Applicable functions	Reference	Diameter	Integration
B	CSH30: 59634	30 mm	Close ring CT on LV secondary of Zero Sequence CT. (to wire and install in LV compartment)

PM108730



**VIP410 sensitive earth fault: close ring Zero Sequence CTs**

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

PM106733



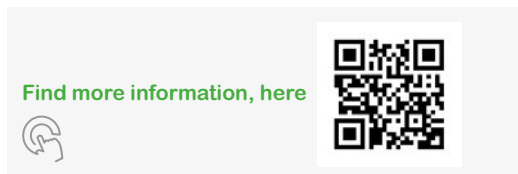
VPIS V3

PM106803



VPIS V2

PM109863



## Voltage sensors

Capacitive dividers are provided in the cable bushing of the functional units. They provide a signal with an accuracy of 5 % to the voltage indicating device.

## 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.

Two devices are available:

- 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.

### RM AirSeT is equipped with Schneider Electric Voltage Presence Indication Systems:

VPIS V2 is used for applications with:

- Flair Fault Passage Indicators: F22D or F23DM
- Live Cable Interlock

VPIS V3 is used for voltage presence on Easergy T300 RTU.

### Phase concordance unit

The units for VPIS and VDIS are different: The Phase concordance unit of VDIS provides a **backward compatibility** with VPIS V2 and VPIS V3.

PE56830



## 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 phenomenon
- 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 Easergy 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 Easergy T300
- No need to disconnect for cable testing up to 42 kV/15 min.

PM108344



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

## SSIS current and voltage transformers

Different types of voltage transformer (VT) are used on RM AirSeT switchboards. They are designed for easy installation and long service life. They are compliant with standard IEC 61869-3 and operate at 50 Hz frequency.

### VRU1

The VRU1 is a phase-to-earth screened voltage transformer used in I, B, Q or R functions.

- Compact dimensions and design for easy installation in core units
- Easy front access for disconnection for commissioning
- SSIS design for insensitivity to harsh environments

PE58411



	Screened	Traditional
Metalized SSIS technology for mounting in cable compartment (consult us) <ul style="list-style-type: none"> <li>• SSIS types VTs are connected on HV side with plug-in connectors</li> <li>• The SSIS technology provides them with compact design and insensitivity to harsh environment conditions</li> <li>• The profile is compliant with type A cable termination or compliant with Schneider Electric Premset profiles (consult us)</li> </ul>	<ul style="list-style-type: none"> <li>• For Air insulated tariff metering application</li> </ul>	

### Characteristics

Rated voltage	kV	7.2			12		
		6/√3	6.6/√3	6/√3	10/√3	11/√3	10/√3
Primary voltage	kV	6/√3	6.6/√3	6/√3	10/√3	11/√3	10/√3
Rated insulation and lightning impulse voltage	kV	20/60	20/60	32/60	28/75	28/75	42/75
First secondary voltage	V	100√3	110√3	100√3	100√3	110√3	100√3
Rated burden and accuracy class		10 VA Cl 0.2					
Second secondary voltage	V	100/3	110/3	100/3	100/3	110/3	100/3
Rated burden and accuracy class		30 VA 3P					

Please contact our Customer Care Center for availability of current ratios and performance levels.

# PowerLogic™ measuring devices

## Unique consistency of efficient ADVANCED measuring devices

A majority of applications in Electrical Distribution Companies or Simple **Private Installation** do not require additional measuring devices, as other components procure simple measuring functions:

- All functions of RM AirSeT Connected in our Smart RMU Easergy T300 comprise measuring available in local, and in remote from Distribution Management System (Scada such as EcoStruxure ADMS to improve the volt plan...)
- RM AirSeT I, Q, or R functions often comprise indicators (Flair collection of Fault Passage indicators provides optimal measuring functions for most applications)
- RM AirSeT B Circuit Breakers functions equipped with VIP40, VIP400, Easergy P1 comprise measurement up to energy quality management functionalities in Easergy P5.

For additional requirements, from maintenance purpose to accurate quality **management and metering**, RM AirSeT secondary switchgears easily integrate additional measuring IEDs relays on a customised approach.

Several sizes of extended Low Voltage cabinets are ready to receive any type of measurement relays. RM AirSeT is OPEN to most of selections simultaneously with or without other relays (protection, RTU...) including for third party tariff meters.

Efficient and compact Sensors are available (please refer to the relevant CT and VT chapter).

### 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.**

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)



PowerLogic Ion6200



PowerLogic PM5000 series



PowerLogic PM5350P



PowerLogic Ion7420

Find more information, here



# PowerLogic™ measuring devices

RM AirSeT	Traditional separated instruments		Compact multi-function digital meters				Advanced multi-function digital meters		
Application	Local analog measure		Digital local and remote energy				Power quality		Advanced utilities
	AMP	VLT	Simple		Industries & Critical buildings				
Model			iEM	ION 6200	PM5350	PM5500	PM8000	ION9000	ION7400
<b>Measurement Instantaneous rms/ Max Demand values</b>									
Current: present / max values	● / -		● / ●	● / ●	● / ●	● / ●	● / ●	● / ●	● / ●
Voltage		● / -	●	●	●	●	●	●	●
Power Active/Reactive/Apparent (Present+Max+Predicted values)			● / ● / ●	● / - / - (2)	● / ● / ●	● / ● / ●	● / ● / ●	● / ● / ●	● / ● / ●
Power factor			●	●	●	●	●	●	●
<b>Energy values / Measurement accuracy <sup>(1)</sup></b>									
Active, reactive, apparent energy				● / - / -	●	●	●	●	●
Active energy IEC 60687 or 62053-22				Class 0.5	Class 0.5S	Class 0.2S	Class 0.2S	Class 0.1S	Class 0.2S
Sub billing and cost allocation				●	●	●	●	●	●
Current IEC 61557-12 / reading	cl 1.5			0.3 %	0.3 %	0.3 %	0.1 %	0.1 %	0.1 %
Voltage IEC 61557-12 / reading		cl 1.5		0.3 %	0.3 %	0.3 %	0.1 %	0.1 %	0.1 %
Number of samples/cycle or sample frequency				64	64	64	256	1024	256
<b>Auxiliary powered</b>									
Additional auxiliary power required	NO	NO	●	●	●	●	●	●	●
<b>HMI</b>									
Display	72x72 or 96x96 mm		Inside (4)	110x110 mm	96x96 mm	96x96 mm	96x96 mm	170x192 mm	92x92 mm
Front panel display	Analog	Analog	LCD	Bright leds	LCD	LCD	LCD	LCD	TFT
Available with detachable display							●	●	●
Color graphic display							●	●	●
Multi-language / number of languages							●/8	●/8	●/8
<b>Inputs &amp; outputs</b>									
Pulse output				●2	2	2		4	1
Digital inputs / Digital outputs max			2	0/2	4/2	4/2	27/9	32/14	27/9
Analog inputs / Analog outputs max						1 / -	16/8	16/8	16/8
<b>Power quality measurements</b>									
Harmonic distortion current and voltage					●	●	●	●	●
Individual harmonics (odd)					31	31	63 +	63 +	63
Waveform capture						●	●	●	●
Fast acquisition 1/2 cycle data							●	●	●
<b>Data recording</b>									
Memory (in Mbytes)						1.1 Mb	512 Mb	2 000 Mb	512 Mb
GPS synchronization							● (+/- 1 ms)	● (+/- 1 ms)	● (+/- 1 ms)
<b>Communication</b>									
Communication port			●	●	●	●	●	●	●
RS485 / Ethernet			1	1	1	2	2 (3)	2	2
Alarm notification via email SMTP email / SFTP file transfer							● / ●	● / ●	● / ●
HTTP/HTTPS web server with waveform viewer							●	●	●
USB port / ANSI C12.19 Optical port								● / ●	● / ●
Front IP index				IP65	IP51	IP51	IP54	IP65	IP54
Operating Temperature				-20 °C to +70 °C	-25 °C to +70 °C	-25 °C to +70 °C	-25 °C to +70 °C	-25 °C to +60 °C	-25 °C to +70 °C

(1) Maximal accuracy of the product / (2) Predicted value not available in ION6200 / (3) Please refer to PowerLogic literature for more communication options / (4) The iEM modules are mounted inside the LV compartment (not visible from the front of the switchgear)

# Installation and connection

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Dimensions of the substation	86

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- 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, or R functional units.

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

### “Long bushing”

The Long bushing is required for:

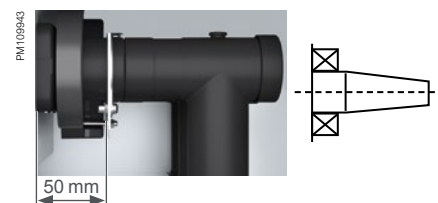
- 90 mm bushing CT from Schneider Electric.

**50 mm Bushing CTs or most fault passage indicator sensors can be mounted on long bushing.**

**Two lengths are available: standard and long**

### Standard

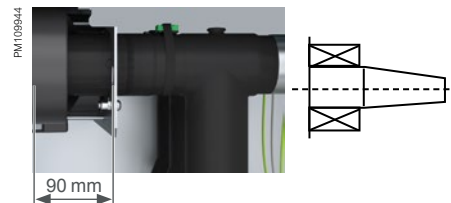
**Bushing CTs for 50 mm can be mounted**



Standard with 50 mm CT

### Long

**Bushing CTs for 90 or 50 mm can be mounted**



Long with 90 mm CT

# Cable connections

## Cable compartment

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

### Cable connectors:



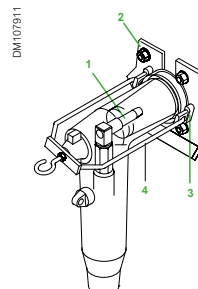
## Cable compartment

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

- Shielded connectors
- Non-shielded connectors.

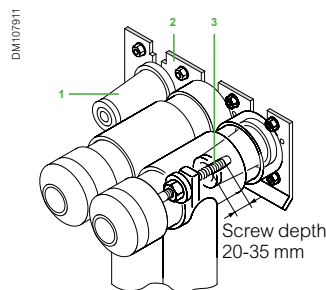
**Cable support mountings are adjustable horizontally and vertically to enable installation of various cable systems.**

## Bushing connector cones in accordance with EN-50181:



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

Connector cone Type A			
Switchboard function			
R / RE			
-	-	•	-



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

Connector cone Type C			
Switchboard function			
R / RE			
•	•	• (optional)	•

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

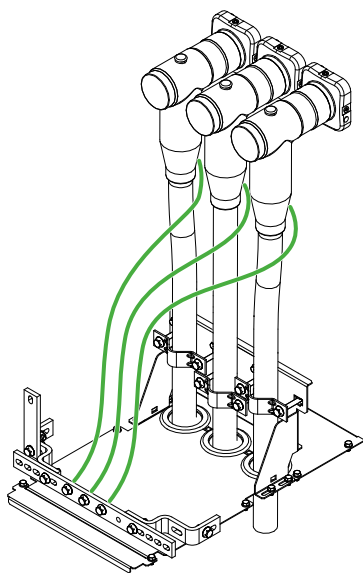


### Type of connection

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

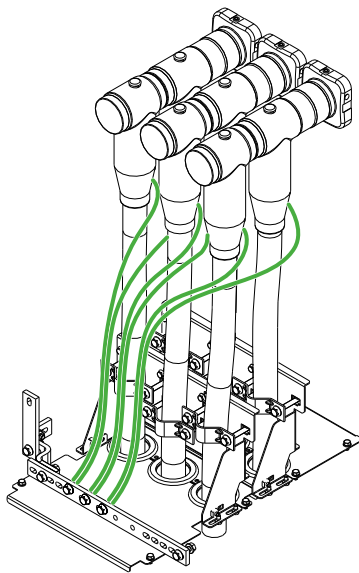
- Single cable per phase
- Two cables per phase
- Single cable per phase + surge arresters
- No cable - bushing protected by insulating plug.

DM107884



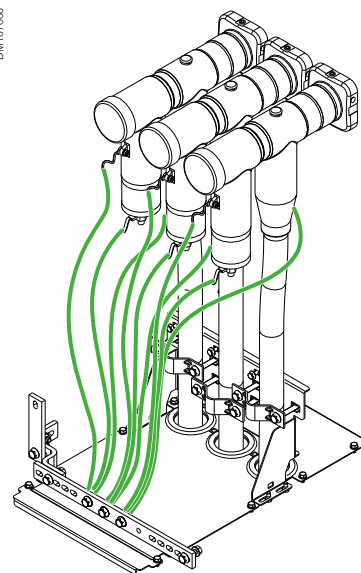
**Single cable per phase**

DM107885



**Two cables per phase\***

DM107886



**Single cable per phase + surge arresters**

\* Only available in the RM AirSeT 1 380 mm height version).

# 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
<b>Shielded</b>	NEXANS - Euromold / Elastimold	200LR <sup>(1)</sup> (or old 158LR) K158LR <sup>(1)</sup>	Elbow	16 to 95 mm <sup>2</sup>
	PRYSMIAN- Pirelli	FMCE 250	Elbow	16 to 95 mm <sup>2</sup>
	NKT cables	EASW 12/250 A	Elbow	25 to 95 mm <sup>2</sup>
	NKT cables	CE 24-250 CSE-A 250	Elbow Elbow	25 to 95 mm <sup>2</sup>
	3M	93-EE 605-2	Elbow	25 to 95 mm <sup>2</sup>
	TE Connectivity - Raychem	RSES-52xx		16 to 120 mm <sup>2</sup>
	Südkabel	SEW 12 / 24	Elbow	25 to 150 mm <sup>2</sup>
<b>Not Shielded / Heat Shrinkable <sup>(2)</sup></b>	TE Connectivity – Raychem	EPKT + EAKT + RSRB	-	16 to 150 mm <sup>2</sup>

(1) 120 or 150 mm<sup>2</sup> 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.

# Cable connections

## 1 or 2 cables per phase – Bushing Type C



### 12 kV - 95 kV

- 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.

Indicative list, for other brands please consult us.

Connector type	Manufacturer	Reference of connector	Shape	For cable cross section
<b>Screened</b>	NEXANS - Euromold / Elastimold	K/400LB	Elbow	16 to 300 <sup>(1)</sup> mm <sup>2</sup>
		K/400/430/440TB	Tee	16 to 300 <sup>(1)</sup> mm <sup>2</sup>
	PRYSMIAN - Pirelli	FMCEAs-630	Tee	70 to 300 mm <sup>2</sup>
	NKT cables	CB 12 / 24-630	Tee	25 to 300 mm <sup>2</sup>
	3M	93-EE 705	Tee	25 to 300 mm <sup>2</sup>
	TE Connectivity - Raychem	RSTI-58xx	Tee	25 to 300 mm <sup>2</sup>
		RSES-54 / 57	Elbow	25 to 300 mm <sup>2</sup>
Südkabel	SET 12 / 24	Tee	50 to 300 mm <sup>2</sup>	
<b>Not Screened / Heat Shrinkable <sup>(2)</sup></b>	NKT cables	AB 12-630	-	25 to 300 mm <sup>2</sup>
	TE Connectivity - Raychem	RICS-51xx	-	25 to 300 mm <sup>2</sup>
	TE Connectivity – Raychem	RSRB	-	16 to 300 <sup>(1)</sup> mm <sup>2</sup>
	NEXANS	15TS-NSS	-	35 to 300 <sup>(1)</sup> mm <sup>2</sup>

(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 can be used: no cable CTs.

# Cable connections

## 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 <sup>(1)</sup>	Shape
<b>Screened</b>	NEXANS - Euromold/ Elastimold	158SA or 300SA	For Tee
	NKT cables	CCSA 12	For Tee
	3M	MUT 23	For Tee
	TE Connectivity - Raychem	RSTI-SA	For Tee
<b>Not Screened / Heat Shrinkable <sup>(2)</sup></b>	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.

## RM AirSeT dimensions and weights <sup>(1)</sup>

Number of functions	Width (L) <sup>(2)</sup> / mm	Depth (D) / mm	Height (H) <sup>(4)</sup> / mm		Weight (W) <sup>(3)</sup> / kg
			MV	If LV cabinet	NE - Non Extensible
1	420	780	1625 Including the Basic integrated LV compartment	1975	260 to 365
2	770	780		with Extended LV cabinet +350	300 to 425
3	1120	780		2125	400 to 560
4	1470	780		with Extended LV cabinet +500	500 to 700

(1) Applicable to all RM AirSeT with switch-disconnector, Circuit Breaker, Fuse-switch. Compact (NE) or extensible (LE / RE / DE).

(2) L is the Width of the frame, including extensions: There is no space between 2 switchgears that are assembled.

Busbar extensibility: For safety of operators, before energizing a switchgear, it is essential that cover-s with insulating caps are mounted on the busbar extension bushings, when the busbar extension is not connected to another RM AirSeT. (1 cover per RM AirSeT type "RE" or "LE"; 2 covers per RM AirSeT type "DE"). Each cover increases the Length by X = +2 cm on the respective side. It is removed when the 2nd extensible switchgear is assembled.

(3) The weight depends on configuration and options.

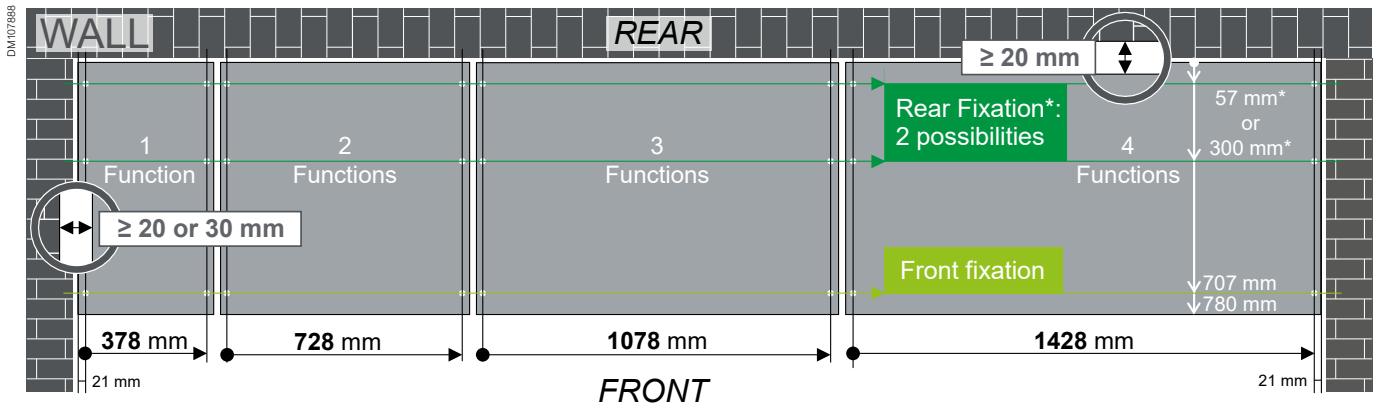


# Civil engineering

## 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



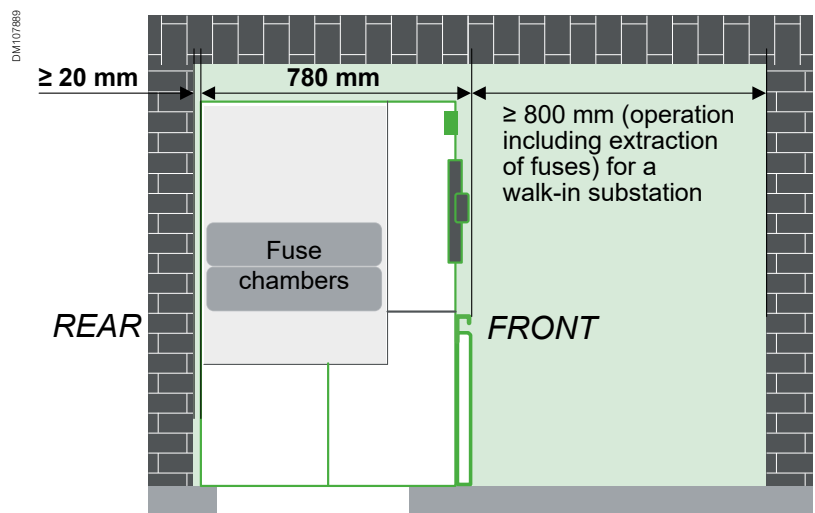
**Top view:** Minimal distances from sides to the walls of the substation / location of fixing points.

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

- These minimal distances provide the clearances required when RM AirSeT is **standalone**. When extensible RM AirSeT must be assembled, additional clearance are required (see next pages)
- 4 fixing points must be used for each RM AirSeT unit
- Minimal distances on the sides depends on the extensibility version of RM AirSeT, as shown in the table.

Extensibility	NE	LE	RE	DE
<b>Panels surfaces: Minimal distance from RM AirSeT to walls</b>				
LEFT	≥ 20 mm	NA	≥ 20 mm	≥ 30 mm
RIGHT	≥ 20 mm	≥ 20 mm	NA	≥ 30 mm
REAR	≥ 20 mm	≥ 20 mm	≥ 20 mm	≥ 20 mm

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



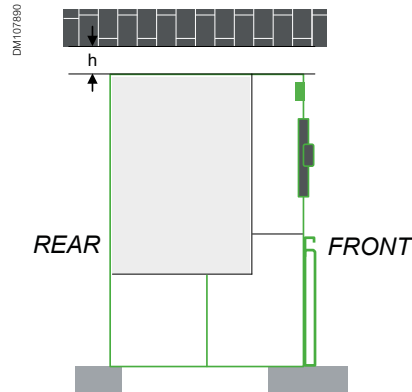
Please consult us for shorter distances.

# 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.

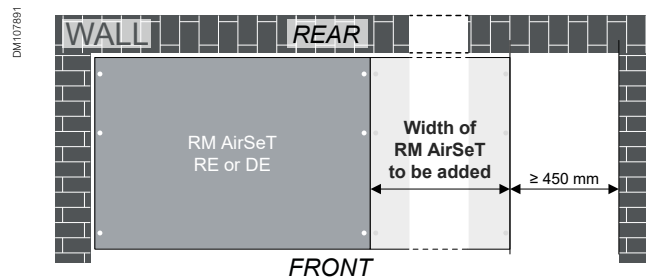
### Side view: Minimal distance required to the ceiling



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

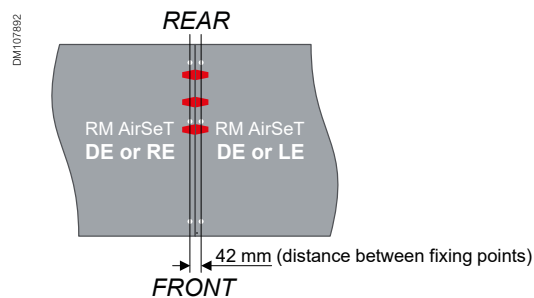
- For **RM AirSeT mounted standalone**: the distance shall be  $h \geq 20 \text{ mm}$
- To **allow side extensions**, the recommended distance is  $h \geq 100 \text{ mm}$ .

### 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.

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



Please consult us for shorter distances.

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.

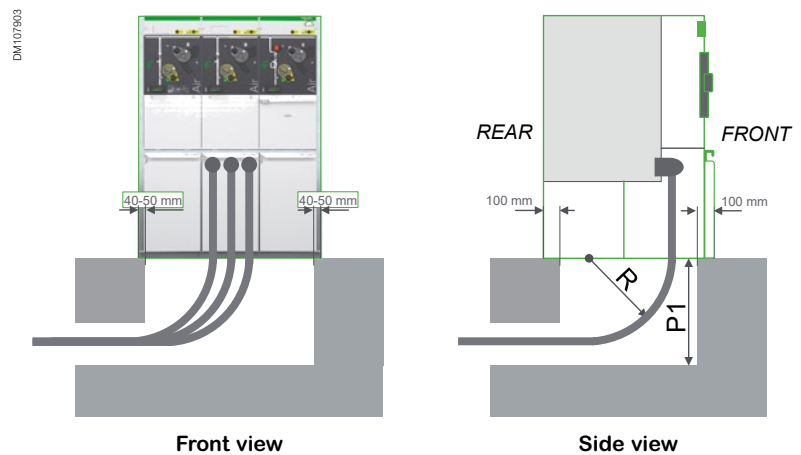
The heights of cable trench (P1) and bending radii (R) indicated in the table are typical: the engineers designing the substation must adapt the dimensions of civil works to the actual cables, the routing and installation mode. The bending radius (R) indicated by the cable manufacturer must be respected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

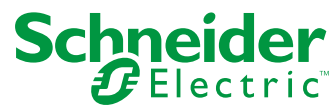


### Determining typical height of cable trench (P1)

Connection	Cable insulation	Cable	Cross section (mm <sup>2</sup> )	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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