EcoStruxure™
Innovation At Every Level

SeT Series

MCSet

Active & Active Plus

Catalog 2025

Air-insulated Switchgear up to 17.5 kV
Middle Rolling Circuit Breaker

se.com

Life Is On | Schneider Electric

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Are you dealing with complex electrical grids and trying to go green at the same time?

Or perhaps large or critical applications that face challenges to decarbonize?

At Schneider Electric, we are committed to help you maximize performance, while becoming more sustainable by embracing **AIR & DIGITAL** technologies

Same technology, same offer, simpler names.

We are making it easier for you to navigate across the wide range of our world-class digital products and select the offers that are right for you and your needs with confidence.

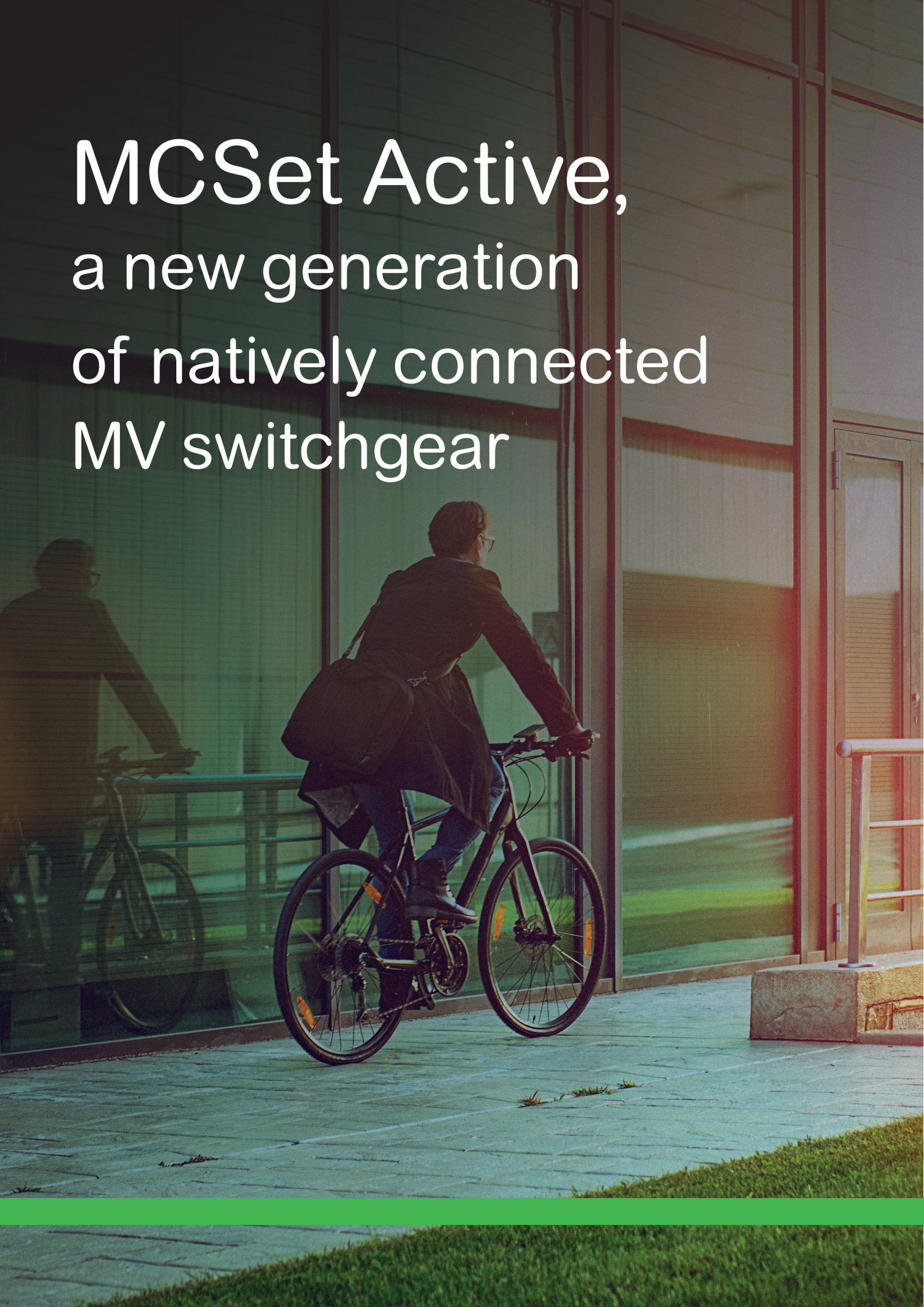
SeT Series

Featuring outstanding medium-voltage (MV) and low-voltage (LV) switchboards, motor control centers and power distribution solutions for high-performance power applications, SeT Series provides optimized solutions based on a modular architecture and incorporating smart connected devices to increase safety, reliability, performance and energy efficiency. Explore our SeT Series latest offers here.

Active Connectivity

Our latest equipment takes advantage of advancements in digitization to be connected by default. We call this Active connectivity.
Featuring a scalable range of connected features, smart sensors and devices, integrated seamlessly in the factory to provide data about the installation environment and health of your installation. Together, this data is easily shared to improve all aspects of the application lifecycle. Read-on to learn more about Active connectivity.

MCSet Active,
a new generation of natively connected MV switchgear



MCSet Active Plus,

for 24/7 businesses that stay On!

GENERAL CONTENT

Find more information here

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

Overview

Innovative technologies for greater sustainability

Powered by air and digital

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

Sustainability, let's clear the Air

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

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

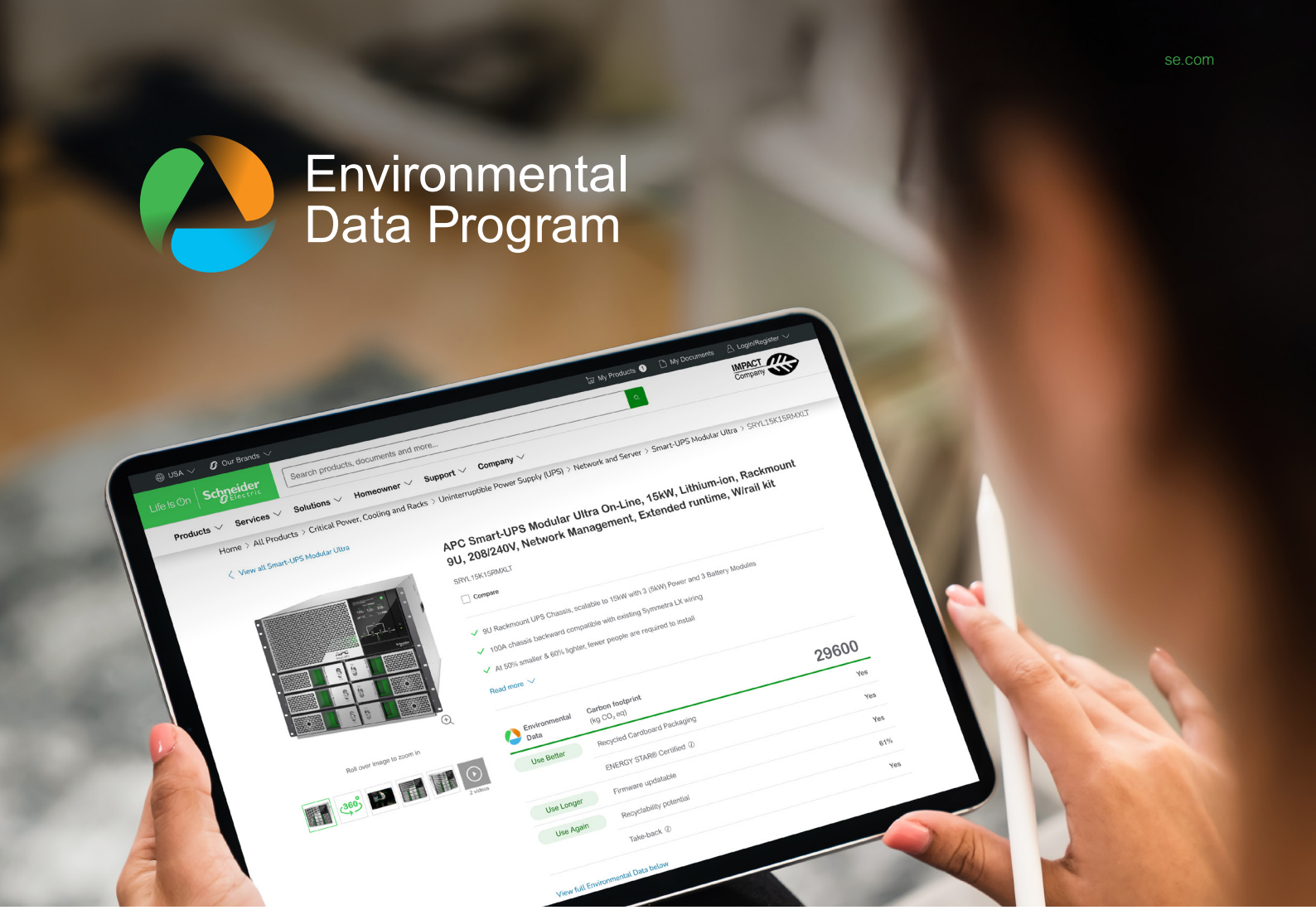
- Monitor equipment health and use optional EcoCare membership to optimize efficiency, and reduce unplanned downtime
- Enable operation of live equipment from outside of the arc-flash zone
- Speed up daily interactions with paperless documentation and records.

The unique combination of Air and Digital equipment with EcoCare membership helps you decarbonize, simplify, reduce downtime and maintenance costs, while increasing equipment lifespan and saving time. All with less CO_2, for a more sustainable future.

(*) Higher ratings are achieved using alternative circuit breakers. Please see available options in the catalogue for further information.

Watch the SF6-free video playlist

Environmental Data Program

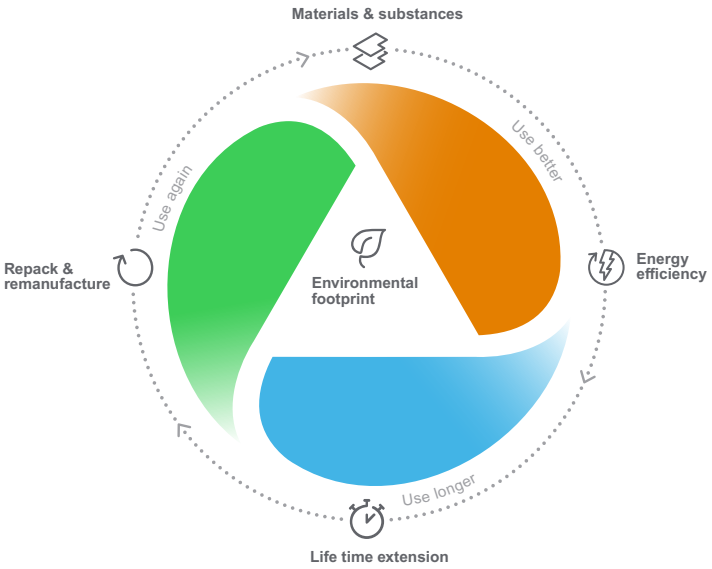


Next-level transparency for better-informed product choices

The Environmental Data Program is a framework for how we measure, categorize, and compare the environmental attributes and footprint of our products.

Using a rigorous, fact-based methodology, the program provides environmental data from across the product lifecycle.

Five data categories across the product lifecycle



Use Better: How sustainable a product is, including environmental footprint, materials and substances, packaging, and energy efficiency.

Use Longer: How a product's life time can be effectively extended in terms of repairability and updatability.

Use Again: How a product can be reused, from dismantling and remanufacturing to recyclability and manufacturer take back.

With this transparent, verified data, customers and partners are empowered to make conscious environmental choices and accurately evaluate and report on sustainability performance.

All our hardware offers have an associated environmental data available on se.com product pages.

Learn more about the Environmental Data Program

Design for a large field of application

MCSet switchgear has been designed for the various operating requirements in public and industrial medium-voltage systems.

Power Supply Companies

- HV/MV substation
- MV/MV substation
- MV/LV substation
- Power generation

Industries

- Oil and gas industry
- Chemical industry
- Automotive industry.
- Mining, Mineral, Metal
- Process engineering

Infrastructure

- Airports
- Tower Blocks
- Water plants

Marine

- Cruise Ships
- Container & LNG Ships
- Off-shore platforms
- Army & Navy Vessels

Data Centers

- Extra Large Data Centers
- Cloud & Service Providers

Natively digital for next level reliability

Enhanced safety

MCSet Active now embeds a set of comprehensive features like remote controlled circuit breakers, remote controlled earthing switches and internal arc flash detection, all dedicated to reduce risks.

Simpler

MCSet Active has been designed to accommodate a diverse range of installation requirements, yet simplify operations. This is done by improving visibility and accessibility so that users take decisions and act faster. The digital logbook gives simple access to all related document in a user-friendly manner.

Resilient

MCSet Active benefits from more than 50 years of experience in medium voltage switchgear and in-house component design. Now with condition monitoring sensors, users can stay informed of real condition to maintain reliable power, even in the harshest of environments.

Efficient

Accommodating circuit breakers, contactors, metering or earthing devices in compact cubicles saves space. Combined with native connectivity, you can operate and monitor equipment remotely with condition-based maintenance providing powerful insights, anywhere, anytime to stay at peak efficiency.

Enhanced Safety & Reliability

Unique benefits of digitally native MCSet

Enhanced operational safety

As a natively digital switchgear, MCSet Active Plus enables nearby digital control and monitoring features.
Digital controls allow users to operate and monitor the switchgear from a smart device or HMI, enabling staff to do their jobs without physically interacting with the equipment. Circuit Breaker operation, earthing switch and racking can all be managed from outside of the arc flash zone.
With added arc-flash detection built-in (optional) you can reduce risks both to on-site operators and of equipment damage.
The latest embedded IoT monitoring sensors provide a scalable way to maintain visibility of equipment condition in real-time. Starting with MCSet Active allows users to benefit from essential monitoring features to avoid unplanned downtime. Scaling up to MCSet Active Plus brings our latest Partial Discharge monitoring when combined with a dedicated expert monitoring service.

Simplicity

It takes time to manage power distribution applications correctly, while avoiding unplanned downtime and increasing costs. We designed our latest digitally native MCSet Active with simplicity in mind. All necessary components are embedded, covering today and tomorrows needs, simple to specify, order, install and use. Connectivity features and sensing are factory installed and tested, meaning no complex engineering or commissioning.
Documentation and drawings of the as-built configurations are loaded to a unique cloud-based repository called Digital Logbook, to be viewed and updated anytime, anywhere.
Our simple architectures for cloud or edge (on-premise) connectivity use a single gateway, EcoStruxure Panel Server to gather and communicate with wired and wireless sensors, devices and HMI.

Enhanced Safety & Reliability

Unique benefits of digitally native MCSet

More Resilience

With more than 50 years experience in medium voltage, we know that design for safety and reliability go hand in hand as critical factors in the selection of equipment. We take extra special care using in-house design of key components to bring you the best experience, even in the harshest of installation conditions.
Using the latest IoT sensors to monitor installation conditions, busbars, circuit breakers and more allows MCSet Active to take resilience to the next level. The use of condition-monitoring with alerts allows maintenance to be optimized, while reducing costs.
Application data from sensors are utilized in powerful analytics within EcoCare membership, delivering alerts, predictions and expert knowledge to guide your decisions 24/7. Whether on-site or on-holiday, you can count on a team of dedicated professionals to support and help your every move help prevent downtime.

Striving for Efficiency

Linked to sustainability, make the most of your energy extends to everything we do.
Whether integrating circuit breakers, contactors or protection relays, our integrated approach means that you receive factory tested, connected components, all ready for use with minimal additional integration. We develop digital components with the same philosophy, including embedded cybersecurity compliance for all components, truly digitally native.
MCSet Active can be cloud connected, as easily as inserting a SIM card and configuring a new phone, but flexible to connect your on-premise solutions, all thanks to simplicity of architectures and a single, all-in-one gateway for data, EcoStruxure Panel Server. Take efficiency further and save time by using remote digital monitoring and controls on a local HMI or mobile device, all designed for efficiency.
EcoCare membership supports your transition to more predictive maintenance. Scalable and powered by our EcoStruxure Digital platform, using condition monitoring alerts, lifespan predictions and expert support, for best-in-class efficiency with MCSet Active equipment.

What is EcoStruxure?

Overview of MCSet Active and MCSet Active Plus

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

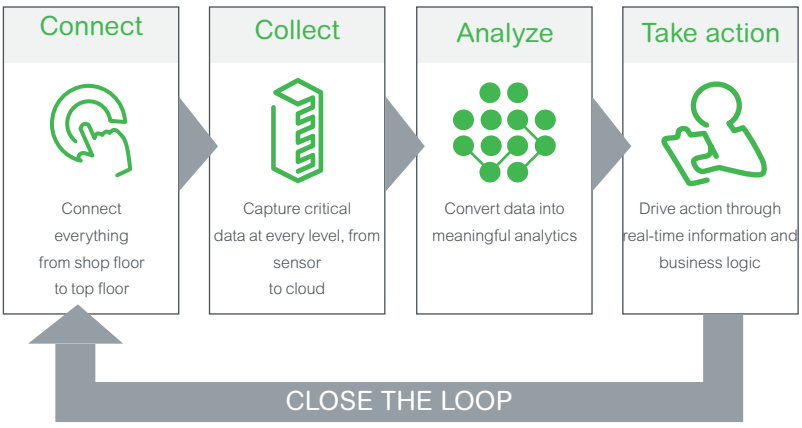
Advanced features designed-in and based on well-known designs, experience and technology.

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.

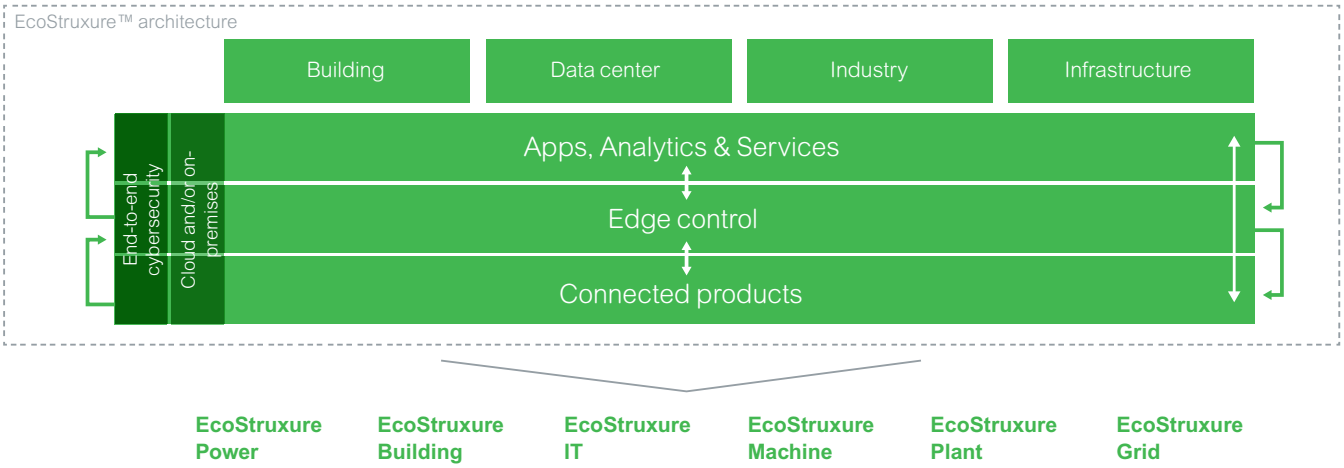
Turn data into action

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



EcoStruxure Power | **EcoStruxure Building** | **EcoStruxure IT** | **EcoStruxure Machine** | **EcoStruxure Plant** | **EcoStruxure Grid**

What is EcoStruxure?

MCSet Active & MCSet Active Plus

Unlock the full potential of your MCSet Active and its performance by **combining it with EcoCare membership*** and get access to:

- 24/7 health monitoring & alarms from our Connected Services Hub, our remote team of experts including Partial Discharge monitoring (Active Plus only)
- Exclusive priority access to Schneider Electric expertise and on-site interventions, defined by Service Level Agreement (SLA)
- Proactive recommendations and insights to your operations to reduce costs and disruption, increase safety, reliability and help extend the equipment lifespan to optimize costs or carbon emissions.

MCSet Active: Natively connected essential monitoring

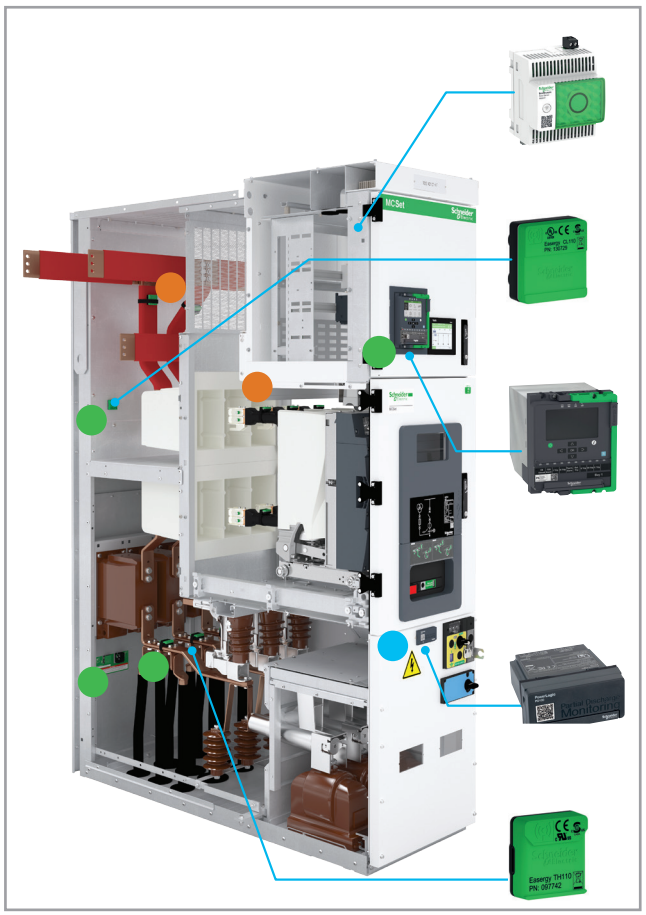
MCSet Active is our well known MV switchgear equipped natively with thermal, environmental and circuit breaker monitoring.
This solution connects your substation equipment to a cloud-based remote monitoring platform for 24/7 health assessment from day one of operations.

MCSet Active Plus: Comprehensive with optional Partial Discharge monitoring

Additionally, MCSet Active Plus adds comprehensive monitoring using Partial Discharge monitoring sensors. When coupled with dedicated expert services, it helps you identify a variety of abnormal events before they result in unplanned downtime.

MCSet Active: ● + *optional* ●

MCSet Active Plus: ● + ●



(*) Please contact your local Schneider Electric representative to verify the availability of EcoCare / EcoStruxure Service Plan in your region.

EcoStruxure™ Panel Server PAS600

Seamless connection of smart IoT devices to your applications

- All-in-one gateway
- Wireless or wired devices
- Simple commissioning and operation
- Edge or Cloud architectures

PowerLogic CL110 Environmental Sensor

Measure ambient temperature and humidity to detect abnormal conditions in:

- Switchgear electrical room
- Cable or busbar compartment
- Dew point calculation
- Battery-powered (service life > 15 years)

PowerLogic P5 Protection Relay

- Built-in arc flash protection
- 8 Communication protocols, including IEC 61850
- Nearby operation through your smartphone
- Cybersecurity compliance
- Withdrawable design
- Advanced color screen display

PowerLogic PD100 Partial Discharge sensor

Continuous partial discharge monitoring to detect abnormal activity in switchgear and cables terminations

- Based on capacitive coupling
- Fully integrated sensors
- Optional, expert driven Service

PowerLogic TH110 Thermal Sensor

Continuous thermal monitoring to detect hotspots and potential loose connections of:

- Cable connections
- Busbar connections (optional)
- Circuit breaker arms (optional)
- Battery-less sensor

Overview

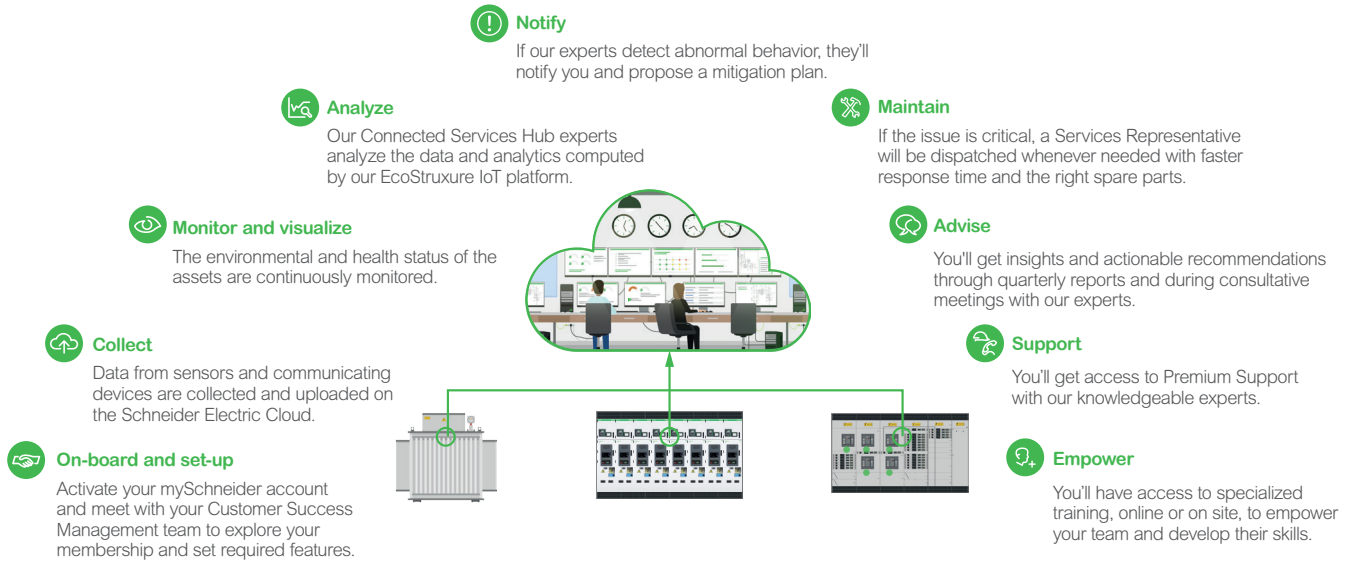
EcoCare membership

Combine MCSet Active or MCSet Active Plus with a next-generation services plan

We help you optimize your electrical asset management. How?

Even the most reliable switchgear can face unforeseen failures in the early years of operation, often due to unpredictable external factors like installation environment and operational practices.

With **EcoCare membership**(1), a next-generation service plan, you gain **exclusive support for your equipment from day 1** and throughout its entire lifecycle. For minimal investment compared with your overall CapEx, you'll enjoy 24/7 remote monitoring and alarm management, and get exclusive and faster access to technical expertise, on-site and remotely.



Understanding the EcoCare features and benefits

		EcoCare Essential	EcoCare Advanced	EcoCare Advanced+
Support to operations	• mySchneider portal • Premium support • Emergency support • Customer success management	✓	✓	✓
Workforce empowerment	Access to online training courses	✓	✓	✓
Exclusive Benefits	Members rates on other services: on-site intervention, advanced trainings, spare parts and more(2)	✓	✓	✓
	24/7 monitoring and alarming	✓	✓	✓
	Consultancy by our experts and quarterly reports	–	✓	✓
	Condition-based maintenance	–	–	✓
	Partial discharge monitoring for medium voltage switchgear	–	Optional	Optional
	Advanced transformer oil monitoring	–	Optional	Optional
Extended warranty		✓	✓	✓
On-site maintenance	Manufacturer calendar-based maintenance visits with asset diagnostic	Optional	Optional	–

Why become an EcoCare member?

- **Simplified operations** with online asset condition monitoring and alarming.
- **Help prevent fires** with continuous thermal monitoring.
- **Increased asset uptime** with predictive analytics, remote, and on-site manufacturer expertise.
- **Faster issue resolution** with 24/7 remote technical assistance.
- **Optimized operational budget** with a condition-based maintenance strategy.
- **Improved asset's lifetime**, helping to avoid carbon emissions.

(1) If EcoCare is not available in your region, leverage EcoStruxure Service Plan.
(2) Check with your local Schneider Electric services representative.

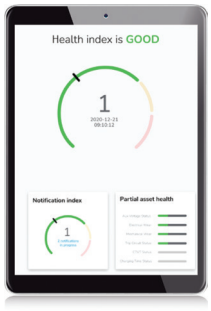
Overview

EcoCare membership

Combine MCSet Active or MCSet Active Plus with a next-generation services plan

EcoCare Membership can help you reduce electrical failure risk and unplanned downtime by up to 75%(1), on-site maintenance and planned downtime costs by up to 40%(2), and also extend your assets' lifespan to optimize costs and carbon emissions.

Electrical Fire Index



Asset Health Index

Partial Discharge Monitoring

Unlock the potential of your connectable asset with EcoCare membership

Scan the QR Code to learn more
Or visit our webpage

Reducing electrical fire event probability with Electrical Fire Index

Combined with a Monitoring Level, Electrical Fire Index **provides extra protection against electrical fire events** in your installation.

- Based on field data and advanced analytics enabled by 24/7 monitoring of potential source of fire.
- You receive alarm notifications and have access to the level of risk and localization in the equipment.
- When the Electrical Fire Index increases, experts from the Connected Services Hub analyze the situation, and if needed, call you to propose a corrective action and/or an intervention of by a qualified Services representative.

Reinforcing electrical uptime with Health Index

The **criticality of each asset** is defined with each customer, taking into account the impact of potential downtime on their process.
The system provides:

- A Health Index for each connected asset and an overall site Risk Index
- Advanced analytics enabled by 24/7 asset monitoring
- Alarm notifications and easy access to data via mobile app and web portal
- When the Asset Health Index evolves, experts from the Connected Services Hub analyze the situation and provide actionable recommendations to help you reduce risk of downtime and optimize your assets' lifespan.

Reinforcing electrical uptime an minimize earlier degradation with Partial Discharge monitoring

Partial discharge is a localized electrical discharge which affects insulation, impacting equipment and business operations uptime, and lifespan since it is an **early indicator of equipment degradation**.
When Partial discharge sensor (PowerLogic PD100) is installed in medium-voltage switchgear with Active Plus connectivity, we can monitor this critical phenomenon as an **optional feature** in your EcoCare membership with:

- 24/7 monitoring and alarming with easy access to data through our mobile app and web portal.
- Dedicated and specific monitoring by our Experts.
- Detection of all types of Partial Discharge (Corona, surface or internal discharge).
- Advanced analytics to monitor trends and environmental conditions.

Moving to Condition-based maintenance with Maintenance Index

EcoCare Advanced+ helps you move from calendar to condition-based maintenance.

- By default, maintenance cycle might be potentially extended from 3 up to 5 years for assets connected to our EcoStruxure IoT platform
- Our team of remote experts provides recommendations and propose a dynamic maintenance management
- They leverage the Maintenance Index, our innovative analytics based on stress, wear and aging indicators, that continuously controls the date of the next recommended maintenance of each connected asset
- The Maintenance Index is also visible to you, along with associated dashboard, insights and notifications.

(1) This percentage is non-contractual and is based on our experience and expertise for the main root cause of electrical failure risk observed in low and medium-voltage equipment and for which Schneider Electric has developed solutions.
(2) This percentage is non-contractual and is based on the time between two manufacturer maintenance activities for low and medium voltage equipment which can be extended by up to 2 years compared to a traditional calendar-based maintenance contract, from 3 to 5 years.

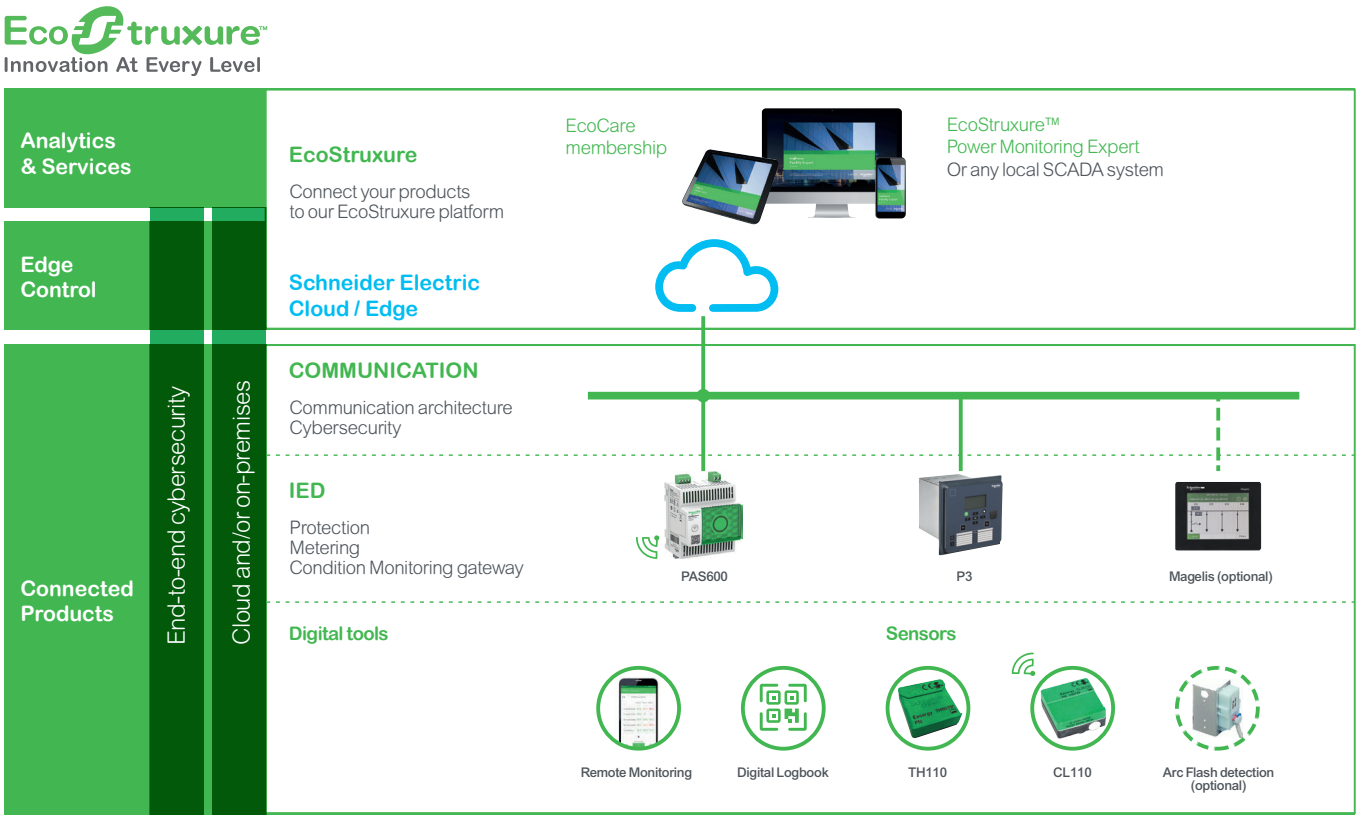
MCSet Connectivity Architectures

Active:
Digitally native with essential monitoring

MCSet Active
Features native connectivity to cloud or edge architectures

Detect and react faster to abnormal conditions, with 24/7 cloud connectivity with essential monitoring features.

- Thermal monitoring
- Environmental monitoring
- Circuit Breaker monitoring
- Connectivity gateway to Schneider Electric cloud
- QR code access to a Digital logbook and product information via **EcoStruxure Facility Expert**
- Combine MCSet Active with **EcoCare membership** for exclusive access to our MV services experts and advanced analytics



PowerLogic Environmental Tag

CL110 monitors ambient conditions continuously to:

- Help maintenance manager to monitor ambient moisture and pollution which are detrimental to the switchgear.
- Calculate condensation cycle, compared with mission profile conditions. Using EcoCare membership, a team of dedicated experts can recommend maintenance and cleaning frequency adjustment in order to maintain the switchgear in its nominal status.

PowerLogic Thermal Tag

TH110 monitors thermal condition of live components connections to:

- Highlight thermal anomalies in critical power connections
- Continuous monitoring helps prevent deterioration, reducing risks to operators and equipment
- Optimize predictive maintenance and fire prevention

MCSet Connectivity Architectures

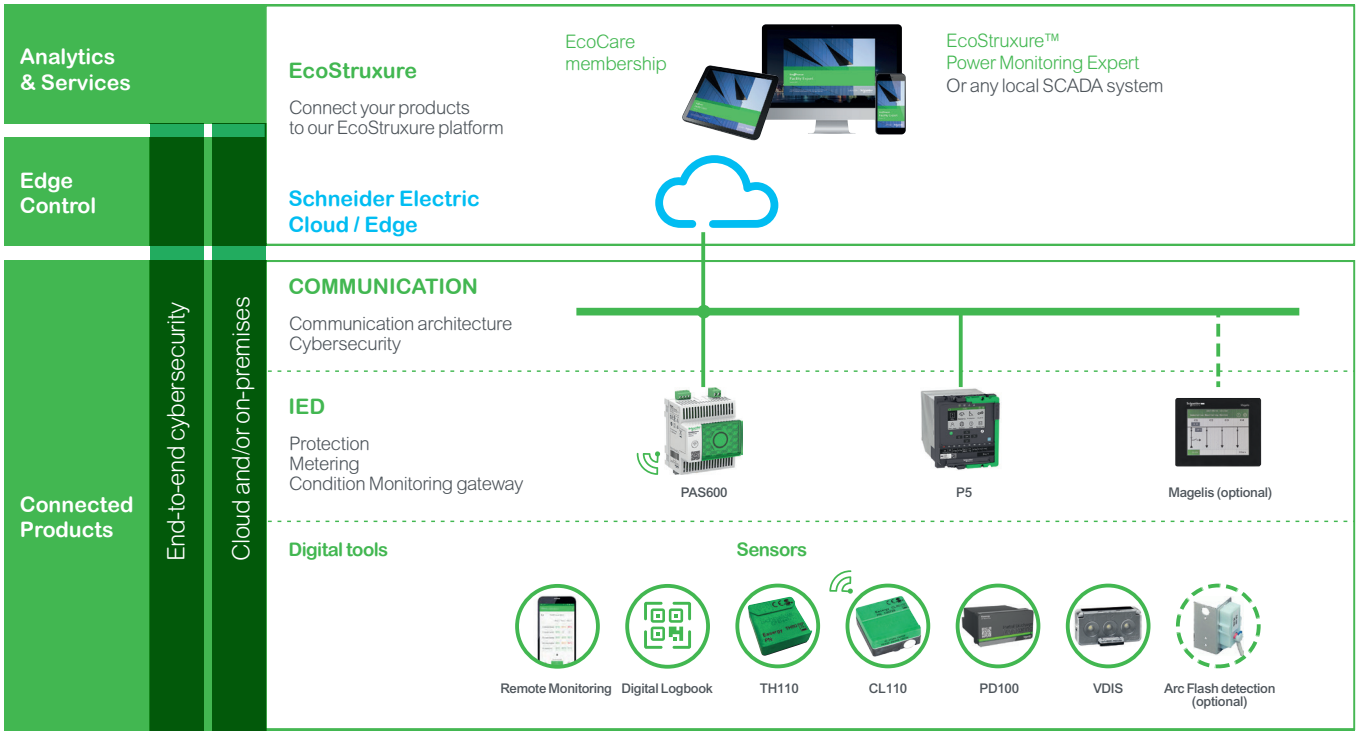
Active Plus:
Comprehensive monitoring & control

MCSet Active Plus
Takes monitoring and control to the next level.

Comprehensive monitoring and control of switchgear and breaker. Health diagnosis and remote alerts, as well as digital operation and racking, through your local HMI or mobile device

- Thermal monitoring
- Environmental monitoring
- Circuit Breaker monitoring
- Partial Discharge Monitoring (requires **EcoCare membership**)
- Connectivity gateway to Schneider Electric cloud
- QR code access to a Digital logbook and product information via **EcoStruxure Facility Expert**
- Combine MCSet Active Plus with **EcoCare membership** for exclusive access to our MV services experts and advanced analytics

EcoStruxure™
Innovation At Every Level



EcoStruxure™ Panel Server

PAS600 provides seamless connection of smart IoT devices to your applications
- All-in-one gateway.
- Wireless or wired devices.
- Simple commissioning and operation.
- Edge or Cloud architectures.

PowerLogic Voltage Detection

PowerLogic Voltage Detection and Indicating System (VDIS) in compliance with IEC 62271-213:2021
- 35 references available to adapt to all applications
- Voltage Output option to provide Voltage signal to Flair 2xD / VD23 or T300 SC150 module through an adapter

PowerLogic Partial Discharge sensor

PowerLogic PD100 monitors for all types of partial discharge in switchgear and cable terminations
- Fully integrated sensing based on capacitive coupling
- Requires EcoCare membership for analysis and recommendations

Notes

Range Description

Range Description

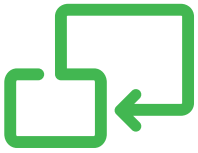
MCSet Solutions

Enhanced Safety

- MCSet cubicles are Internal Arc Classified AFLR up to 50 kA/1s
- Full remote control of circuit breaker and earthing switch operations, avoiding to stand in front of the cubicles
- Mechanical and electrical interlock embedded to address operator safety
- Arc extinguishing solution

Enhanced Reliability

- MCSet is fully compliant with metal enclosed switchgear IEC standards
- It is designed for 30 years life time with respect of installation, operations and environmental conditions
- Clear guided operation with ergonomic operator interface implemented to avoid any misusage
- Design integrating a cradle for the withdrawable devices insuring a perfect connection and match to the busbars



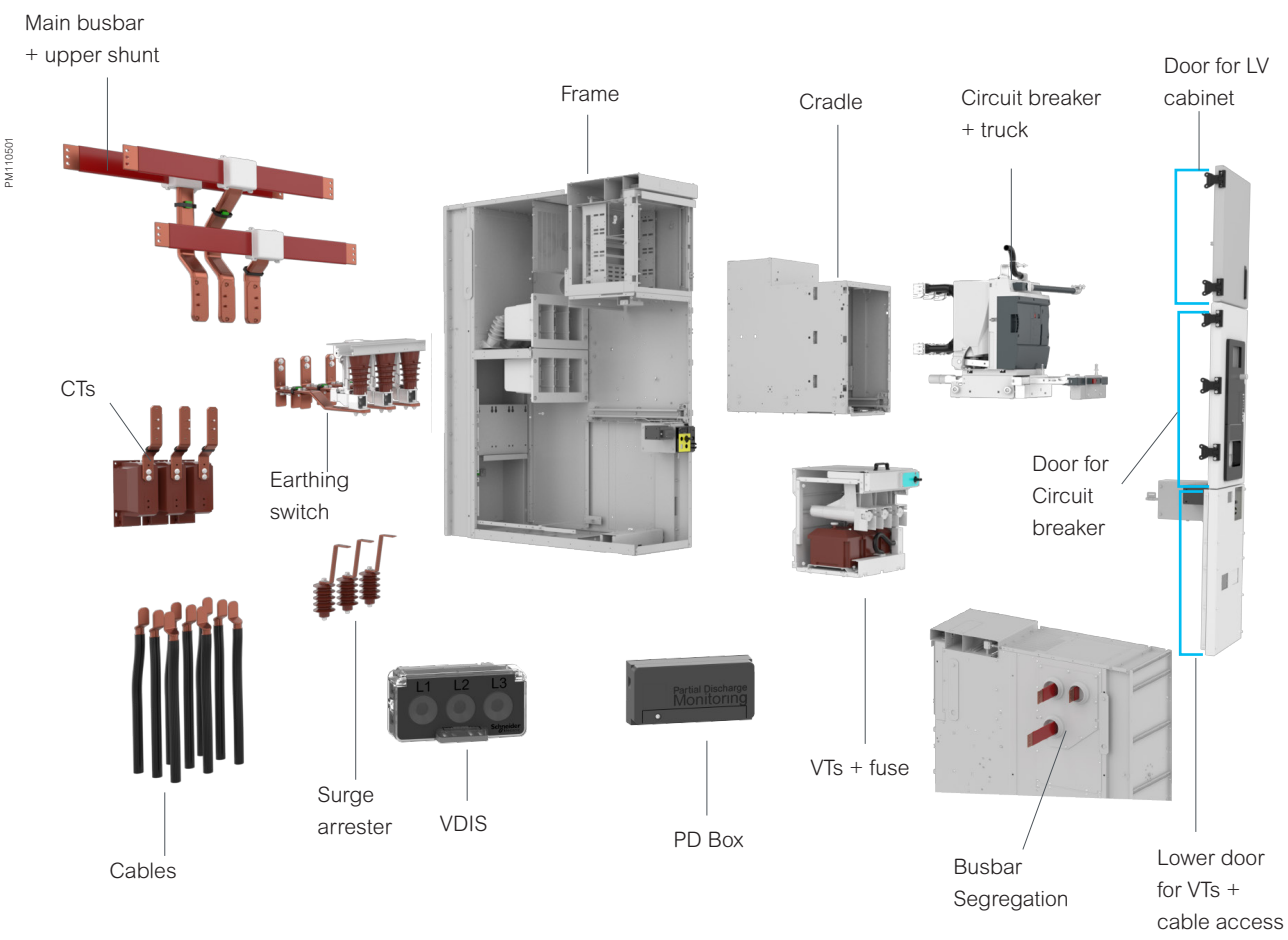
Simplicity

- Installation back to back, connections from bottom or top: MCSet offers a wide array of arrangements
- The breakers can be operated from the front/nearby or remote control
- Fast access to cubicles, breakers, relays documents through QR codes, stored in the digital safe repository

Enhanced Efficiency

- Space savings: the MCSet design allows various functions to be accommodated in very space optimized cubicles: from 570 mm width to 2700 mm height with Internal Arc Protection tunnel (2300 mm height without tunnel), and a managed depth of 1550 mm, MCSet will fit in a variety of environments
- Operating costs savings: thanks to its remote operations management, human intervention are reduced

Description



Description

Make up of an MCSet Switchboard

MCSet switchboards are made up of several interconnected functional units.
Power connections are made between functional units within a switchboard via a single busbar.
The electrical continuity of all metal frames is provided by the connection of each functional units earthing busbar to the switchboards main earthing circuit.
Low voltage wiring trays are provided in the switchboard above the low voltage control cabinets.
LV cables can enter the switchboard through the top or bottom of each functional unit.

Description of a Functional Unit

A functional unit comprises all equipment in the main and auxiliary circuits which together provide a protection function. Each functional unit combines all the components which are required to fulfil this function:

- The cubicle
- The protection, monitoring and control system
- The withdrawable part

The Cubicle

The cubicle is of LSC2B (Loss of Service Continuity Category) type as defined by IEC standard 62271-200, in other words the medium voltage parts are compartmented using metal partitions (PM class) which are connected to earth and which separate:

- The busbars
- The withdrawable part (circuit breaker, fuse-contactor, disconnector truck or earthing truck)
- MV connections, earthing switch, current transformers and voltage transformers as required

MCSet is categorized **LSC2B** in the Loss of Service category defined by the IEC standard 62271-200 with **PM** Partition with Metal guarantees a high level of protection for people. This allows the accessibility of withdrawable part compartment with other compartments like busbar and/or cable compartment to remain energized.
The low voltage auxiliaries and monitoring unit are in a control cabinet separated from the medium voltage section.

Five basic cubicle layouts are offered:

- Incomer or feeder **AD**
- Line up bus-section **CL-GL**
- Busbar metering and earthing **TT**
- Switch-fuse feeder **DI**

AD and **CL** cubicles have withdrawable switching devices.

LSC2B (Loss of Service Continuity IEC 62271-200)

This category defines the possibility of keeping other compartments energized (in service) when opening the main circuit breaker compartment.

Technical Characteristics

PM110502

Normal Operating Conditions According to IEC 62271-200 and IEC 62271-1

Rated voltage						
		Ur	(kV)	7.2	12	17.5
Rated insulation level						
Power frequency withstand voltage 50 Hz - 1 min		Ud	(rms kV)	20	28	38
Lightning impulse withstand voltage 1.2/50 µs		Up	(kV peak)	60	75(1)	95
Rated normal current and maximum short time withstand current(2)						
Functional unit with circuit breaker						
Short time withstand current	Ik max.	Ik/tk	(kA/3 s)	25	25	25
				31.5	31.5	31.5
				40	40	40
				50(3)	50(3)	
Rated current	Ir max. busbar	Ir	(A)	4000	4000	4000
Rated current	Ir CB	Ir	(A)	630	630	630
				1250	1250	1 250
				2500	2500	2500
				3150	3150	3150
				4000(4)	4000(4)	4000(4)
Functional unit with fuse-contactor						
Short time withstand current (prospective value)(6)	Ik max.		(kA)	50(5)	50(5)	
Rated current	Ir max.		(A)	315	200	
Functional unit with switch-fuse combination (DI cubicle)(7)						
Rated current according to the fuses installed, see documentation						
Rated current	Ir max. ≤		(A)	200	200	200
Degree of protection						
IP3X IP4X IPX1 IPX2						

(1) For 12 kV contactor suitable up to 60 kVp.
(2) For functional units equipped with circuit breakers or fuse-contactors, the breaking capacity is equal to the short time withstand current. In all cases, the device peak making capacity is equal to 2.5 times the short time withstand current for 50 Hz and 2.6 times the short time withstand current for the 60 Hz.
(3) Limited to 1 s for in circuit breaker 1250 A.
(4) With fan for forced cooling.
(5) Limited by fuses (prospective value).
(6) In accordance with IEC 62271-106.
(7) According to IEC 62271-105, combinations do not have a rated short time withstand current.

IAC (Internal Arc Classification)

The metal enclosed switchgear may have different types of accessibility on the various sides of its enclosure.

For identification purposes concerning the different sides of the enclosure, the following code shall be used (according to the IEC 62271-200 standard):

- **A**: Restricted access to authorized personnel only. Sides of the enclosure which meet the criteria of the internal arc test.
- **F**: Front side.
- **L**: lateral side.
- **R**: Rear side.

Operating Conditions and Standards

PM106682

Standards

The MCSet meets the following international standards:

- **IEC 62271-1**: High-voltage switchgear and controlgear: common specifications
- **IEC 62271-200**: AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kA
- **IEC 62271-100**: High-voltage switchgear and controlgear - Alternating current circuit breakers
- **IEC 62271-106**: High-voltage switchgear and controlgear - Alternating current contactors, contactor-based controllers and motor-starters
- **IEC 62271-103**: High-voltage switchgear and controlgear - Switches for rated voltages above 1 kV up to and including 52 kV
- **IEC 60282-1**: High-voltage fuses - Current-limiting fuses
- **IEC 62271-102**: High-voltage switchgear and controlgear - Alternating current disconnectors and earthing switches
- **IEC 60255**: Measuring relays and protection equipment - Common requirements
- **IEC 61869-2**: Instrument transformers - Current transformers
- **IEC 61869-3**: Instrument transformers - Inductive voltage transformers
- **IEC 60044-8**: Instrument transformers - Electronic current transformers
- **IEC 61869-11**: Instrument transformers - Part 11: Additional requirements for low power passive voltage transformers
- **IEC 62271-105**: High-voltage switchgear and controlgear - Alternating current switch-fuse combinations

Operating Conditions

Normal operating conditions, according to the IEC International Standards listed below, for indoor switchgear.

Ambient air temperature

- Less than or equal to 40 °C
- Less than or equal to 35 °C on average over 24 hours
- Greater than or equal to -5 °C

Altitude

- Less than or equal to 1000 m
- Above 1000 m, a derating coefficient is applied (contact Schneider Electric))

Atmosphere

- No dust, smoke, or corrosive, or inflammable gas and vapor, or salt

Humidity

- Average relative humidity over a 24 hour period ≤ 95%
- Average relative humidity over a 1 month period ≤ 90%
- Average vapor pressure over a 24 hour period ≤ 2.2 kPa
- Average vapor pressure over a 1 month period ≤ 1.8 kPa

Specific operating conditions (contact Schneider Electric)

MCSet has been developed to meet the following specific conditions:

- High ambient temperature (possible derating)
- Corrosive atmospheres, vibrations, (possible adaptation)
- Optional monitoring of cubicle is available like CL110, and so on.

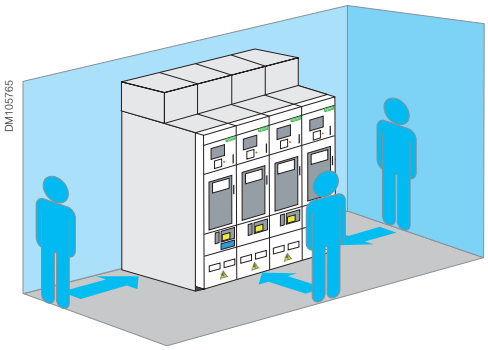
Storage Conditions

In order to retain all of the functional units qualities when stored for prolonged periods, we recommend that the equipment is stored as follows:

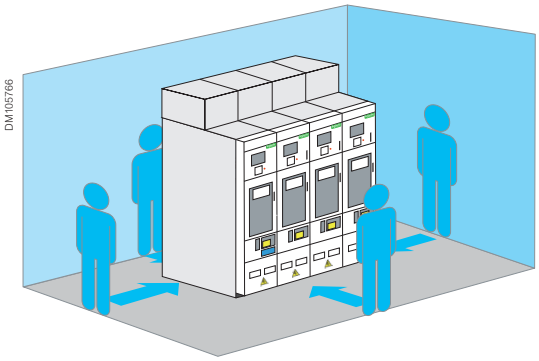
- In its original packaging.
- In dry conditions.
- Sheltered from the sun and rain at a temperature ranging from -25 °C up to +55 °C.

Protection of People

Internal Arc Classification



Internal arc classification IAC: Accessible sides AFL



Internal arc classification IAC: Accessible sides AFLR

IAC	**I**nternal **A**rc **C**lassification
A	Accessibility **A** Restricted to authorized personnel only
F	**F**ront side
L	**L**ateral side
R	**R**ear side
50 kA	Arc fault current **50 kA**
1 s	Arc fault duration **1 s**

Example of MCSet with internal arc classification IAC

Internal Faults Causing Internal Arcs

- Due to its design, the MCSet switchgear has the high level of service continuity:
  - No sources of interference due to external influence during operation
  - In accordance with IEC/EN 62271-200, avoiding internal arcs has top priority
  - The IEC/EN 62271-200, Table 2, recommendations include the use of gas-insulated switchgear as a preventive measure to avoid faults due to dirt, moisture, dust, vermin etc.
- The operating company is free to select a switchgear unit with internal arc classification IAC according to the applicable standards. According to IEC/EN 62271-200, switchgear cubicles with internal arc classification should only be used if the operating company considers it essential to prevent the risk of danger to life due to internal arcs.

Internal Arc Classification

- The internal arc classification IAC provides a verified level of operator safety in the immediate vicinity of the switchgear under normal operating conditions.
- The internal arc classification is an option in accordance with IEC 62271-200 and EN 62271-200. It refers to the effect of internal excess pressure on covers, doors, inspection ports, vents etc. Moreover, the thermal effects of the internal arc and its roots on the enclosure and escaping hot gases or incandescent particles are taken into account.
- Metal-enclosed switchgear and controlgear are granted Internal Arc Classification if all the following criterias are met:
  - Criteria No. 1: Correctly secured doors and covers do not open
  - Criteria No. 2: No fragmentation of the enclosure occurs during the arc fault duration
  - Criteria No. 3: Arcing does not cause holes by burning through the classified sides up to a height of 2000 mm
  - Criteria No. 4: Indicators do not ignite due to the effect of hot gases
  - Criteria No. 5: The enclosure remains connected to the earthing point
- Internal arc classification IAC has been conducted successfully.
- As operating and test procedures are performed on the front of the MCSet, access via the front and the side walls is standard (IAC AFL)
  - The switching compartment depth can be minimized by wall-mounting the switchgear
  - In this design, the MCSet switchgear and controlgear does not require a rear assembly aisle. Access, for example, to the cable compartment or the low-voltage cabinet, is only possible via the front
- If the MCSet needs to be installed in the switchgear room with access to the switchgear via the rear side, the switchgear can be provided with additional elements for internal arc classification IAC AFLR (optional)
- Arc flash detection is available (optional).
  - An electromechanical detector: a tripping circuit positioned on the cubicles flap valves transmits the information to the relay which will open the upstream breaker
  - An optic detector (Vamp system): optical sensors detect the light caused by arcing initiation, which opens the upstream breaker

Specific Applications

GOST Conformity
(MCSet till 12 kV)

The GOST conformity system applies to most of the products sold and used according to Russian standards.

As far as electrical equipment is concerned, this conformity applies when the equipment is used under the following conditions:

- Electrical equipment designed for use in an explosive environment and in mines
- Equipment related to the oil and gas industries: prospecting, exploration, refining, transportation, storage
- Equipment used in the chemical and petrochemical industries and considered to be potentially hazardous because it operates in a toxic, explosive and aggressive environment
- Electrical heating equipment is used to produce ferrous and non-ferrous metal casting

PM106684

This certification follows the Russian standards:

- GOST 2.601-95
- PB 03-576-03
- PB 03-584-03

The entire MCSet range meets the GOST certification requirements.

Nuclear

PM106685

The medium voltage electrical distribution switchgear in a nuclear power station must meet the most stringent requirements.

Schneider Electric has more than 40 years of experience in this area is at your disposal via our range of MCSet.

Certified by the chief nuclear standards (IEC), our MCSet range provides you with:

- Optimized personal safety
- Solidity of electrical and mechanical solutions
- Switchgear that is subjected to various tests, such as:
  - Seismic
  - Electrodynamic
  - Switch-off
- Compact cubicles

Seismic Areas

MCSet meet international seismic specifications IEC/TS 62271-210.
MCSet tested up to the seismic level of 1 g and severity level 2.
Test procedures follow the IEC 60068-3-3 standard.

MCSet meet the requirement of the following documents:

- UBC 97
- IBC 2000
- MSK 64
- ENDESA
- EDF HN.20.E53

Marine Applications

PM106686

A Marine version has been developed to meet specific conditions when used on ships or offshore platforms (vibrations/impacts, slant, etc.).

This version carries over the electrical and dimensional characteristics of the standard range, adapted to marine requirements:

- PM (partition class) compartmented cubicle (LSC2B type)
- Front access
- Withdrawable circuit breaker
- Easergy protection and control chain
- Internal arc withstand
- Thermal + environment diagnosis (optional)

Marine performances are achieved with EasyPact breaker (vacuum) and LF breaker (SF6).

PM110503

Environmental Conditions

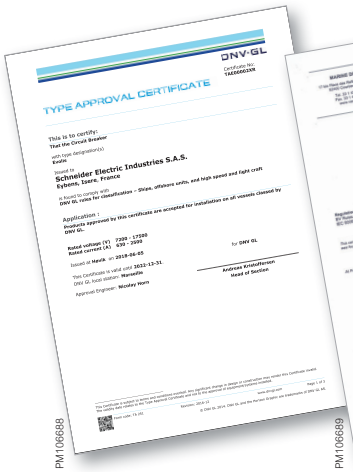
Ambient temperature		-5 to +40 °C(1)
Humidity	On 24 h	95%
	On 1 month	90%
Vibrations (IEC 60068-2-6)	**Frequency range**	
	2 to 13.2 Hz	1 g
	13.2 to 100 Hz	0.7 g

(1) For higher temperature contact Schneider Electric.

Note: For specific certification request, contact Schneider Electric.

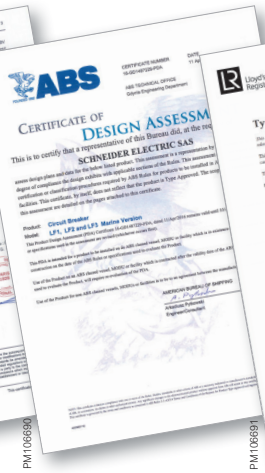
PM106687

PM106688

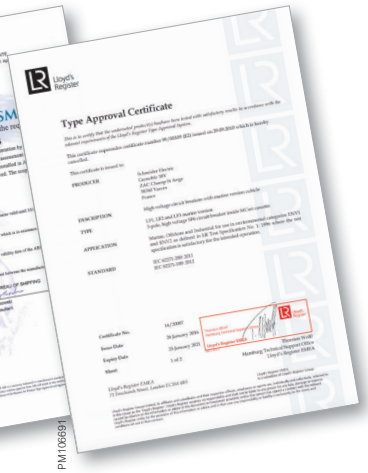


PM106689

PM106690



PM106691



LR Type Approval Certificate

Marine Applications

PM106692

PM106693

PM106694

MCSet Suitable for Marine Requirements

- Internal arcing withstand is ensured by the use of a tunnel specifically designed for marine applications. Located above the cubicle, it can evacuate gases due to arcing effects
- A low voltage control cabinet has also been designed to meet the need for using numerous control and monitoring systems and LV components
- The cubicles are provided with switchgear employing SF6 or vacuum technologies
- The incoming/outgoing feeder cubicles are connected by cables through the bottom
- Skids are available as an option to group together several cubicles on a platform for improved rigidity and to absorb vibrations through the use of dampers They also facilitate handling and installation of the switchboard.

MCSet is the solution to the specific needs and requirements of a Marine environment:

- Performances
  - from 25 to 31.5 kA, with a compact tunnel
  - from 40 to 50 kA, with a standard tunnel
  - internal arc withstand up to 1 s
- Compactness: MCSet marine has been designed to meet the space constraints (clearance under ceiling) that are sometimes indispensable

Rated voltage (kV)			
	7.2	12	17.5
Rated insulation level			
Power frequency withstand voltage 50 Hz - 1 min (rms kV)	20	28	38
Lightning impulse withstand voltage 1.2/50 µs (kV peak)	60	75	95

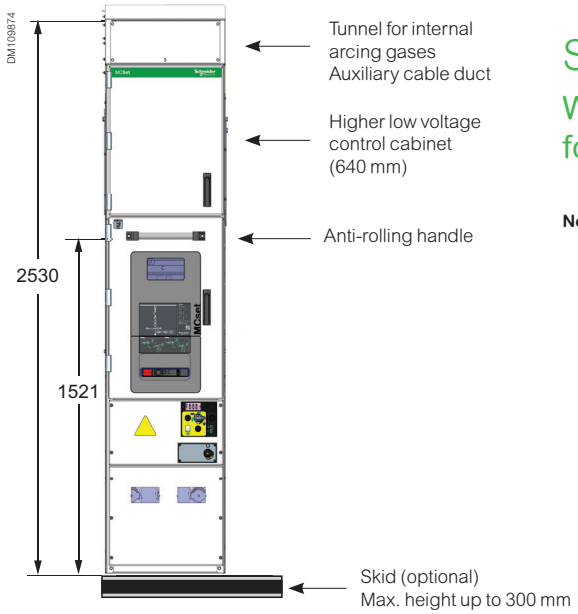
MCSet switchboard for Marine

PM110504

Marine applications

Maximum performance for MCSet with specific marine design:

- Higher LV cabinet and compact tunnel
- For a total height including tunnel of 2530 mm



MCSet switchgear for Marine

Specific Design

Higher LV cabinet and compact tunnel (2530 mm total height)

Note: Refer Technical details from "Functional Overview", page 36 section.

Standard Design

With Marine specificities (anti-rolling features, handle) for a total height of 2730 mm

Note: Refer Technical details from "Functional Overview", page 36 section.

Function/Module Description

Function/Module Description

Functional Overview

Choice of Functional Units

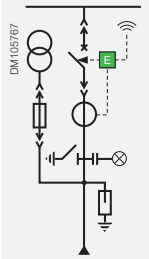
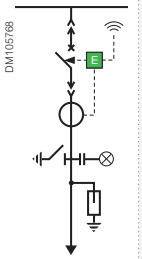
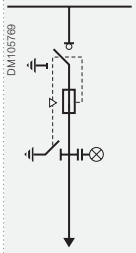
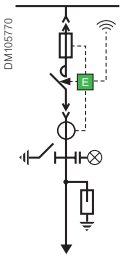
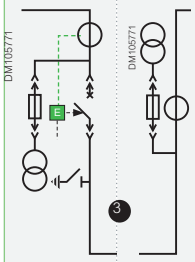
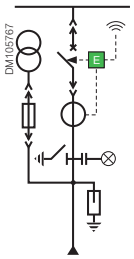
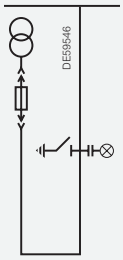
MCSet has a comprehensive range of functions to suit all requirements for many applications.

The table below can be used to link requirements to functional units and gives basic information on the general composition of each unit.

Selection Guide

For example:
You want to supply power to a transformer:
The chosen solution is a **transformer feeder/breaker.**
The corresponding functional unit will therefore a **AD cubicle**.
The main functions of the equipment are shown below.

Additional functions are available upon request to answer specific requirements.

Function	Incomer 1	Feeder			Bus sectioning			Metering and Busbar earthing
	Line / Transformer / Generator	Line / Transformer / Motor / Capacitor	Transformer	Motor / Capacitor	Switchboard		Substation	
Cubicle	AD 1-2-3	AD 1-2-3	DI 2	MCSet M1 2	CL 1-2-3	GL 1-2-3	AD 1-2-3	TT 1-2
Device	Circuit breaker	Circuit breaker	Fuse-switch	Fuse contactor	Circuit breaker		Circuit breaker	
Single line diagrams								

E Easergy relay

1 The direct incomer (functional unit without circuit breaker, equipped with a fixed busbar bridge) is produced using cubicles AD1-2-3 for Ur up to 17.5 kV.

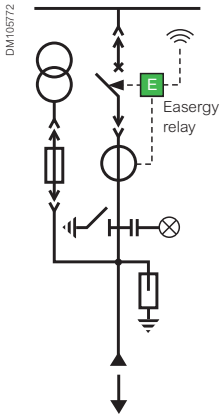
2 The Bus earthing device cannot be installed in the contactor cubicle.

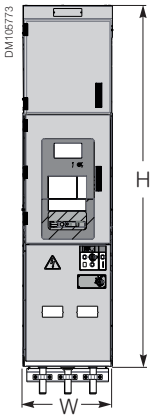
3 VTs or Earthing switch cannot be installed at the same time. In case a busbar earthing switch is required, the TT cubicle should be selected.

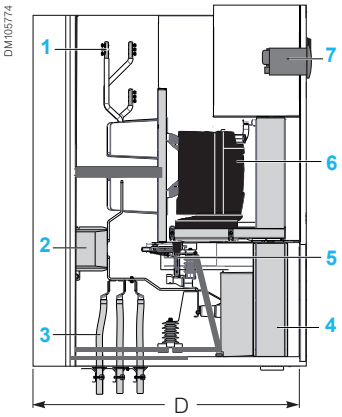
Functional Overview

AD Type Cubicles–Incomer or Feeder

AD1, AD2, and AD3







MV devices

1 Busbars for cubicle interconnection
2 Current transformers
3 MV connections by bottom cables accessible from the front (for top cable and top busbar entry, contact Schneider Electric)
4 Voltage Transformers (optionally equipped with withdrawable fuses)
5 Earthing switch
6 Main switching device

Note: For feeder function, no need of the VT device.

LV control cabinet

7 Low voltage auxiliaries and the protection, monitoring and control units are in one control cabinet which is separated from the medium voltage part

Function/Module Description

Functional overview

AD Type Cubicles–Incomer or Feeder

		AD1						M1		AD2								
Rated voltage (kV)		**7.2**			**12**			**7.2**	**12(1)**	**7.2**				**12**			**17.5**	
Breaking capacity (kA)		25	31.5	50 (2)	25	31.5	50 (2)	50 (2)	50 (2)	25	31.5	40	50	25	31.5	40	25	31.5
Rated current (A)																		
EasyPact EXE circuit breaker	630	●	●		●	●											●	●
	1250	●	●		●	●											●	●
	2000														●			
	2500																	
CVX contactor	315							●										
	200								●									
LF circuit breaker	630	●	●		●	●						●	●(3)			●	●	●
	1250	●	●		●	●				●	●	●	●(3)			●	●	●
	1600									●	●	●	●(3)	●	●	●	●	●
	2500																	
	3150																	
	4000(4)																	
Rollarc contactor	200			●			●											
	250			●														
Short-circuit making current Ip (peak value kA)	50 Hz	63	79		63	79						100	125		79	100	63	79
	60 Hz	65	82		65	82						104	130		82	104	65	82
Dimensions (mm)	H	2300						2300		2300								
	W	570						400		700								
	D(5)	1550						1725		1550								
Approximate weight (kg)(6)		850						600		1000								

		AD3											
Rated voltage (kV)		**7.2**				**12**				**17.5**			
Breaking capacity (kA)		25	31.5	40	50	25	31.5	40	50	25	31.5	40	50
Rated current (A)													
EasyPact EXE circuit breaker	630												
	1250												
	2000												
	2500	●	●			●	●			●	●		
CVX contactor	315												
	200												
LF circuit breaker	630												
	1250								●(3)			●	
	1600												
	2500	●	●	●	●(3)	●	●	●	●(3)	●	●	●	
	3150	●	●	●	●(3)	●	●	●	●(3)	●	●	●	
	4000(4)	●	●	●	●(3)	●	●	●	●(3)	●	●	●	
Rollarc contactor	200												
	250												
Short-circuit making current Ip (peak value kA)	50 Hz	63	79	100	125	63	79	100	125	63	79	100	125
	60 Hz	65	82	104	130	65	82	104	130	65	82	104	130
Dimensions (mm)	H	2300											
	W	900											
	D(5)	1550											
Approximate weight (kg)(6)		1300–1700											

(1) For impulse voltage of 60 kVp.

(2) Fault current limited by fuses: prospective current value in accordance with IEC 62271-106.

(3) Rated short circuit breaking duration (tk): 1 s.

(4) With fan.

(5) Overall + 175 mm for 4-sided internal arcing protected switchboards (AFLR), for 3150 A/4000 A and/or 2 sets of CTs.

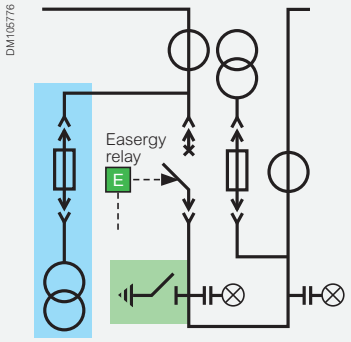
(6) Fully equipped cubicle.

Function/Module Description

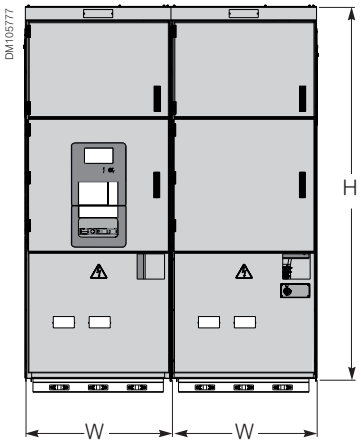
Functional Overview

CL–GL Type Cubicles/ Line-up Bus-sectioning

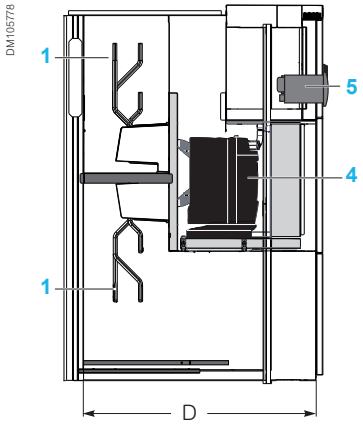
The bussectioning functional unit comprises 2 cubicles mounted side by side (one cubicle equipped with a circuit breaker, the other with a busbar return).



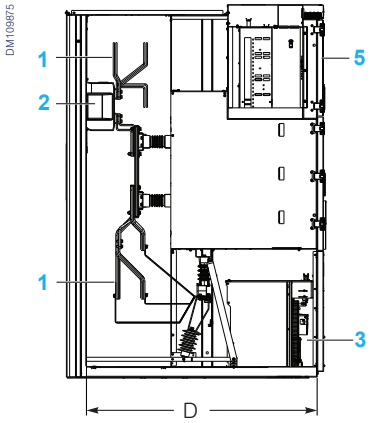
Option for customer to choose:
- VTs (blue) OR Earthing switch (green)



CL1, CL2, CL3



GL1, GL2, GL3



MV devices

1 Busbars to connect the bus-sectioning functional unit with other switchboard functional units
2 Current transformers
3 Voltage Transformers (optionally equipped with withdrawable fuses)
4 Main switching device

LV control cabinet

5 Low voltage auxiliaries and the protection, monitoring and control units are in one control cabinet which is separated from the medium voltage part

Functional overview

CL–GL Type Cubicles/ Line-up Bussectioning

		CL1+GL1						CL2+GL2									CL3+GL3											
Rated voltage (kV)		7.2			12			7.2				12			17.5		7.2				12				17.5			
Breaking capacity (kA)		25	31.5	50 (1)	25	31.5	50 (1)	25	31.5	40	50	25	31.5	40	25	31.5	25	31.5	40	50	25	31.5	40	50	25	31.5	40	50
Rated current (A)																												
EasyPact EXE circuit breaker	630	●	●		●	●									●	●												
	1250	●	●		●	●									●	●												
	2500																●	●			●	●			●	●		
LF circuit breaker	630	●	●		●	●				●	●			●	●	●												
	1250	●	●		●	●		●	●	●	●			●	●	●								●			●	
	1600							●	●	●	●	●	●	●	●	●												
	2500																●	●	●	●	●	●	●	●	●	●	●	
	3150																●	●	●	●	●	●	●	●	●	●	●	
	4000(2)																●	●	●	●	●	●	●	●	●	●	●	
Rollarc contactor	200			●			●																					
	250			●																								
Short-circuit making current Ip (peak value kA)	50 Hz	63	79		63	79				100	125			100	63	79	63	79	100	125	63	79	100	125	63	79	100	125
	60 Hz	65	82		65	82				104	130			104	65	82	65	82	104	130	65	82	104	130	65	82	104	130
Dimensions (mm)	H	2300								2300							2300											
	W	2* 570								2* 700							2* 900											
	D	1550								1550							1550											
Approximate weight (kg)(3)		1500								1800							2200–2500											

(1) Overall + 175 mm for 4-sided internal arcing protected switchboards (AFLR).

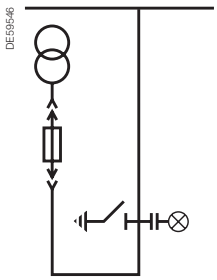
(2) With fan.

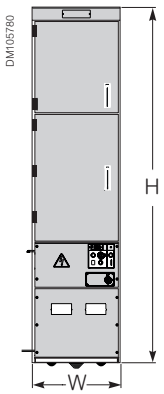
(3) Fully equipped cubicle.

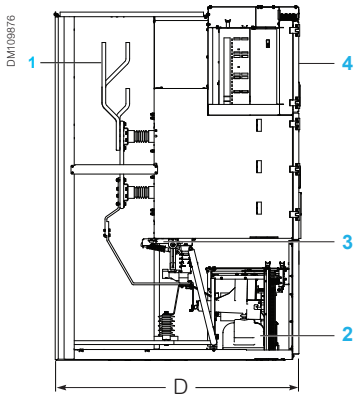
Functional Overview

TT Type Cubicles Metering/Busbar Earthing

TT1-2







MV devices

1 Busbars to connect the TT functional unit with other switchboard cubicles
2 Voltage Transformers (optionally equipped with withdrawable fuses)
3 Earthing switch

LV control cabinet

4 Low voltage auxiliaries and the protection, monitoring and control units are in one control cabinet which is separated from the medium voltage part

Characteristics			TT1		TT2		
Rated voltage	kV		7.2	12	7.2	12	17.5
Insulation voltage	kV power frequency 50 Hz - 1 min		20	28	20	28	38
	kV lightning impulse 1.2/50 µs		60	75	60	75	95
Short time withstand current		kA rms 3 s	31.5	31.5	50	40	40
Dimensions	mm	H(1)	2300		2300		
		W	570		700		
		D(2)	1550		1550		
Approximate weight	kg		500		550		

(1) Without tunnel.

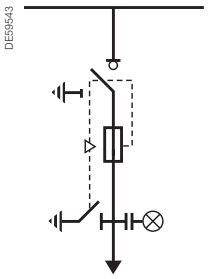
(2) Overall + 175 mm for 4-sided internal arcing protected switchboards (AFLR).

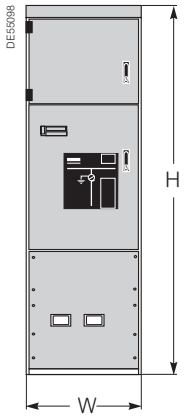
Function/Module Description

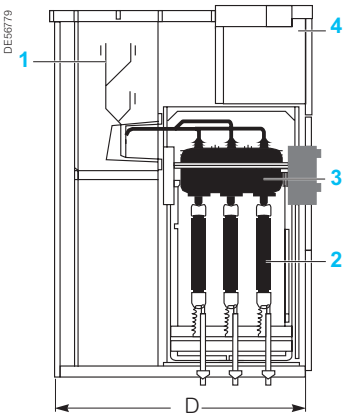
Functional Overview

DI Type Cubicles
Fuse-Switch Feeder

DI2







MV devices

1 Busbars to connect the DI functional unit with other switchboard cubicles
2 MV fuses
3 Switch - earthing switch

LV control cabinet

4 Low voltage auxiliaries and the protection, monitoring and control units are in one control cabinet which is separated from the medium voltage part

All functional interlocks meet recommendations in IEC 62271-200:

- The switch is only possible to close if the earthing switch is open and the connection access cubicle is in place
- Closing of the earthing switch is only possible if the switch is open
- Opening of the access cubicle to medium voltage connections and fuses is only possible when the earthing switches upstream and downstream of the fuses are closed
- The switch is locked in the open position when the access panel is taken off
- The voltage presence indicator is situated on the front face of the functional unit, integrated in the switches control cubicle

Characteristics					DI2		
Rated voltage				kV	7.2	12	17.5
Insulation level	Insulation	Ud	50/60 Hz 1 min	kV rms	20	28	38
	Isolation	Ud	50/60 Hz 1 min	kV rms	23	32	45
	Insulation	Up	1.2/50 µs	kV peak	60	75	95
	Isolation	Up	1.2/50 µs	kV peak	70	85	110
Rated current			200	A	●	●	●
Short time withstand current				kA rms 1 s(1)	25	25	20
Dimensions	mm			H(2)	2300		
				W	700		
				D(3)	1550		
Approximate weight	kg				640		

DI cubicles including a switch-fuse are used to supply power and protect low power transformers.
For example, Auxiliary service transformers in primary substations.

(1) Limited by fuses.
(2) Without tunnel.
(3) Overall + 175 mm for switchboard internal arcing four sides (AFLR).

Notes

Components and Accessories

Components and Accessories

Safety and Protection of Persons and Property

Safety and Protection of Persons and Property

The devices used to equip the MCSet range of functional units have outstanding features:

- Long service life
- Maintenance-free live parts
- High electrical endurance
- Operating safety
- Insensitivity to the environment

The Withdrawable Parts

PM106461

- The circuit breaker, the contactor, the disconnector truck or the earthing truck
- The lever-type propulsion mechanism for racking in-out
- Interlocks to fix the withdrawable parts onto the fixed part

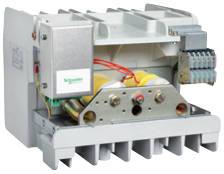
Circuit breaker

A circuit breaker is a safety device enabling switching and protection of electrical distribution networks. Installed in the MCSet cubicle, it protects all components situated downstream during a short-circuit.

- Vacuum breaking: **EasyPact EXE**
- Breaking in SF6: **LF**

PM106697

PM103784



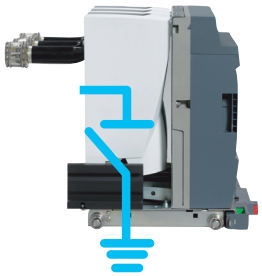
Contactor

The contactor is a motor control and protection device.

- Vacuum breaking: **CBX**
- Breaking in SF6: **Rollarc***

* All accidental overpressure would be limited by the safety disk opening.

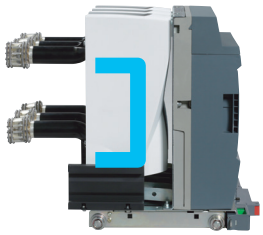
PM106696



Earthing Device

The earthing device is a safety feature which allows the cubicle busbar to be earthed. It is installed instead of the circuit breaker and has the same interlock possibilities.

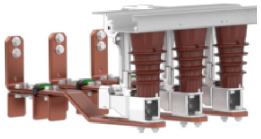
PM105381



Disconnector Device

The disconnector device enables the upper and lower part of the cubicle to be short-circuited. It is installed instead of the circuit breaker and has the same interlock possibilities.

PM110772



Earthing Switch

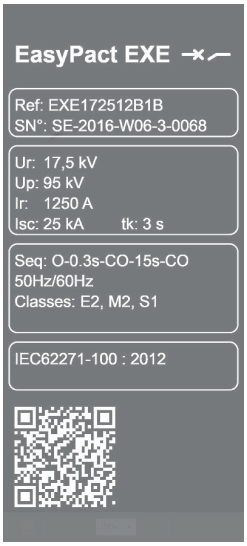
The earthing switch earths the main current paths with a fast closing mechanism in accordance with IEC 62271-102.
Optional - Motorized operation.

EasyPact EXE Circuit Breaker

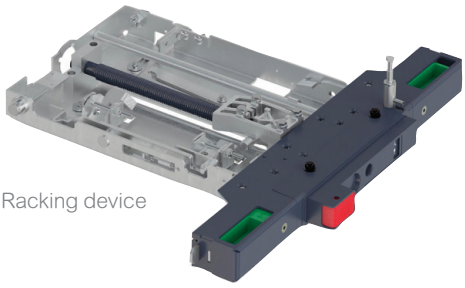
General Characteristics

PM106400

PM106412



PM106402



Racking device

EasyPact EXE is our latest range of state of the art vacuum circuit breaker. Its design is the result of more than 40 years of Schneider Electric experience in switching devices. Its wide geographical deployment makes it a key component of MCSet equipment.

It has been designed to suit particularly applications such as: Infrastructure, commercial and Industrial Buildings, Industrial plants, Distribution sub-stations.

The materials used to manufacture this circuit breaker have been selected and designed to operate 10,000 cycles.

Mechanism

The operating mechanism gives the device an opening and closing speed that is independent of the operator whether the order is electrical or manual. It carries out reclosing cycles and it is automatically recharged by a geared motor after each closing.

Vacuum Interrupter

This component is the heart of the circuit breaker. The very careful Schneider Electric own design allows to break the rated short-circuit current and this is achieved by:

- Choosing materials that are specifically selected for this application (metals and ceramics)
- Choosing an appropriate assembly process (vacuum, high temperature brazing)
- The use of a **getter** material to absorb the residual gas inside the enclosure

Racking Device

The racking device moves the circuit breaker from the disconnected position to the service position and vice versa.

A motorized version of the truck allows to remotely rack-in and rack-out the circuit breaker.

This feature greatly enhances the safety operation of the switchboards.

EasyPact EXE racking device has a robust interlocking system with the switchgear door, the LV plug, the circuit breaker and the earthing switch.

The materials used to manufacture EasyPact EXE racking trolley sub-assemblies have been selected and designed to operate 2000 cycles under the conditions defined by the IEC standard.

According to IEC 62271-100			
Rated voltage	Ur	kV	12
			17.5
Rated frequency	fr	Hz	50/60
Rated short duration power frequency withstand voltage	Ud	kV	28
			38
Rated lightning impulse withstand voltage	Up	kV	75
			95
Rated short-circuit breaking current	Isc	kA	20
			25
			31.5
Rated duration of short-circuit	tk	s	3

EasyPact EXE Circuit Breaker

General Characteristics

PM105982

According to IEC 62271-100: 2012

Common characteristics		12 kV	17.5 kV
Rated short-time withstand current (Ik/tk)	kA/3 s (50/60 Hz)	= Isc	= Isc
Rated operating sequence	O-3 min - CO-3 min - CO	•	•
	O-0.3 s - CO-3 min - CO	•	•
	O-0.3 s - CO-15 s - CO	•	•
Operating times	Opening	< 50 ms	< 50 ms
	Breaking	< 66 ms	< 66 ms
	Closing	< 71 ms	< 71 ms
Electrical endurance		E2	E2
Rated line-charging breaking current		10-C2	10-C1
Rated cable-charging breaking current		25-C2	31.5-C1
Rated single capacitor bank breaking current	A-class at 1250 A 25 kA	400-C2	400-C1(1)
	A-class at 1250 A 31.5 kA	400-C1	400-C1(1)
Back to back capacitor switching for 31.5 kA		400-C2	

(1) Contact your Schneider Electric sales representative for more information.

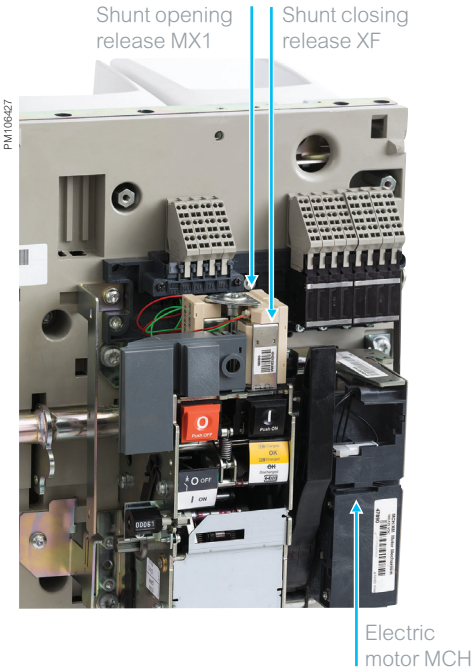
Mechanical Endurance

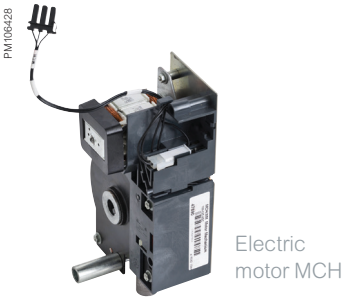
EasyPact EXE installed in normal service condition and with preventive maintenance program is designed up to:

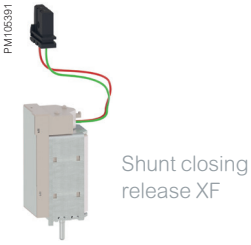
Mechanical endurance	
Circuit breaker	M2 (IEC 62271-100: 2012) 10,000 operating cycles
Racking trolley (disconnecting functions)	M1 (IEC 62271-102: 2018) 2000 operating cycles
MCH motor	10,000 charging operations
MX/XF, MN releases	10,000 operations

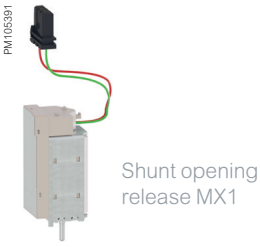
EasyPact EXE Circuit Breaker

Remote Control Mandatory Auxiliaries









The remote control auxiliaries comprises an electric motor (MCH) a shunt closing release (XF), and a shunt opening release (MX1)

Electric Motor (MCH)

The electric motor operates to charge the closing spring as soon as it is connected to the auxiliary power supply. This allows the circuit breaker to close after opening according to the rated operating sequence.
A lever is located on the front of the circuit breaker that enables the closing spring to be charged manually if the auxiliary power supply is unavailable.
The electric motor is equipped with an electrical contact to indicate the «spring charged» status of the mechanism.
The electric motor includes a gear reducer.

Characteristics	
Power supply	• DC: 24–30 V, 48–60 V, 110–130 V, 200–250 V • AC (50 Hz/60 Hz): 48–60 V, 100–130 V, 200–240 V
Operating range	0.85 to 1.1 U_a
Consumption (VA or W)	180
Motor overcurrent	2 to 3 In for 0.1 s
Charging time	≤7 s
CH contact	10 A/240 V

Shunt Closing Release (XF)

A shunt closing release operates to close the circuit breaker when the voltage at the terminals of the release is between 85% and 110% of its rated voltage. The closing release is designed to withstand permanent power supply.

Characteristics		
Power supply	• DC: 24–30 V, 48–60 V, 100–130 V, 200–250 V • AC (50 Hz/60 Hz): 24 V, 48 V, 100–130 V, 200–250 V	
Operating range		0.85 to 1.1 U_a
Consumption (VA or W)	Triggering	200 (for 200 ms)
	Latched	4.5

Shunt Opening Release (MX1)

A shunt opening release operates to open the circuit breaker when the voltage at the terminals of the release is between 70% and 110% (in the case of direct current)- or between 85% and 110% (in the case of alternative current)- of its rated voltage. The opening release is designed to withstand permanent power supply and to lock the circuit breaker in the «open» position as long as the voltage is maintained at its terminals.

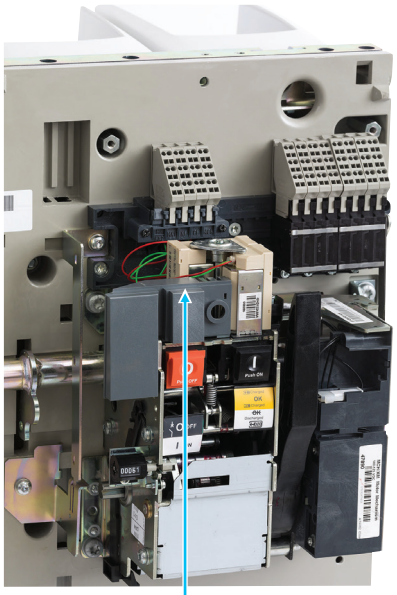
Characteristics		
Power supply	• DC: 24–30 V, 48–60 V, 100–130 V, 200–250 V • AC (50 Hz/60 Hz): 24 V, 48 V, 100–130 V, 200–250 V	
Operating range	• DC: 0.7 to 1.1 U_a • AC: 0.85 to 1.1 U_a	
Consumption (VA or W)	Triggering	200 (for 200 ms)
	Latched	4.5

EasyPact EXE Circuit Breaker

Remote Control Optional Auxiliaries

EasyPact EXE can be equipped with a second opening release that can be either a shunt opening release or an undervoltage release.

PM106427



Shunt opening release MX2 or Under voltage release MN

Second Shunt Opening Release (MX2)

The second shunt opening release operates to open the circuit breaker when the voltage at the terminals of the release is between 70% and 110% (in the case of direct current)- or between 85% and 110% (in the case of alternative current)- of its rated voltage.

The opening release is designed to withstand permanent power supply and to lock the circuit breaker in the **open** position as long as the voltage is maintained at its terminals.

Characteristics		
Power supply	• DC: 24–30 V, 48–60V, 100–130 V, 200–250 V • AC (50 Hz/60 Hz): 24 V, 48 V, 100–130 V, 200–250 V	
Operating range	• DC: 0.7 to 1.1 U_a • AC: 0.85 to 1.1 U_a	
Consumption (VA or W)	Triggering	200 (for 200 ms)
	Latched	4.5

Undervoltage Release (MN)

The undervoltage release operates to open the circuit breaker when the voltage at the terminals of the release falls below 35% of its rated voltage, even if the fall is slow and gradual.

The undervoltage release does not operate the circuit breaker when the voltage at its terminals exceeds 70% of its rated supply voltage. The area between 35% and 70% is uncertain, and the undervoltage release might operate to open the circuit breaker.

The closing of the circuit breaker is possible when the voltage at the terminals of the release is equal to or exceeds 85% of its rated voltage. On the other hand, the closing of the circuit breaker is impossible as long as the voltage at the terminals is below 35% of the rated supply voltage.

Characteristics		
Power supply	• DC: 24–30 V, 48–60 V, 100–130 V, 200–250 V • AC (50 Hz/60 Hz): 24 V, 48 V, 100–130 V, 200–250 V	
Operating range	Opening	0.35 to 0.7 U_a
	Closing	0.85 U_a
Consumption (VA or W)	Triggering	200 (for 200 ms)
	Latched	4.5

PM105391

Shunt opening release MX2

PM105391

Undervoltage release MN

EasyPact EXE Circuit Breaker

Remote Control Optional Auxiliaries

Undervoltage Release (MN2)

The undervoltage release operates to open the circuit breaker when the voltage at the terminals of the release falls below 35% of its rated voltage, even if the fall is slow and gradual.
The undervoltage release does not operate the circuit breaker when the voltage at its terminals exceeds 70% of its rated supply voltage. The area between 35% and 70% is uncertain, and the undervoltage release might operate to open the circuit breaker.
The closing of the circuit breaker is possible when the voltage at the terminals of the release is equal to or exceeds 85% of its rated voltage. On the other hand, the closing of the circuit breaker is impossible as long as the voltage at the terminals is below 35% of the rated supply voltage.

Characteristics		
Power supply	• DC: 24–30 V, 48–60 V, 100–130 V, 200–250 V • AC (50 Hz/60 Hz): 24 V, 48 V, 100–130 V, 200–250 V	
Operating range	Opening	0.35 to 0.7 U_a
	Closing	0.85 U_a
Consumption (VA or W)	Triggering	200 (for 200 ms)
	Latched	4.5

Mechanism Blocking Coil (MN2) Release Combination Table

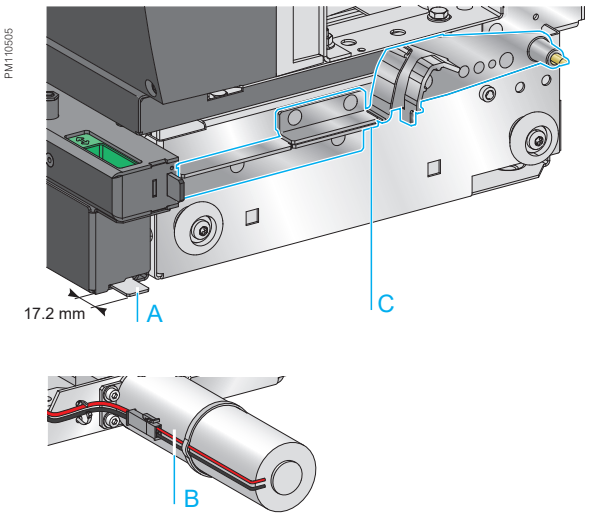
MCH	•	•	•
XF	•	•	•
MX1	•	•	•
MX2		•	
MN			•
MN2	•	•	•

Customization Flexibility

EasyPact EXE Circuit Breaker

Remote Control Optional Auxiliaries

Front View of Circuit Breaker



A Earthing Switch connection interlock
B Racking device motor (option)
C Shutter ramp

Electrical Control

In order to use the electrical control functions, either local or remote, the remote control auxiliaries with associated pushbutton and commutators must be installed.
The table below shows the possible configurations for electrical control of the device.

Charging devices		Closing release	Opening releases			Low energy release			Racking device motorization	Electro magnet padlocking
MCH	PF	XF	MX1	MX2	MN	MITOP	RESET	SDE		
■	■	■	■			Optional			Optional	Optional
■	■	■	■	■		Optional			Optional	Optional
■	■	■	■		■	Optional			Optional	Optional

EasyPact EXE Circuit Breaker

Remote Control Indication Auxiliaries

PM106429

Rotary type
contacts (OC)

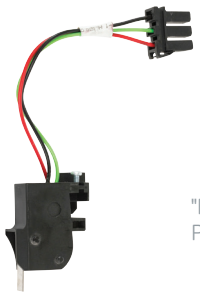
Position Contacts (OC)

EasyPact EXE is equipped with one block of four position contacts as standard, and the Panel Builder may add one or two additional blocks of four contacts.
The maximum number of position contacts is twelve.

Characteristics			
Standard delivery	1 (1 block of 4 contacts)		
Maximum quantity	3 (3 blocks of 4 contacts)		
Breaking capacity (A)	Standard		Min. load: 100 mA/24 V
Cos φ: 0.3	Vac	240/380	10/6
	Vdc	24/48	10/6(1)
		125	10/6
		250	3

(1) Standard contacts: 10A; optional contacts: 6A (temperature derating)

PM106430



"Ready to close"
PF contact

"Ready to Close" Contact (PF)

A "ready to close" contact (PF) indicates that the circuit breaker is ready to close in the following conditions:

- The circuit breaker contacts are open
- The operating mechanism closing spring is charged
- The opening pushbutton is not activated (by a keylock or manually)
- The opening shunt release is not energized
- The undervoltage release, if present, is energized

EasyPact EXE is always equipped with 1 "ready to close" contact (PF) for remote control.

Characteristics			
Standard delivery	1		
Maximum quantity	1		
Breaking capacity (A)	Standard		Min. load: 100 mA/24 V
Cos φ: 0.3	Vac	240/380	5
	Vdc	24/48	3
		125	0.3
		250	0.15

PM106431

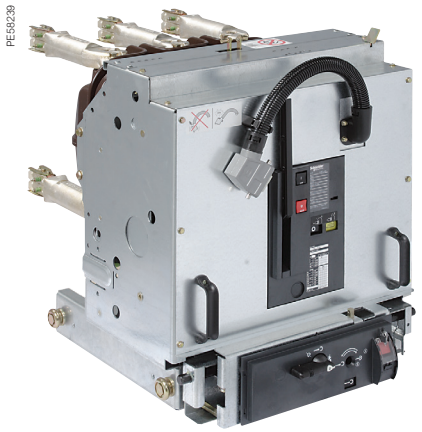
Operation counter
(CDM)

Operation Counter (CDM)

An operation counter counts the number of operating cycles (close-open) that the device has carried out.
EasyPact EXE is always delivered with an operation counter showing the number of close-open cycles that have been performed for the factory routine test (usually 50).

LF Circuit Breaker

Presentation



Description of the Device

The LF circuit breaker consists of:

The circuit breaker unit with its operating mechanism:

- 3 poles integrated in a **sealed pressure system** type insulating enclosure
  The sealed assembly is filled with SF6 gas at low relative pressure (0.15 Mpa/1.5 bars) and equipped with a pressure switch
- An RI stored energy electrical operating mechanism:
  This gives the device an opening and closing speed that is independent of the operator, for both electrical and manual orders. It enables reclosing cycles to be carried out.
- A front cubicle housing the manual operating mechanism and status indicators

The components enabling it to be withdrawable:

- The circuit breaker is equipped with racking arms and contact fingers and mounted on a racking in/out drive device with a threaded shaft activated by a handle, including all of the safety interlock systems
- A Harting-type male LV connector allows connection of the external auxiliary circuits

Each device can optionally be fitted with:

- Locking of the circuit breaker in the following positions:
  - Open, by a key lock installed on the control cubicle
  - Racked out, by a key lock installed on the drive device.

Specific Applications

Protection of generators and power station auxiliaries

All circuit breakers in the LF range break short circuit currents with an asymmetry of at least 30%.

In cases where the network constant X/R is greater than 45 ms, the asymmetry to be broken is higher; this is often the case of circuit breakers protecting nuclear or thermal power station auxiliaries or circuit breakers that are close to generator sets or large transformers.

Specific tests have been carried out:

Circuit breakers	kV	kA	Asymmetry
LF2	7.2	43.5	50%
LF3	7.2	43.5	50%
	12	40	50%
	17.5	25	100%

Switching and protection of capacitor banks

LF range circuit breakers are particularly well suited to switching and protection of capacitor banks; they are classed C2 according to standard IEC 62271-100.

Tests are carried out according to the standard for breaking at 400 A with making and breaking cycles in the case of a capacitor bank with a making current of 20 kA.

Additional tests have been carried out: please contact Schneider Electric.

LF Circuit Breaker

Characteristics in MCSet Cubicles

Electrical Characteristics According to IEC 62271-100

The electrical characteristics are given on the circuit breaker designation (rating plate).

				LF1/MCSet				LF2/MCSet				
Rated voltage	Ur	kV 50/60 Hz		7.2		12		7.2		12	17.5	
Insulation voltage												
- power frequency withstand	Ud	kV 50 Hz 1min(1)		20		28		20		28	38	
- lightning impulse withstand	Up	kV peak		60		75		60		75	95	
Rated current	Ir	A	630	●	●	●	●	●	●	●	●	●
			1250	●	●	●	●	●	●	●	●	●
			1600					●	●	●	●	●
Short circuit current	Isc	kA		25	31.5	25	31.5	40	50	40	25	31.5
Short time withstand current	Ik/tk	kA/3 s		25	31.5	25	31.5	40	50(2)	40	25	31.5
Short-circuit making current	Ip	kA peak	50 Hz	63	79	63	79	100	125	100	63	79
			60 Hz	65	82	65	82	104	130	104	65	82
Rated switching sequence		O-3 min-CO-3 min-CO		●	●	●	●	●	●	●	●	●
		O-0.3 s-CO-3 min-CO		●	●	●	●	●	●	●	●	●
		O-0.3 s-CO-15 s-CO		●	●	●	●	●	●	●	●	●

				LF3/MCSet										
Rated voltage	Ur	kV 50/60 Hz		7.2				12				17.5		
Insulation voltage														
- power frequency withstand	Ud	kV 50 Hz 1min(1)		20				28				38		
- lightning impulse withstand	Up	kV peak		60				75				95		
Rated current	Ir	A	1250	–	–	–	–	–	–	–	●	–	–	●
			2500	●	●	●	●	●	●	●	●	●	●	●
			3150	–	●	●	●	–	●	●	●	●	●	●
			4000(4)	–	–	–	●	–	–	–	●	–	–	●
Short circuit current	Isc	kA peak		25	31.5	40	50	25	31.5	40	50	25	31.5	40
Short time withstand current	Ik/tk	kA/3 s		25	31.5	40	50	25	31.5	40	50(2)	25	31.5	40
Short-circuit making current	Ip	kA	50 Hz	63	79	100	125	63	79	100	125	63	79	100
			60 Hz	65	82	104	130	65	82	104	130	65	82	104
Rated switching sequence		O-3 min-CO-3 min-CO		●	●	●	●	●	●	●	●	●	●	●
		O-0.3 s-CO-3 min-CO		●	●	●	●	●	●	●	●	●	●	–
		O-0.3 s-CO-15 s-CO		●	●	●	●	●	●	●	●	●	●	–

(1) Ud 42 kV 50 Hz, 1 min possible

(2) When In ≤ 1250 A, the rated short-circuit breaking duration (tk): 1 s

(3) For other values, please contact Schneider Electric

(4) With fan:

● Available

– Not available

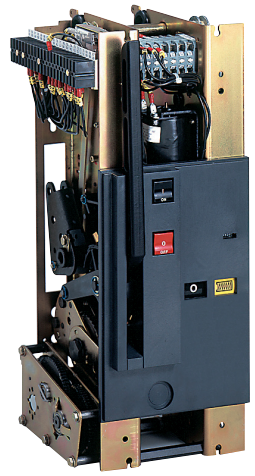
Specific applications according to IEC 62271-100

Operating times		Opening ms	48 ms
		Breaking ms	70 ms
		Closing ms	65 ms
Service temperature	T	°C	–25 to +40
Mechanical endurance		Class	M2
		Number of switching operations	10,000
Electrical endurance		Class	E2
Capacitive current breaking capacity		Class	C2

LF Circuit Breaker

RI Stored Energy Operating Mechanism

PE57164



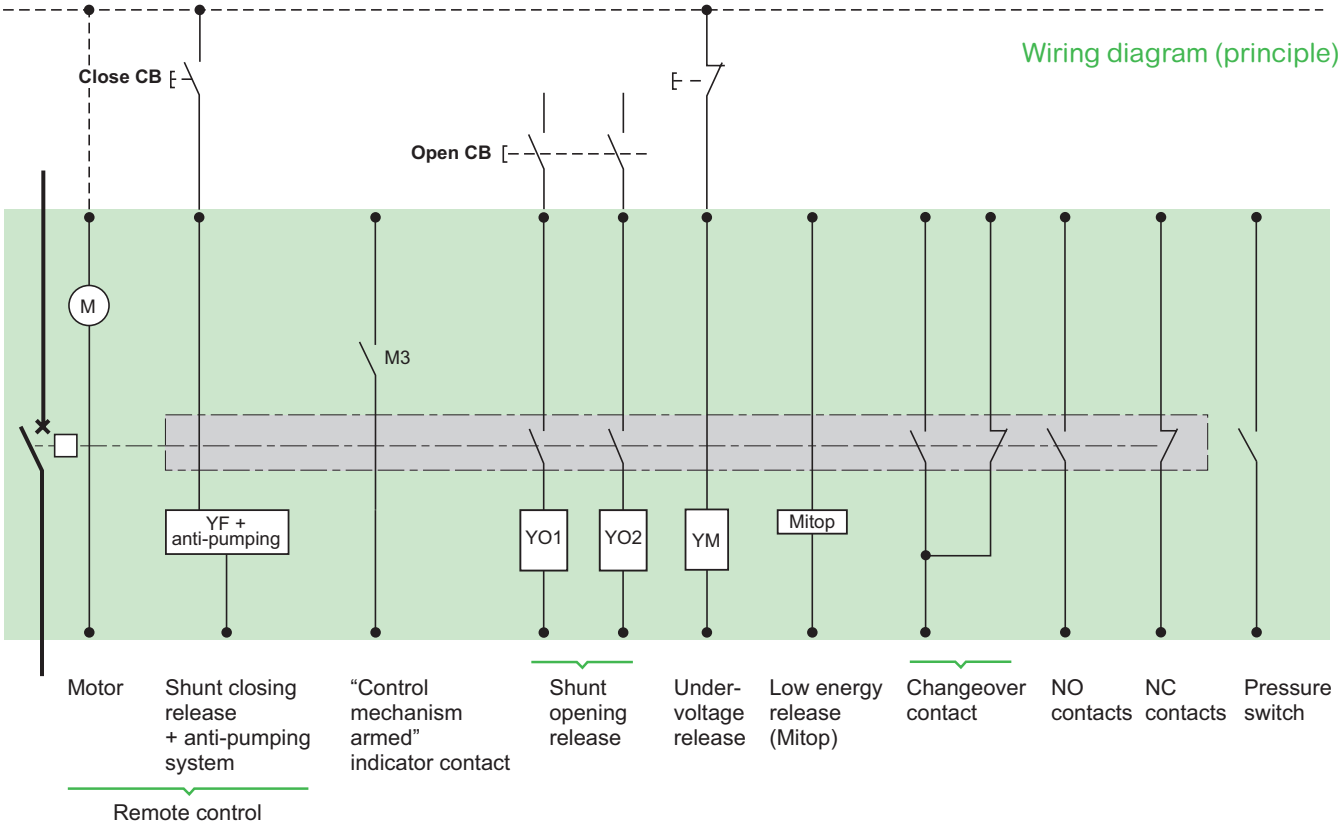
Operation of the RI Stored Energy Operating Mechanism

This gives the device an opening and closing speed that is independent of the operator whether the order is electrical or manual.
The electrical control mechanism performs the reclosing cycles and is automatically recharged by a geared motor each time after closing.
It consists of:

- A stored energy operating mechanism which stores the energy required to open and close the device in the springs
- A manual lever-operated spring arming device
- A geared electrical arming device which automatically re-arms the control mechanism as soon as the circuit breaker is closed (optional)
- Push button manual order devices on the front cubicle of the device
- An electrical remote closing device containing a release with an antipumping relay
- An electrical opening order device consisting of one or several release units which can be of the following type:
  - Shunt opening
  - Undervoltage
  - Mitop, a low consumption release, used only with the Sepam 100 LA protection relay
- An operation counter
- An "open/closed" position indicator device with a mechanical indicator
- A device to indicate the **charged** operating mechanism status via mechanical indicator and electrical contact (optional)
- A module of 14 auxiliary contacts whose availability varies according to the diagram used
- A single contact pressure switch is activated when the gas pressure exceeds 0.1 MPa (relative pressure: 1 bar)

DE58511EN

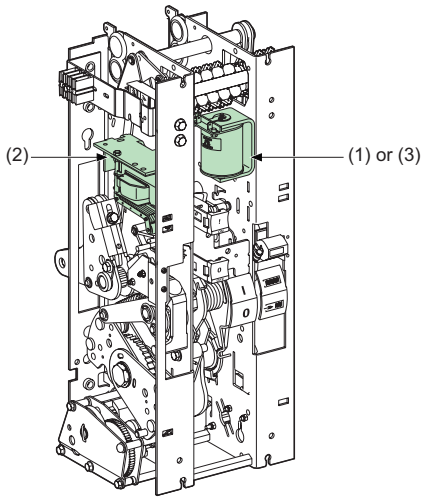
Wiring diagram (principle)



LF Circuit Breaker

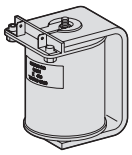
RI Stored Energy Operating Mechanism

DE57612EN



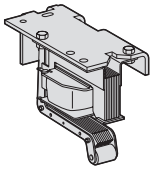
Operating mechanism

DE58092



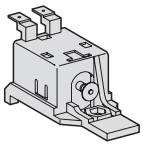
Shunt opening release (1)

DE58093



Undervoltage release (2)

DE58094



Low energy release (3)

Opening Circuit

Composition

The opening circuit can be produced using the following components:

- Shunt opening release (upon energizing) (YO1)
- Second shunt opening release (upon energizing) (YO2)
- Undervoltage release (YM)
- Low energy release (Mitop)

Note: see the table of the combinations of releases at page C-23.

Shunt opening release (YO1 and YO2)

Energizing this release causes an instant opening of the circuit breaker.

Characteristics		
Power supply	Vac (50 Hz)	48, 110, 220
	Vac (60 Hz)	120, 240
	Vdc	24, 30, 48, 60, 110, 125, 220
Threshold	Vac	0.85 to 1.1 Ur
	Vdc	0.7 to 1.1 Ur
Consumption	Vac	160 VA
	Vdc	50 W

Undervoltage release (YM)

This release unit causes the systematic opening of the circuit breaker when its supply voltage drops below a value less than 35% of the rated voltage, even if this drop is slow and gradual. It can open the circuit breaker between 35% and 70% of its rated voltage. If the release unit is not supplied power, manual or electrical closing of the circuit breaker is impossible. Closing of the circuit breaker is possible when the supply voltage of the release unit reaches 85% of its rated voltage.

Low energy release (Mitop)

This specific release unit comprises a low consumption unit and is specifically used for Sepam 100 LA self-powered relays.

Any tripping due to the Mitop release unit is momentarily indicated by an SDE type changeover contact (option).

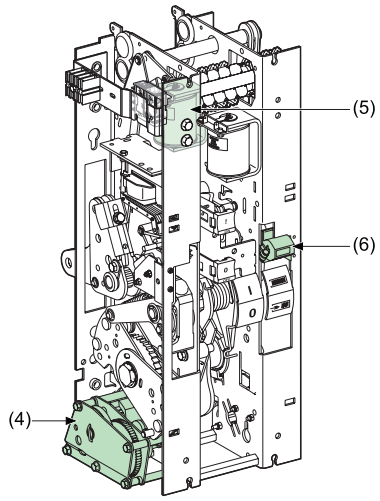
Characteristics			
Power supply		Vac (50 Hz)	48, 110, 220
		Vac (60 Hz)	120, 240
		Vdc	24, 30, 48, 60, 110, 125, 220
Threshold		Opening	0.35 to 0.7 Ur
		Closing	0.85 Ur
Consumption	Triggering	Vac	400 VA
		Vdc	100 W
	Latched	Vac	100 VA
		Vdc	10 W

Characteristics	
Power supply	Direct current
Threshold	0.6 A < I < 3 A

LF Circuit Breaker

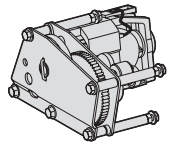
RI Stored Energy Operating Mechanism

DE57604



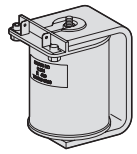
Operating mechanism

DE58096



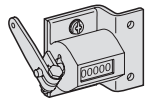
Electrical motor with gearing (4)

DE58092



Shunt closing release (5)

DE58097



Operation counter (6)

Remote Control

Function

Remote control enables the remote opening and closing of the circuit breaker

Composition

The remote control mechanism consists of:

- An electrical motor with gearing
- A shunt closing release (YF) combined with an anti-pumping device
- An operation counter

Electrical motor with gearing (M)

The electrical motor carries out the automatic rearming of the stored energy unit as soon as the circuit breaker is closed. This allows the instant reclosing of the device after opening. The arming lever is only used as a backup operating mechanism in the case of an absence of the auxiliary power supply.
The M3 contact indicates the end of arming operations.

Characteristics		
Power supply	Vac	48…60, 110…127, 220…250
	Vdc	24 …32, 48…60, 110…127, 220…250
Threshold	Vac/Vdc	0.85 to 1.1 Ur
Consumption	Vac	380 VA
	Vdc	380 W

Shunt closing release (YF)

This release allows the remote closing of the circuit breaker when the operating mechanism is armed.

Characteristics		
Power supply	Vac (50 Hz)	48, 110, 220
	Vac (60 Hz)	120, 240
	Vdc	24, 30, 48, 60, 110, 125, 220
Threshold	Vac	0.85 to 1.1 Ur
	Vdc	0.85 to 1.1 Ur
Consumption	Vac	160 VA
	Vdc	50 W

The shunt closing release is combined with an anti-pumping relay that enables priority to be given to opening in the case of a permanent closing order. This thus avoids the device being caught in an uncontrolled opening-closing cycle.

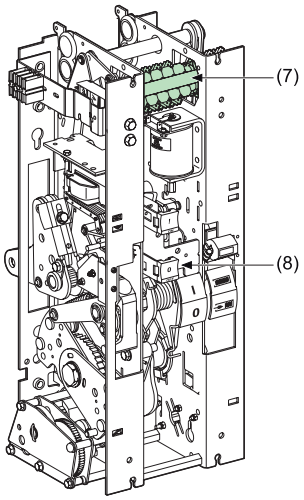
Operation counter

The operation counter is visible on the front cubicle.
It displays the number of switching cycles (CO) that the device has carried out.

LF Circuit Breaker

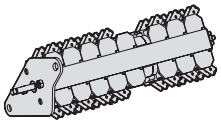
RI Stored Energy Operating Mechanism

DE57491



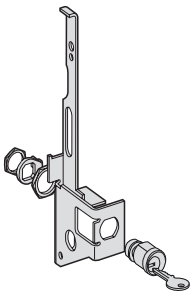
Operating mechanism

DE53129



Auxiliary contacts (7)

DE53127



Keylocking kit (8)

Indication and Locking/Interlocking

Open/closed auxiliary contacts

The number of contacts available depends on the options chosen on the operating mechanism.

In the basic configuration, the circuit breakers operating mechanism consists of a total of:

- 5 normally closed contacts (NC)
- 5 normally open contacts (NO)
- 1 changeover contact (CHG)

The usage procedure for auxiliary contacts is given in the following table:

Options	NC contact	NO contact
Shunt opening release (each one)	0	1
Undervoltage release	0	0
Low energy release (Mitop)	0	0

In order to know the final number of available contacts, you must deduct the total number of contacts included in the circuit breaker (5 NC + 5 NO + 1 CHG), the number of contacts used is given in the table above.

For example, A circuit breaker equipped with a remote control and a shunt trip unit has the following available contacts:
5 NC + 4 NO + 1 CHG.

With a undervoltage release instead of a shunt trip, this circuit breaker would have the following available contacts:
5 NC + 5 NO + 1 CHG.

Shunt opening release combinations			
1st release / **2nd release**	Shunt opening release YO1	Undervoltage release YM	Mitop
Without	5NC + 4NO + 1CHG	5NC + 5NO + 1CHG	5NC + 5NO + 1CHG
Shunt opening release YO2	5NC + 3NO + 1CHG	5NC + 4NO + 1CHG	5NC + 4NO + 1CHG
Undervoltage release YM	5NC + 4NO + 1CHG		5NC + 5NO + 1CHG
Mitop	5NC + 4NO + 1CHG	5NC + 5NO + 1CHG	

Locking the circuit breaker in the “open” position

This key-operated device allows the circuit breaker to be locked in the **open** position.

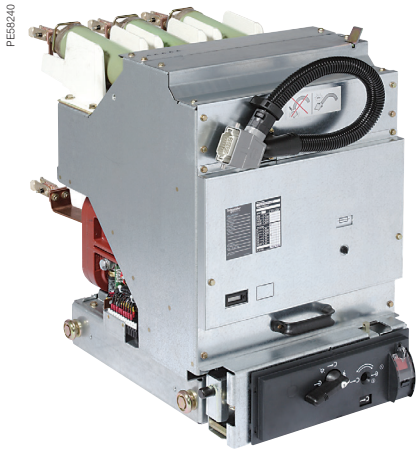
The circuit breaker is locked in the open position by blocking the opening push button in the **engaged** position.

Locking is achieved using a Profalux or Ronis captive key type keylock.

Rollarc Contactor

Presentation

PE58240



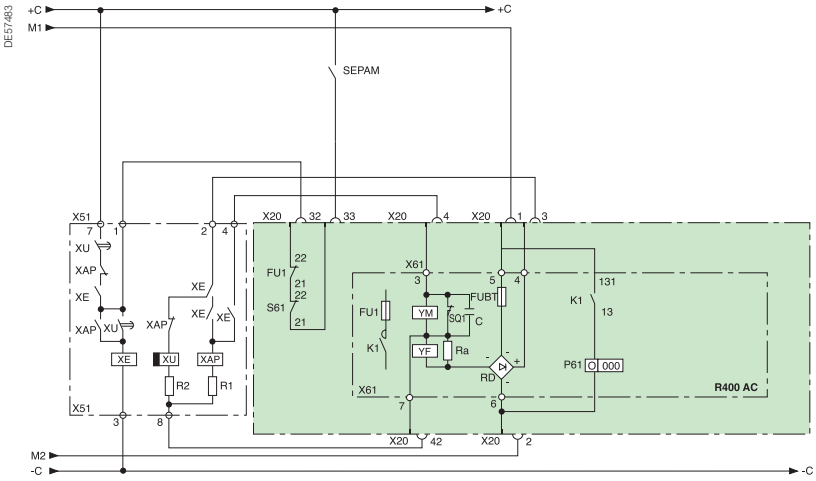
Description

- Three main poles are located in the pressurized enclosure
- Electromagnetic operating mechanism with:
  - magnetic latching for Rollarc 400
  - mechanical latching for Rollarc 400D
- Upstream and downstream terminals for power circuit connections
- Pressure switch equipped with a NO contact for continuous monitoring of SF6
- Mechanical interlocking of the contactor in the open position to prevent racking in or out with the contacts closed
- 3 HPC fuses with striker pin and auxiliary contact to trip the contactor

Auxiliaries Diagram (Principle)

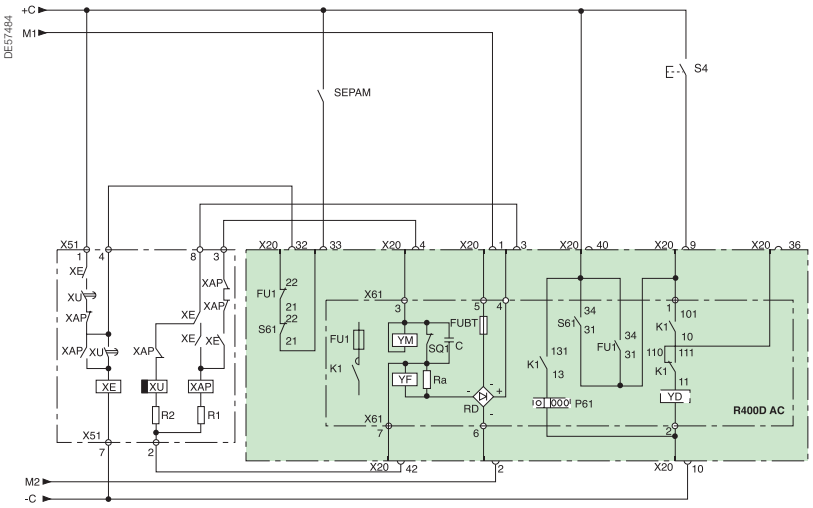
Operating mechanism for Rollarc 400 contactors

DE57483



Operating mechanism for Rollarc 400D contactors

DE57484



FU1	MV fuses
FUBT	LV fuse
K1	R400 AC MV contactor
P61	Operation counter
S61	Locking contact activated by the pre-trip push button and during racking in/out operations
SQ1	Contactor limit switch
X20	LV connecter, 42 pins + earth
X51	Control plate
X61	Contactor terminal block
XAP	Instantaneous auxiliary relay
XE	Instantaneous auxiliary control relay
XU	0.6 s time delay auxiliary relay
YD	Shunt trip coil
YF	Closing coils
YM	Latching coil
S4	Trip button

Rollarc Contactor

Characteristics in MCSet Cubicles

Electrical Characteristics of the Rollarc R400/R400D(1)

Rated voltage (kV)	Dielectric strength		Max. operating current (A)	Rated contactor current (A)	Fuse breaking capacity(3) (kA rms)	Short time withstand current(4)	
	50 Hz 1 min(2) (kV rms)	Impulse 1.2/50 µs (kV peak)				(kA rms)	(kA peak)
7.2	20	60	250	400	50	50	125
12	28	60	200	400	50	50	125

(1) Rollarc 400: without mechanical latching.
Rollarc 400D: with mechanical latching.

(2) 32 kV 1 min possible upon specific request (contact Schneider Electric).

(3) For operating voltages of 3–12 kV.

(4) Limited by fuses.

Maximum Switchable Power

Calculation assumptions (motor)

- Ratio between starting current Id and maximum current In: Id/In = 5 ± 20%
- Power factor x efficiency
  - 0.88 x 0.9 = 0.792 for 300 ≤ P < 600 kW
  - 0.9 x 0.92 = 0.828 for 600 ≤ P < 1100 kW
  - 0.92 x 0.94 = 0.865 for 1100 ≤ P < 5000 kW
- Starting time < 10 s
- Starts per hour ≤ 3 according to IEC 60644

Operating voltage (kV)	Direct starting motor with 315 A fuses (kW	Transformer with 315 A fuses (kVA)	Capacitor with 315 A fuses (kvar)
3.3	1170	1430	1000
4.16	1480	1800	1260
5	1780	2160	1520
5.5	1960	2380	1670
6	2130	2600	1820
6.6	2350	2800	2000
10 (fus. 200 A)	2000	2250	2000

Rollarc Contactor

Characteristics in MCSet Cubicles

Operating Schemes

Temporary service or periodic service

The two curve systems (Figure 1 and Figure 2) can be used to determine the maximum current surges accepted by the Rollarc 400 contactor, in temporary or periodic service.

- Temporary service: knowing the steady state current Ip, we can determine the maximum duration Ts of a current surge Is from **graph 1** (Figure 2).
- Periodic service: knowing 3 of the following 4 parameters:
  - overcurrent Is
  - overcurrent time Ts
  - cooling current Ir
  - cooling time Tr

  We can determine the 4th parameter using **graph 2** (Figure 1 and Figure 2).

Operating time

- Opening time 20 to 35 ms
- Arcing time: < 20 ms
- Closing time: 80 to 120 ms

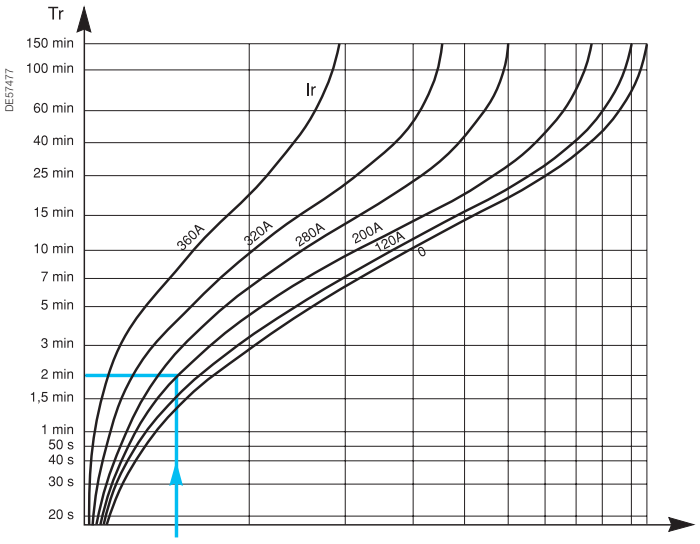


Figure 1

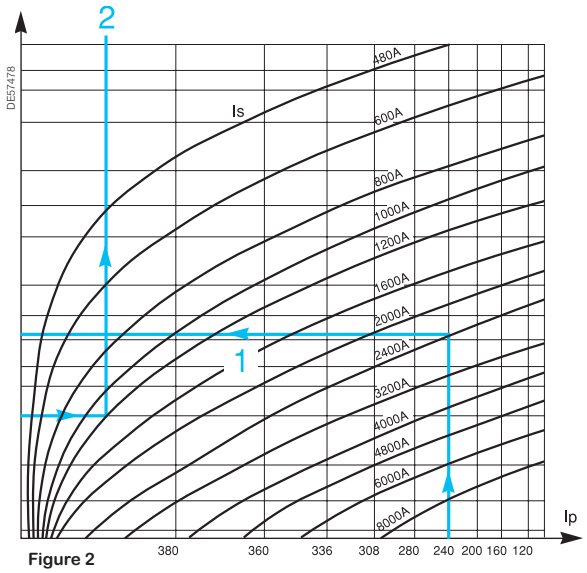


Figure 2

Rollarc Contactor

Characteristics in MCSet Cubicles

Operating Mechanism

Supply voltage(1)

- DC: 48, 110, 127 and 220 V
- AC: 50, 100, 110, 127 and 220 V
- Acceptable variations: +10% –15%

Rollarc 400 contactor

The contactor is closed by the pick-up coils.

The latching coils are inserted in the circuit at the end of the stroke of the contactor.

Consumption	Pick-up	Latched
DC	1050 W	30 W
AC	900 VA	30 VA

Rollarc 400D contactor

The contacts are mechanically latched in the closed position. They are opened by a shunt trip release which releases the latching.

Consumption	Pick-up coil(2)	Shunt trip
DC	1050 W	80 W
AC	900 VA	100 VA

(1) Optional supply possible by auxiliary transformer.

(2) Supply time < 0.12 s.

Auxiliary Contacts

Auxiliary contacts are of the common point changeover type.

The following are available:

- 9 contacts for the Rollarc 400
- 8 contacts for the Rollarc 400D

Contact characteristics

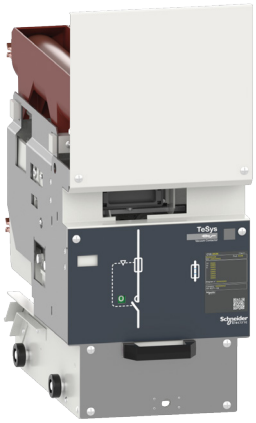
- Rated current: 10 A
- Breaking capacity:
  - DC (L/R ≤ 0.01 s): 2 A at 110 V
  - CA (cos φ ≥ 0.3): 10 A at 220 V

CBX Contactor Details

CBX Series up to 7.2 kV for MCSet cubicles

Our range of vacuum contactors, based on years of development within the Schneider Electric Research & Development department, and the use of latest technologies and extensive experience enable us to offer a leading range of vacuum-type contactors up to 7.2 kV.

PM103792



CBX Series

CBX

A cube type configuration for up to 7.2 kV applications:

- Three-phase (CBX)
- Inductive load or capacitive load category

CVX Series

CVX7/CVX7-C

Withdrawable type of CBX equipped with fuse holders (DIN or BS standard) up to 7.2 kV:

- Inductive load or capacitive load categories

Description of the CBX Contactor

Main Characteristics

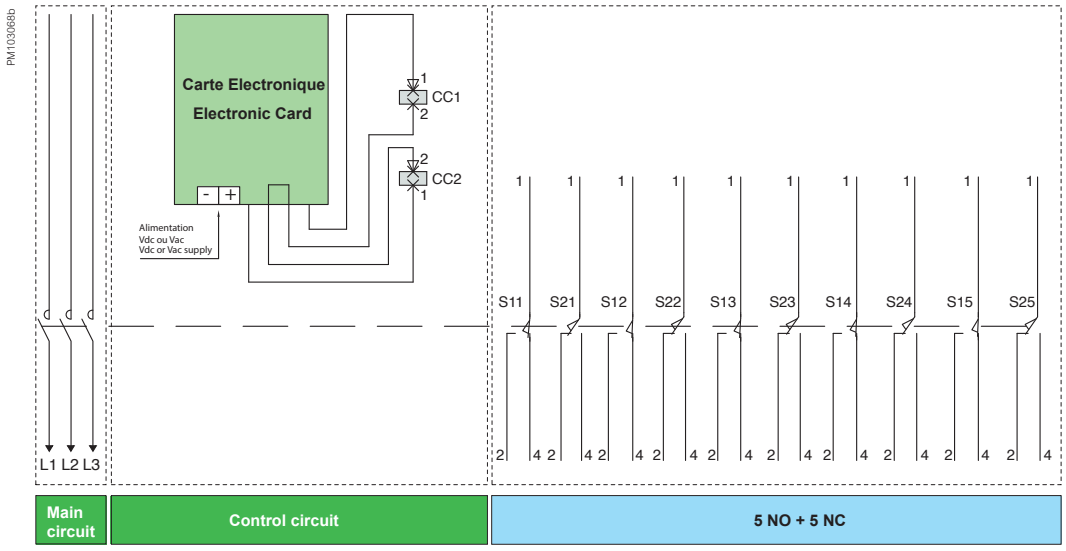
Electrical characteristics according to IEC 62271-106				CBX
Phase to phase distance			mm	108
Rated voltage		Ur	kV 50/60 Hz	7.2
Insulation level	power frequency withstand	Ud	kV 50/60 Hz, 1 min*	20
	lightning impulse withstand	Up	kV peak	60
Rated operational current		Ie	A	400
Utilization category				AC3-AC4
Rated thermal current		Ith	A	400
Rated short-circuit breaking current		Isc	kA	6
Rated short-time withstand current		Ik/tk	kA/1 s	6
Rated peak withstand current		Ip	kA	15
Rated back to back capacitor bank breaking current			A	N/A

*Ud 32 kV, 50 Hz, 1 min available in standard.

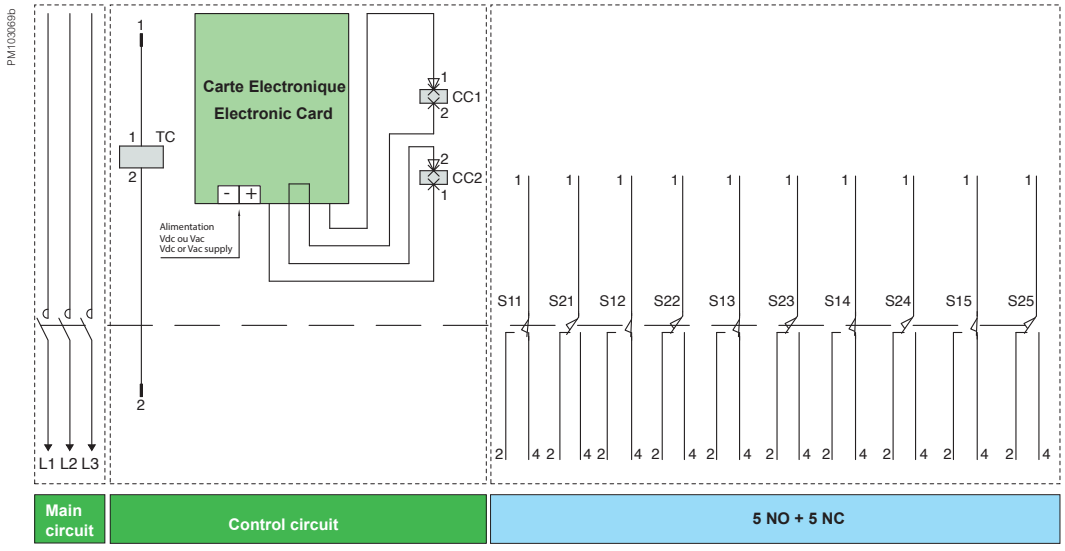
Common characteristics according to IEC 62271-106			CBX
Mechanical endurance	for electromagnetic mechanism	op.	1,000,000
	for mechanical latch mechanism	op.	300,000
Electrical endurance at rated current		op.	250,000
Consumption closing power		W	500
Consumption holding power (magnet type)		W	80
Closing time		ms	120–200
Consumption opening power (mechanical type)		W	240
Opening time	for DC supply	ms	50–100
	for AC supply	ms	50–100
Operating rated ambient temperature		°C	-5/40
Average relative humidity		over 24 h	< 95%
		over 1 month	< 95%

Electric Circuit Diagram

For CBX Electromagnetic Hold Mechanism and DC and AC Supply Voltage:



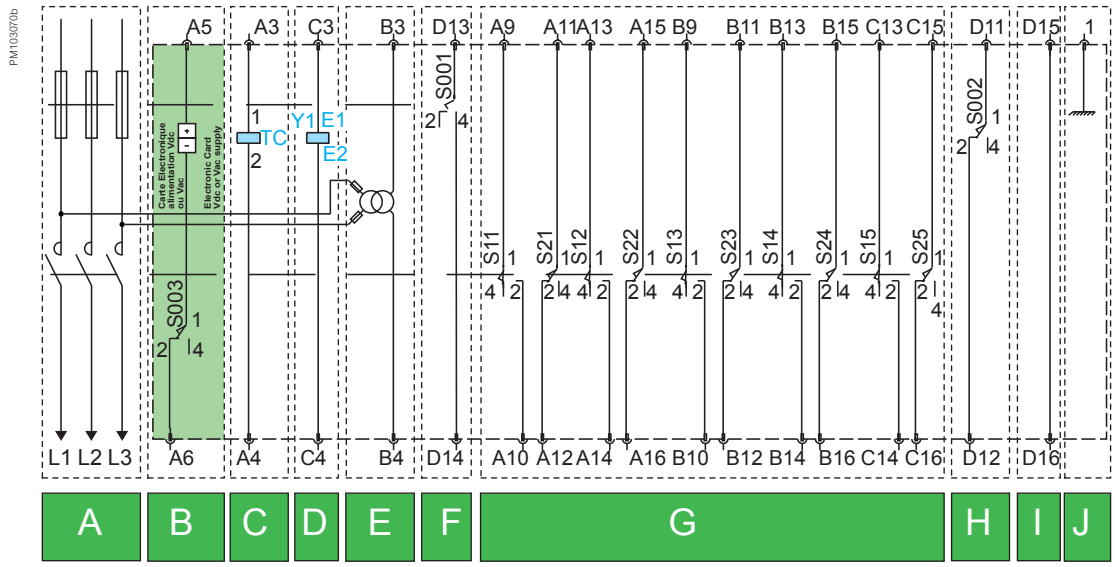
For CBX Mechanical Latch Mechanism and DC and AC Supply Voltage:



Note: Tripping coil (TC) must not be supplied more than 2 s.

Electric Circuit Diagram

DC and AC Supply Voltage for CVX7



Note: Tripping coil (TC) must not be supplied more than 2 s.

Components:

- **A** Fuse contactor
- **B** Closing
- **C** Tripping coil (for the mechanical latch mechanism)
- **D** Blocking magnet (handle) (Optional)
- **E** Control power transformer (only for CVX7/CVX7-C) (Optional)
- **F** Fuse blowing
- **G** Auxiliary contact: 5NO + 5NC
- **H** Mandatory electrical interlock
- **I** Plug-in socket
- **J** Earthing

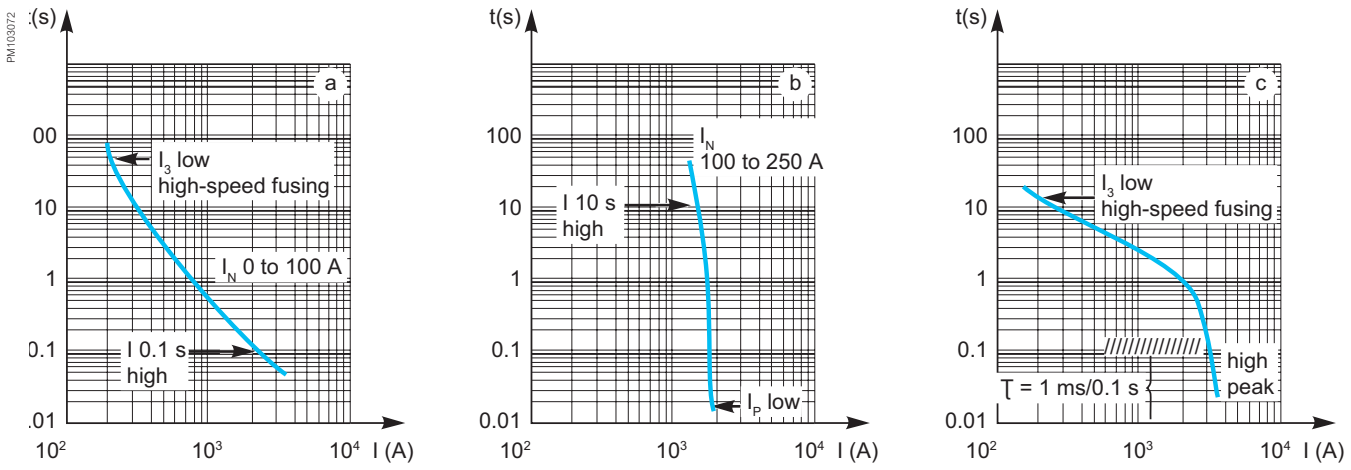
Fuse Selection

The table in below contains a summary of the requirements of the different types of fuse according to the type of load:

Type of load	Transformer	Motor	Capacitors	
			Single bank	Multiple step banks
Ordre of magnitude of fuse rating (A)	4 to 100	100 to 250	100 to 250	
Selection rules	IA < IN transf. < IB	Fixed by IP and tD IN motor x 1.2	IN bank x 1.7 < IN fuse Insc fixed by î. t	
Ip	No specification	Low		High τ ≈ 1 ms
I fusing 0.1 s	High	No specification	High (τ ≈ 0.1 s)	No specification
I fusing 10 s	Low for close-up protection	High	Low for close-up protection	
I3		No specification		
UN (kV)	0 to 36	0 to 12	0 to 36	

These specifications can be used to plot the ideal time/current characteristic for a fuse according to its use (refer to the diagram in below). This diagram clearly shows the requirement parameters for each type of protected load. It also clearly illustrates the relative insignificance of the IN value of a fuse when it is taken alone as a selection criterion (as is unfortunately too often the case).

Ideal Time/Current Characteristics for Protecting

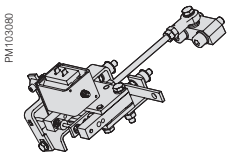


a) Transformer

b) Motor

c) Capacitor

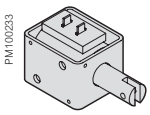
Description of Functions



Mechanical Latch with Tripping Coil

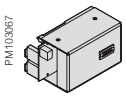
The mechanical latch mechanism with the tripping coil can be selected instead of the electromagnetic hold mechanism. It is comprised by 1 piece mechanical latch and 1 piece tripping coil:

- A mechanical latch part



A corresponding tripping coil with various options for supply voltage:

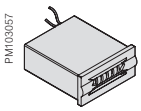
- DC 24–30 V
- DC 48 V
- DC 110–250 V/AC 110–240 V



Electronic Card

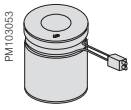
A set of electronic card is equipped, and has various options for supply voltage:

- DC 24–60 V
- DC 110–250 V/AC 110–240 V



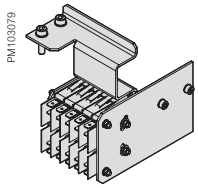
Operations Counter

For vacuum contactors CVX/CVX-C, an operations counter is equipped.



Closing Coil

- DC 24-60 V
- DC 110-250 V/AC 110-240 V.



Auxiliary Contact

- 5NO + 5NC, right hand side assembly

DI Switch Cubicle

Presentation

E74222

Loadbreak Switch

The three rotating contacts are placed in an enclosure filled with gas at a relative pressure of 0.04 MPa (0.4 bars).
The system offers maximum operating reliability.

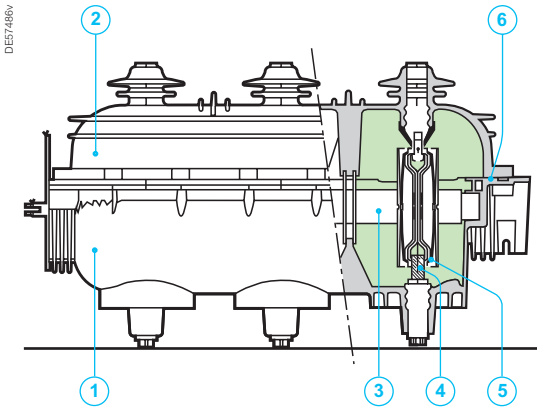
Gas tightness

The SF6 filled enclosure is a **sealed pressure system** type. Sealing tightness is always checked at the factory.

Safety

- The switch may be in one of three positions: closed, open, or earthed, creating a natural interlocking system that prevents operator error
- Moving contact rotation is driven by a fast-acting mechanism that is independent of the operator
- The device combines the breaking and disconnecting functions
- The SF6-enclosed earthing switch has a short-circuit making capacity
- in compliance with the relevant standards

DE57486v



1 Enclosure
2 Cover
3 Operating shaft
4 Fixed contact
5 Moving contact
6 Seal

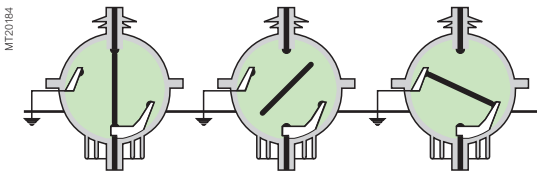
Insensitivity to the environment

- Parts are designed in order to obtain optimum electrical field distribution
- The metallic structure of cubicles is designed to withstand and aggressive environment and make it impossible to access any energized part during operation

Breaking principle

The outstanding qualities of SF6 gas are used to extinguish the electrical arc.
To increase the cooling of the arc, a relative movement is created between the arc and the gas. The arc strikes when the fixed and moving contacts separate.
The combination of the current and magnetic field created by a permanent magnet causes the arc to rotate around the fixed contact, extending and cooling it until it is extinguished at current zero point. The distance between the fixed and moving contacts is then sufficient to withstand the recovery voltage.
This system is both simple and dependable, and provides improved electrical endurance due to the very low wear of contacts.

MT20184

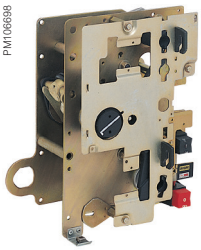


Contacts closed Contacts open Contacts earthed

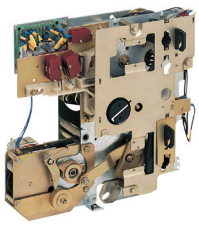
DI Switch Cubicle

Characteristics

PM106698



PM106699



Operating Mechanism and Auxiliaries

CI2 double function operating mechanism

- **Switch function:**
  - Independent closing in two steps:
    - Operating mechanism recharged by a hand lever or motor
    - Stored energy released by a push button (I) or trip unit
  - Independent opening by push button (O) or trip unit
- **Earthing switch function:**
  - Independent closing by a hand lever

  Operating energy is provided by the compression of a spring which causes the contacts to close or open after the neutral point is passed.
- **Auxiliary contacts:**
  - Switch (2 O + 2 C)
  - Switch (2 O + 3 C) and earthing switch (1 O + 1 C)
  - Switch (1 C) and earthing switch (1 O + 1 C) in the motor option
- **Motor option**
- **Opening release:**
  - Shunt
  - Undervoltage (optional)
- **Closing release:**

  Shunt trip
- **Fuse blown release:**

  Any fuse blown trips the opening of the switch

Motor option and releases

Un		DC					AC (50 Hz)(1)	
Supply	(V)	24	48	110	125	220	120	230
Motor option								
	(W)	200						
	(VA)						200	
	(s)	< 7					< 7	
Opening releases								
Shunt	(W)	200	250	300	300	300		
	(VA)						400	750
Undervoltage	(W)	160						
Pick-up	(VA)						280	550
Latched	(W)	4						
	(VA)						50	40
Closing releases								
Shunt	(W)	200	250	300	300	300		
	(VA)						400	750

(1) Please contact Schneider Electric for other frequencies.

Voltage Transformers for MCSet

These supply power to:

- Measuring, metering and monitoring devices
- Relays or protective devices
- Auxiliary LV sources for various types of switchgear; all these devices are protected and insulated from the MV section

They are installed at the bottom of the functional unit. In the withdrawable fuse version, the energized part is entirely encapsulated in an Thermoplastic, which provides both electrical insulation and excellent mechanical strength.

They include the following models:

- With one insulated MV terminal, for connection between neutral and phase conductors in three-phase systems with withdrawable MV fuses
- With two insulated MV terminals, for connection between phase conductors

MCSet123 up to 17.5 kV		
SEMAR VT		
Phase-Earth	VRQ3n/S2	
Phase-Phase	VRC1/S1F	VRCR/S1 (For AD1 contactor)
Other manufactures qualified by Schneider Electric with type test (DIN Type)		
ALCE (Turkey)		
TRAFINDO (Indonesia)		
NPT (India)		

* If no requirement from customer, Schneider Electric will be free to select the VT of SE or other manufacture.

Voltage Transformers for MCSet

E28679

VRQ3

For cubicles AD1, CL1, GL1, TT1, AD2, CL2, GL2, AD3, CL3, GL3

Transformer VRQ3n/S2

- Phase-earth
- Frequency 50–60 Hz

Primary voltage (kV)	3/√3	3.3/√3	5.5/√3	6/√3	6.6/√3	10/√3	11/√3	13.8/√3	15/√3
1st secondary voltage (V)	100/√3	110/√3	110/√3	100/√3	110/√3	100/√3	110/√3	110/√3	100/√3
2nd secondary voltage (V)	100/√3	110/√3	110/√3	100/√3	110/√3	100/√3	110/√3	110/√3	100/√3
1st secondary accuracy class (VA)	30-50 VA cl.0.5								
2nd secondary accuracy class (VA)	50 VA cl.0.5								

E28680

VRC1/S1F

For cubicles AD2, CL2, GL2, TT2, AD3, CL3, GL3

Transformer VRC1/S1F

- Phase-phase
- Frequency 50–60 Hz

Primary voltage (kV)	3.3	5.5	6,6	11	13.8	15
Secondary voltage (V)	110	110	110	110	110	100
Accuracy class (VA)	75 VA cl.0.5					

MT20104

VRCR

For contactor cubicle AD1

This transformer provides power to the coil in order to keep the magnetic circuit of the contactor closed.

Transformer VRCR/S1

- Phase-phase
- Frequency 50–60 Hz

Primary voltage (kV)	3.3	5.5	6.6
Secondary voltage (V)	110	110	110
Accuracy class (VA)	50 VA cl.0.5		

Current Transformers for MCSet

Conventional Current Transformers

Conventional current transformers are used to provide power to metering, measuring or control devices. They measure the value of primary current from 10-4000 A.
Schneider Electric has drawn up a list of current transformers which are appropriate for use with digital protection devices in order to make it easier to determine accuracy characteristics. This list is available in the selection guide.

For cubicle AD1 contactor

MCSet123 up to 17.5 kV				
SEMAR CT				
ARJP1/N2J(AD1)	ARJP2/N2J	ARJP3/N2J	ARJA1/N2J	ARO1a/N3

Other manufactures qualified by Schneider Electric with type test	
Up to 2500 A (DIN Type)	ALCE (Turkey)
	TRAFINDO (Indonesia)
	NPT (India)
> 2500 A	ALCE (Turkey)

E28676

ARJP1, 2 or 3

Transformer ARJP1/N2J

- Single primary current, double secondary current for measurement or protection
- Frequency 50–60 Hz

I1n (A)		10	20	30	50	75	100	150	200	250
Ith (kA)		1.2	2.4	3.6	6	10	10	10	10	10
t (s)		1	1	1	1	1	1	1	1	1
Measuring*	cl.0.5	15 VA								
Protection*	5P20	2.5 VA								

For cubicles AD1-CL1-GL1-AD2-CL2-GL2

Transformer ARJP2/N2J

- Double primary current, double secondary current for measurement or protection
- Frequency 50–60 Hz

I1n (A)		50–100	75–150	100–200	150–300	200–400	250–500	600	750
Ith (kA)		40	40	31.5–40	40	40	40	50	50
t (s)		1	1	1	1	1	1	1	1
Measuring*	cl.0.5			5–10 VA	10–20 VA	7.5–15 VA	10–20 VA	20 VA	20 VA
Protection*	5P20	2.5–5 VA	2.5–5 VA	2.5–5 VA	2.5–5 VA	5–10 VA	5–10 VA	7.5 VA	7.5 VA

Current Transformers for MCSet

For cubicles AD1-CL1-GL1-AD2-CL2-GL2

Transformer ARJP3/N2J

- Single primary current, double secondary current for measurement or protection
- Frequency 50=60 Hz

I1n (A)		1000	1250
Ith (kA)		50	50
t (s)		1	1
Measuring*	cl.0.5	30 VA	30 VA
Protection*	5P20	10 VA	10 VA

* The secondary current for measuring and protection can be of 1 A or 5 A.

For cubicles AD3-CL3-GL3

E74399

ARJA1

Transformer ARJA1/N2J

- Single primary current, double secondary current for measurement or protection
- Frequency 50=60 Hz

I1n (A)		1500	2000	2500
Ith (kA)		50	50	50
t (s)		1	1	1
measuring*	cl.0.5	30 VA	30 VA	30 VA
protection*	5P20	15 VA	15 VA	15 VA

For cubicles AD3-CL3-GL3

E74400

ARO1

Transformer ARO1a/N3

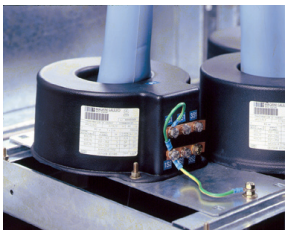
- Single primary current, triple secondary current for measurement or protection
- Frequency 50–60 Hz

I1n (A)		3150
Ith (kA)		50
t (s)		1
Measuring*	cl.0.5	30 VA
Protection*	5P20	7.5 VA

* The secondary current for measuring and protection can be of 1 A or 5 A.

Current Transformers for MCSet

E72965



Low Voltage Toroid Type Current Transformers

For cubicles AD1–AD2 with one single-pole cable

Transformer ARC2

- Single primary current, single secondary current for protection
- Frequency 50–60 Hz

I1n (A)		75	100	150	200	250	300	400
Ith (kA)		50	50	50	50	50	50	50
t (s)		1	1	1	1	1	1	1
Protection	5P20	2.5 VA	2.5 VA	5 VA	5 VA	5 VA	5 VA	5 VA

- Single primary current, double secondary current for measurement or protection
- Frequency 50–60 Hz

I1n (A)		200	250	300	400	600
Ith (kA)		50	50	50	50	50
t (s)		1				
Measuring		5 VA cl.1	10 VA cl.0.5	10 VA cl.0.5	15 VA cl.0.5	15 VA cl.0.5
Protection	5P20	2.5 VA	5 VA	5 VA	5 VA	5 VA

For cubicles AD1-AD2 with two single-pole cables

Transformer ARC3

- Single primary current, double secondary current for measurement or protection
- Frequency 50–60 Hz

I1n (A)		750	1000	1250
Ith (kA)		50	50	50
t (s)		1		
Measuring	cl.0.5	20 VA	30 VA	30 VA
Protection	5P20	7.5 VA	10 VA	10 VA

E28678

Zero sequence core balance CT (CSH type)

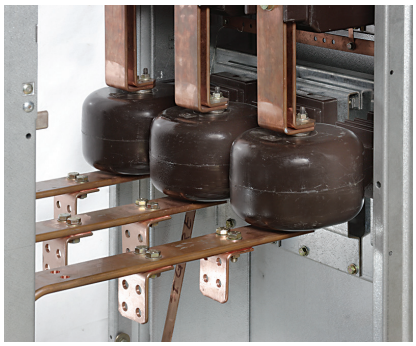
Zero Sequence Core Balance Current Transformers (CSH Type)

CSH 120 and CSH 200 core balance CTs, provide more sensitive protection by direct measurement of earth fault currents.
Specifically designed for the Sepam range, they can be directly connected to the Sepam **residual current** input.
They are only different in terms of their diameter:

- CSH 120 - 120 mm internal diameter
- CSH 200 - 200 mm internal diameter

Current Transformers for MCSet

PE56564



LPCT in cubicle

LPCT Low Power Current Transducer

LPCTs are specific current sensors with a direct voltage output of the **Low Power Current Transducer** type, in conformity with standard IEC 60044-8.
LPCTs provide metering and protection functions.
They are defined by:

- The rated primary current
- The extended primary current
- The accuracy limit primary current or the accuracy limit factor

These have a linear response over a large current range and do not start to saturate until beyond the currents to be broken.

For AD1, AD2, and AD3 cubicles

		CLP1	CLP3
AD1	630/1250 A	•	
AD2	630 A	•	
AD3	1250 A	•	
	2500 A		•

Type	Primary current		Secondary voltage	Accuracy class	Accuracy limit factor	Thermal resistance	Rated insulation			Frequency	Secondary connector
	Rated	Extended									
CLP1	100 A	1250 A	22.5 mV	0.5–5 P	**FLP:** 500	50 kA (1 s)	**Ur:** 17.5 kV	**Ud:** 38 kV (1 min)	**Up:** 95 kV (peak)	50/60 Hz	RJ45 - 8 pts
CLP3		2500 A			**FLP:** 400	40 kA (1 s)					

PM110507

DIN LPCT from (NPT)

Type	Primary current		Secondary voltage	Accuracy class	Accuracy limit factor	Thermal resistance	Rated insulation			Frequency	Secondary connector
	Rated	Extended					Ur	Ud	Up		
MCSE11004-0000	100 A	1250 A	22.5 mV	0.5–5 P	**FLP:** 400	40 kA	17.5 kV	38 kV (1 min)	95 kV (peak)	50/60 Hz	RJ45 - 8 pts
MCSE11004-0001		2500 A									

Protection, Monitoring and Control

Protection relays

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

Need help choosing Protection Relays by Range?
Use this simple selector to find the best fit for your needs.

Help Me Choose

Complete offer to reach all your requirements

PowerLogic Protection

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

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

Easergy MiCOM Protection

	**Easergy MiCOM P30 Series** Easergy MiCOM 30 Series protective devices offer comprehensive protection of MV, HV and EHV networks. With flexible, modular hardware, Ethernet communication and cyber security, they are a trusted device to protect your critical power system assets.
	**Easergy MiCOM P40 Series** A trusted name in protection relays worldwide; our Easergy MiCOM P40 series contains all of the applications you need for MV, HV and EHV protection. High-performance protection functions, Ethernet communication and Cyber security makes this range ready for modern challenges.

Protection, Monitoring and Control

Protection relays

Easergy Sepam Protection

Easergy Sepam Series 60

For complex distribution systems, Easergy Sepam Series 60 has 8 dedicated types of protection relay application.
It consists of a simple base unit with connectors for voltage & current measurement, power supply, relay outputs, communication port and a removable memory cartridge (firmware, settings and language). A range of module or options can be applied to easily extend HMI, Communication or I/O.

Easergy Sepam Series 80

Protection Relays for Custom Applications: 16 types of digital current or voltage protection for any distribution system, each one dedicated to a single application: Easergy Sepam S80, S81, S82, S84, T81, T82, T87, M81, M87, G88, B80, B83, C86. A ready to use Easergy Sepam includes: one base unit, two 20 pin connectors, one current, one current and one voltage connector, one memory cartridge, one application, one language, logipam firmware option, TCP/IP option, optional modules, comm. interfaces or core balance CT.

PowerLogic Arc Protection

PowerLogic A1 and A3

PowerLogic A1 and A3 are designed to mitigate the effects (damage / impact) of Arc faults inside electrical cubicles.

- PowerLogic™ A1: stand-alone device for cubicle protection.
- PowerLogic™ A3: can be used as a stand-alone device or together with other A3 devices as a system solution. It can protect a group of cubicles with monitoring of up to 50 sensors.

V321

V321 Adapted to large substations and installations of up to 150 sensors and multiple elective control with I/O modules.
It provides high performance with inputs for current measurement and communication to supervision solutions.

VIP Relay

VIP40/45 VIP400/410

Our latest range of integrated self-powered relays requiring no auxiliary power supply.
Self-powered protection relays increase the availability of the MV network and are suited to most applications.

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

PowerLogic Control & Monitoring

PowerLogic T300

PowerLogic T300 – a remote terminal unit (RTU) configurable to your precise specifications. PowerLogic T300 delivers advanced monitoring, protection, control, and automation functions in both overhead and underground electrical distribution networks.

Flair Fault Passage Indicators

Fault Passage Indicators for Underground Networks

The Flair range offers cost-effective fault passage indicators (FPI) that can be fully integrated in the cubicle.
In addition to the Flair 21D/22D self-powered FPIs, the range includes the Flair 23DM, a device incorporating FPI, Voltage detection relay and Modbus communication.

Protection, Monitoring and Control

Arc Fault Protection

Arc Fault Detectors Selection Guide

Vamp 125	Vamp 121	Vamp 321 (+I/0 units)*
 PM106411	 PE90502	 PM106632

Functions

The arc protection unit detects an arc flash in an installation and trips the feeding breaker.
An arc flash protection maximizes personnel safety and minimizes material damage caused by arc faults.

System features

- Typical operation on light only principle
  - Input for current criteria for I> and L> operation
  - Integrated 19 - 256 Vac/dc aux. supply
- Optimized for wind power and other small applications
- Up to 4 arc sensors
- Selective trip for 2 zones
- Operation time 1 ms with high speed output and 8 ms with a trip relay
- Non-volatile trip status
- Self-supervision
- Straightforward installation
- Cost efficient solution

- Operation on light only
- Up to 10 arc or smoke sensors
- Single trip contact
- Straightforward installation
- Operation time 9 ms (including the output relay)
- Cost efficient solution
- Self-supervision
- Binary input for blocking or resetting the unit (programmable)
- Possibility for double arc channel activation trip criteria
- BIO light transfer possibility to other Vamp device

- Flexible and modular system can be adapted to different targets requiring arc protection
- Central unit and modular units engineer a scheme to your requirements
- Continuous system self-supervision
- 3-phase current, zero-sequence voltage and current
- Event logs, disturbance recording and real-time clock
- Operation on simultaneous current and light or on light only
- Direct connection of arc sensors in the central unit without using I/O units
- 7 ms operation time with trip contact and 2 ms with high speed output (HSO)
- Programmable operation zones
- Communication protocol support for SCADA and automation interfacing
- Supports maximum 6 Digital Inputs and 8 Digital Outputs for object (CB) status and control (order option dependent)

Sensors

Point sensor - surface

- Arc detection from two compartments simultaneously
- Self-monitored
- Cable length adjustable from 6 m to 20 m down

Point sensor - pipe

- Self-monitored
- Cable length adjustable from 6 m to 20 m down

Loop sensor

- Monitors various compartments
- Small bending radius for easy installation

Benefits

- Reduces production losses
- Extended switchgear life cycle
- Reduced insurance costs
- Low investment costs and fast installation
- Enhancing people safety

IEC standards	IEC standards	IEC standards

* I/0 units: 4 references available (VAM 3L, VAM 10L/LD, VAM 12L/LD, VAM 4C/CD). The choice is to be made according to the needs concerning the type and number of sensors. Please contact us.

Protection, Monitoring and Control

Arc Fault Protection

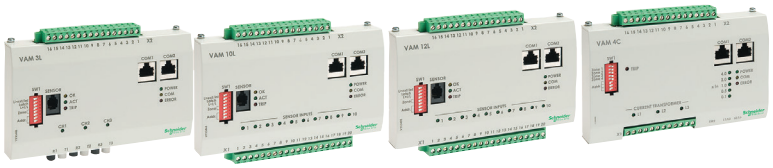
The arc protection unit detects an arc flash in an installation and trips the feeding breaker

An arc flash protection system minimizes material damage caused by arc faults.

Arc flash protection minimizes material damage to the installation in the most hazardous power system fault situations.
Minimized damage also means limited need for repair work and enables rapid restoration of the power supply.

Vamp Arc Flash Range

Vamp 321



Advantages

Enhance people safety

The shorter the operating time of the arc flash protection unit, the smaller will be the damage caused by the arc fault and the shorter the possible power outage.

Extended switchgear life cycle

Arc protection unit increases the life-cycle expectancy of switchgear installations, so that decisions to invest in new switchgear installations can be postponed and money can be saved by re-Vamping existing switchgear systems.

Reduced insurance costs

The faster and better the protection system of a power installation, the more generous will be the insurance terms and costs.

Low investment costs and fast installation

A comprehensive arc protection system is characterized by low investment costs and fast installation and commissioning times. One successful operation of the arc flash protection units provides an immediate investment payoff.

Reliable Operation

Operation is based on the appearance of light or alternatively on the appearance of light and current from an external device. Immune to nuisance trippings due to dual tripping criteria; light and current.

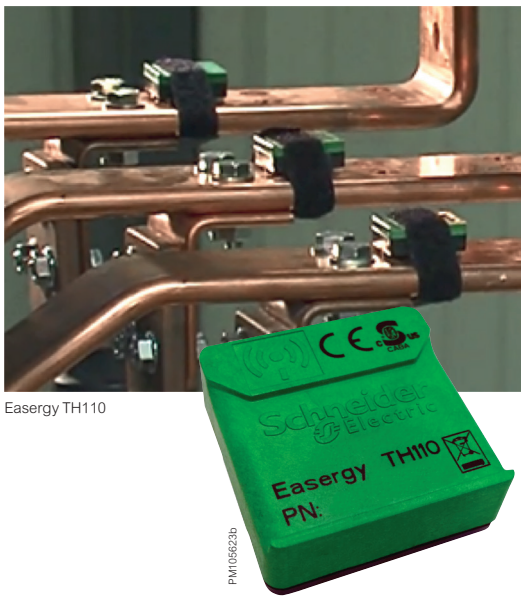
Protection, Monitoring and Control

Thermal Monitoring Easergy TH110

Key benefits

- Battery free
- Wireless communications
- High performances
- In contact measuring point
- Easy installation
- Compact footprint
- Remote monitoring and alarming

PM105621



Easergy TH110

PM105623b

Continuous Thermal Monitoring

The power connections in the Medium Voltage products are one of the most critical points of the substations especially for those made on site like:

- MV Cable connections

Loose and faulty connections cause an increase of resistance in localized points that will lead to thermal runaway until the complete failure of the connections.

Preventive maintenance can be complicated in severe operating conditions also due to limited accessibility and visibility of the contacts.

The continuous thermal monitoring is the most appropriate way to early detect a compromised connection.

Easergy TH110 Thermal Sensor

Easergy TH110 is part of the **new generation of wireless smart sensors** ensuring the continuous thermal monitoring of all the critical connections made on field allowing to:

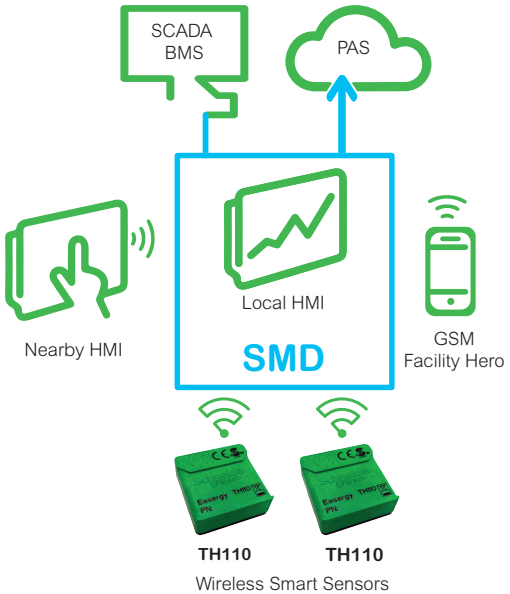
- Prevent unscheduled downtimes
- Increase operators and equipment's safety
- Optimize and predictive maintenance

Thanks to its very **compact footprint** and its **wireless communication,** Easergy TH110 allows an easy and widespread installation in every possible critical points without impacting the performance of the MV Switchgears.

By using **Zigbee Green Power** communication protocol, Easergy TH110 ensure a reliable and robust communication that can be used to create interoperable solutions evolving in the Industrial **Internet of Things** (IIoT) age.

Easergy TH110 is **self powered** by the network current and it can ensure **high performances** providing accurate thermal monitoring being in **direct contact** with the measured point.

DM105320b



Wireless Smart Sensors

Substation Monitoring Device

Easergy TH110 is **connected** to the Substation Monitoring Device (SMD) that harvest the data for local signaling, data analyses and nearby control.

Specific **monitoring algorithms** allow to detect drifts from the threshold based on the specific installation characteristics also in regards of the variable loads or abnormal behaviors coming from phases comparison.

The **remote monitoring and alarming** ensure full peace of mind thanks to remote connection for SCADA or Services, access to Cloud-based Apps and digital services and alarming through SMS or Facility Hero mobile App.

Characteristics	
Power supply	Self powered. Energy harvested from power circuit.
Minimum activation current	5 A
Accuracy	± 1 °C
Range	-25 °C/+115 °C
Wireless communication	ZigBee Green Power 2,4 GHz
Dimension - Weight	31 x 31 x 13 mm - 15 g

Protection, Monitoring and Control

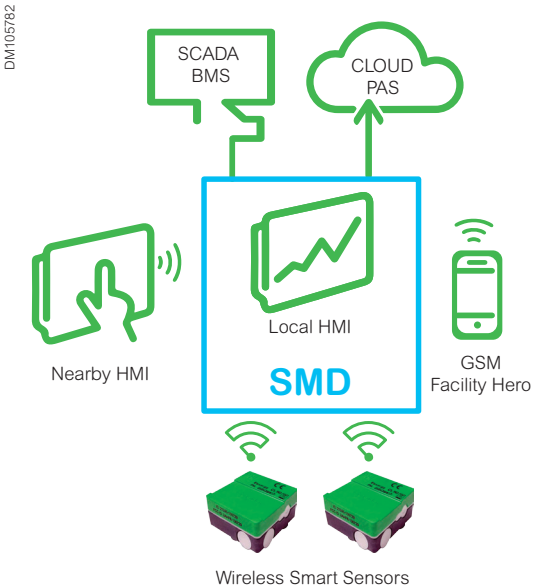
Wireless Environmental Monitoring
Easergy CL110

Key benefits

- Long battery life expectation
- Wireless communications
- High performances
- In contact measuring point for temp.
- Easy installation with magnets
- Compact footprint
- Remote monitoring and alarming

Easergy CL110

Characteristics	
Temperature Accuracy	± 1 °C in a range from -25 °C to 90 °C
Relative Humidity Accuracy	2% in a range from 10% to 98%
Wireless Communication	ZigBee Green Power 2,4 GHz
Protection degree	IP54
Dimension - weight	40 x 40 x 21 mm – 34 g
Power supply	3V battery



Continuous Environmental Monitoring

Harsh environment due to pollution, condensation and strong temperature drifts is one of the most critical failure cause due to accelerated aging.

In **MV Switchgears** an harsh environment generate dirt that, on the surface of not shielded insulators, can lead to surface partial discharges up to a complete flashover.

In **LV compartments** an harsh environment can generate rust on metallic parts and electronic contacts.

The continuous environmental monitoring is the most appropriate way to early detect installation issues optimizing maintenance with predictive information.

Easergy CL110 Environmental Sensor

Easergy CL110 is part of the **new generation of wireless smart sensors** ensuring the continuous environmental condition monitoring allowing to perform, over a deenergized surface, the measurement of:

- Temperature of the surface in contact
- Relative humidity

By using proper algorithms, the above data can be computed to calculate the dew point and condensation occurrence.

Thanks to its c**ompact footprint** and its **wireless communication** Easergy CL110 allows an easy and widespread installation also providing IP54 degree of protection in indoor applications.

Easergy CL110 is **battery powered with life expectation >15 years** and it allows a simple fixing on magnetic metal surfaces thanks to its **high-strength magnets**.

By using **Zigbee Green Power** communication protocol, Easergy CL110 ensure a reliable and robust communication that can be used to create interoperable solutions evolving in the **Industrial Internet of Things** (IIoT) age.

Easergy CL110 provides accurate temperature monitoring of the metal surface being in **direct contact** with it.

Substation Monitoring Device

Easergy CL110 **is connected** to the Substation Monitoring Device (SMD) that harvest the data for local signaling, data analyses and nearby display.

Specific **monitoring algorithms** allow to detect drifts from the threshold based on the specific installation characteristics.

The remote **monitoring and alarming** ensure full peace of mind thanks to remote connection for SCADA or Services, access to Cloud-based Apps and digital services and alarming through SMS or Facility Hero mobile App.

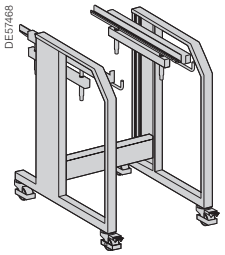
Notes

Installation and Connection

Installation and Connection

Accessories and Extraction Withdrawable Parts

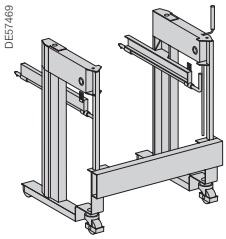
Extraction Table



Adaptable to three cubicle widths, this extraction table enables:

- The withdrawable part to be removed from the cubicle
- The withdrawable part to be fitted into the cubicle

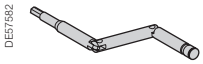
Extraction and Lowering Tool - Optional on Request



Adaptable to three cubicle widths, this extraction tool enables:

- The withdrawable part to be removed from the cubicle
- The withdrawable part to be introduced into the cubicle
- The withdrawable part to be lowered to the ground
- The withdrawable part to be lifted from the ground

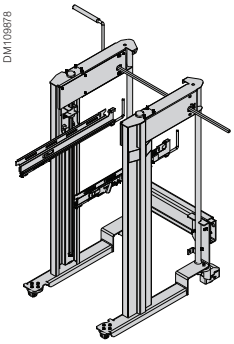
Racking Handle



This handle enables:

- The withdrawable part to be racked in/out
- The earthing switch to be open/closed

Marine Application
Extraction and Lowering Tool - Optional on Request



Adaptable to three cubicle widths, this extraction tool enables:

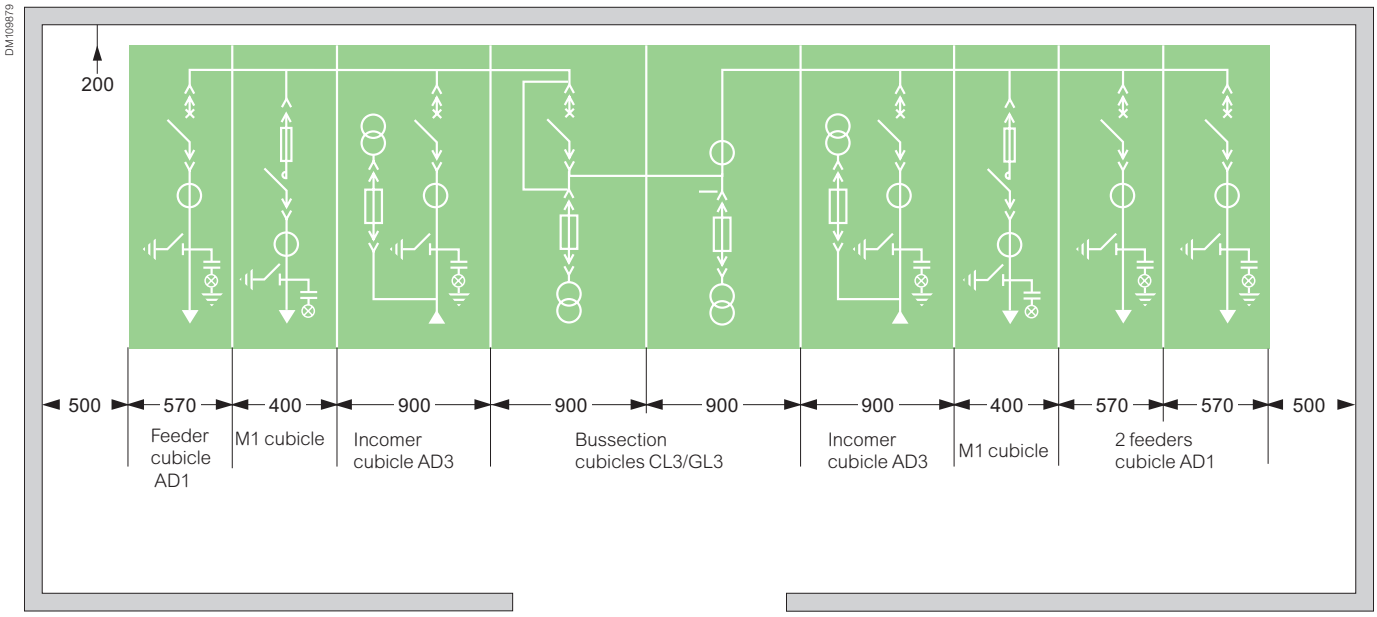
- The withdrawable part to be removed from the cubicle
- The withdrawable part to be introduced into the cubicle
- The withdrawable part to be lowered to the ground
- The withdrawable part to be lifted from the ground

Implementation Examples

MCSet123 Line-up Switchboard

Line-up Switchboard

(2 supply cubicles and 1 bus-section)



Civil Engineering with Utility Space

1. Minimum dimensions to be complied with when installing the MCSet switchboard
2. Minimum dimensions to be defined according to the cable bending radius
3. Operating distance
4. Distance needed to extract a functional unit from the switchboard without moving the other units (Cubicle depth + 200 mm)

* For High LV box door height 3000 mm.

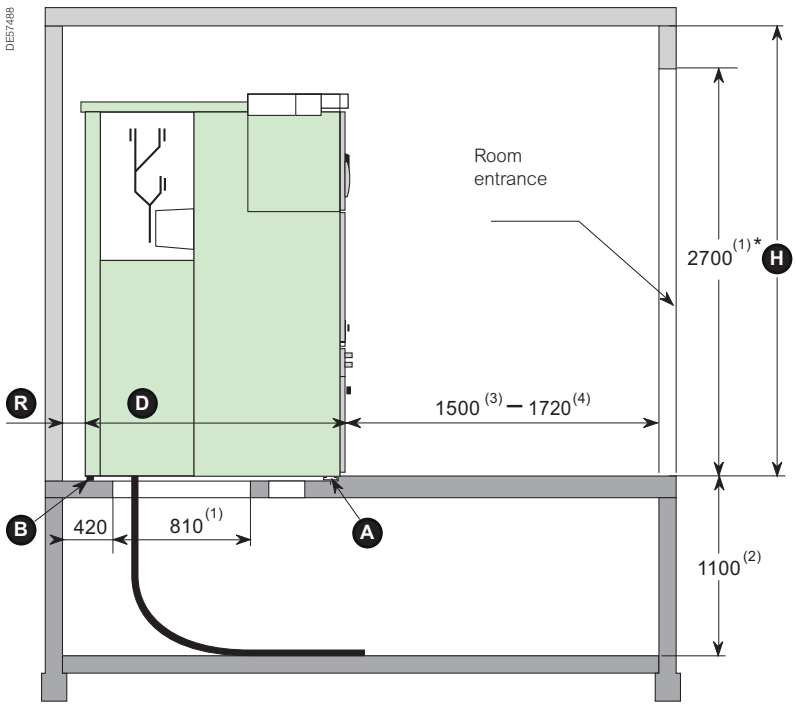
Ⓐ Anchor point.

Ⓑ Adjustment point.

Ⓗ Room height should be as per internal arc gas evacuation system. Refer Civil Engineering Manual (07897303EN).

Note: For further information, refer to the Civil Engineering Guide (07897303EN) and the User and Instruction Manual (MFR6119301).

Cubicle type/Rating	Tunnel	Ⓓ (mm)	Ⓡ (mm)
AFL ≤ 25 kA	No	1550	200
AFL ≤ 50 kA	Yes	1750	200
AFLR ≤ 50 kA	Yes	1750	800



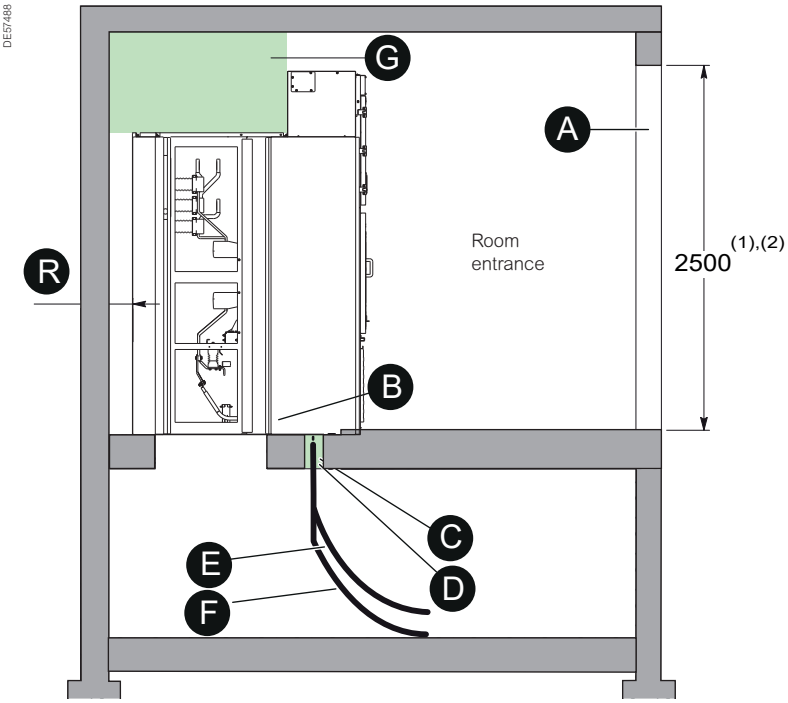
AD3 cubicle with rear cable access

Installation and Connection

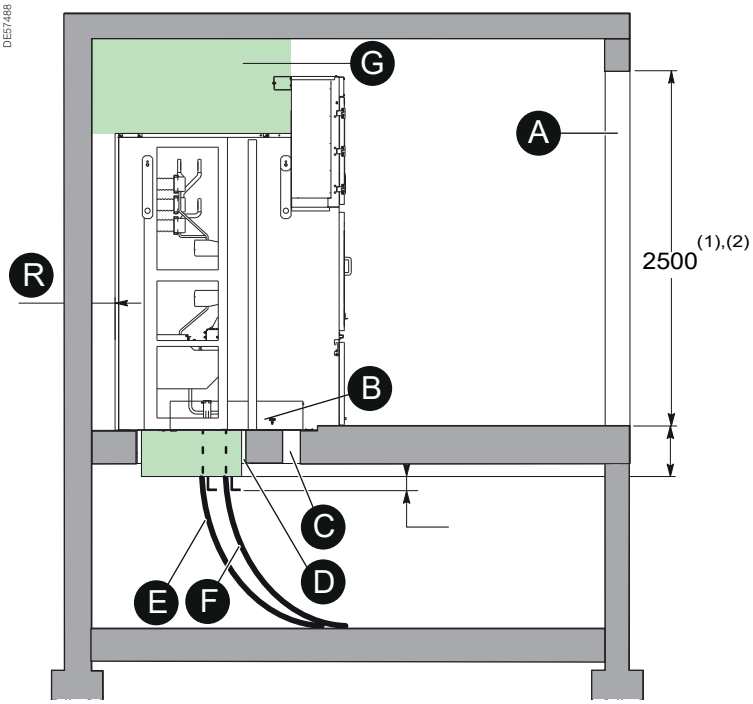
- **A** Access to the room.
- **B** Main earthing bar.
- **C** Reserved slab space (if necessary, for routing of low voltage cables).
- **D** Reserved slab space for routing of MV cables.
- **E** Medium voltage cable.
- **F** Cable connection compartment space (optional).
- **G** This space must remain free for the opening of the gas exhaust outlets in the event of internal arcing. Put nothing in this zone (lights, cable ducts, equipment storage, and so on), or if the tunnel is to be installed.

Panel type/Rating	Tunnel	R (mm)
Front cable entry AFLR	Yes	800
Rear cable entry AFLR	Yes	800
Front cable entry AFL	Yes	200
Rear cable entry AFL	Yes	200

1. Minimum dimension (in mm).
2. 2700 mm should be minimum with standard LV box. For High LV box refer project drawings.



M1 cubicle with front cable access



M1 cubicle with rear cable access

Connections

E72901R

Cold connected terminals

Schneider Electric's experience has led it to favour this technology wherever possible for optimum durability.
The maximum acceptable cable cross-section for standard assemblies are:

- 630 mm^2 for incomer or feeder cubicles with single-pole cables
- 400 mm^2 for incomer or feeder cubicles with three-pole cables
- 95 mm^2 for transformer protection cubicles with fuses

Access to the compartment is only possible when the earthing switch is closed and no voltage in the system.
Note: The cable torque is according to the manufacturer's specifications.

Switchgear Resistance to Ageing in a Substation Depends on 3 Key Factors

- **The need for correctly performed connections**
  New cold connecting technologies offer easy installation and favour durability in time. Their design means they can be used in polluted environments with harsh atmospheres.
- **The impact of relative humidity**
  The installation of a heating element is essential in climates with high relative humidities and significant temperature differentials.
- **Ventilation control**
  The dimensions of air vents must be appropriate for the dissipated energy in the substation. They must only sweep across the transformer environment.

Dry, Single Pole Cable

Short end piece, cold connectable	
Performance	3–24 kV - 400 A - 2500 A - 3150 A - 4000 A
Cross section	50–630 mm^2
Supplier	All suppliers of cold connectable terminals: Silec, 3M, Pirelli, Raychem, and so on.
Number of cables	1–8 per phase
Comments	For a greater cross-section and number of cables, contact Schneider Electric

Dry, Three-Pole Cable

Short end piece, cold connectable	
Performance	3–24 kV - 400 A - 2500 A - 3150 A - 4000 A(2)
Cross section	50–240 mm^2
Supplier	All suppliers of cold connectable terminals: Silec, 3M, Pirelli, Raychem, and so on.
Number of cables	1–4 per phase
Comments	For a greater cross-section and number of cables, contact Schneider Electric

Connection Possibilities Using Dry Cables

Number of cables	AD1	AD1 contactor	AD2	AD3	DI2
1 single per phase	●(1)	●(1)	●(1)		●
2 single per phase	●(1)	●(1)	●(1)	●	
3 single per phase	●	●	●	●	
4 single per phase				●	
1 three per cubicle	●	●	●		
2 three per cubicle	●	●	●	●	
3 three per cubicle	●	●	●	●	
4 three per cubicle				●	

(1) Possibility of installing LV toroid transformers.

Connections

Bottom Cable Connection

DE56771

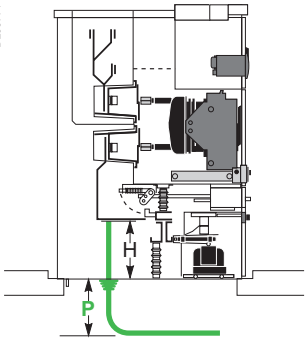


Figure 1

DE56772

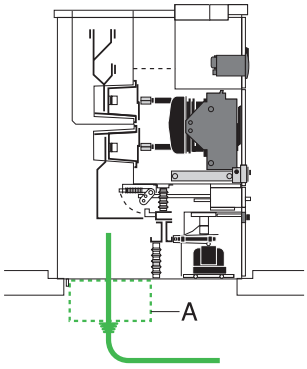


Figure 2

Cable connection height

Type of cubicle	Configuration		H (mm)
AD1–AD2	630 A	LV toroid CT	621(1)
		1 set of 3 CTs	454
		2 sets of 3 CTs	438
	1 50 A	LV toroid CT	621(1)
		1 set of 3 CTs	454
		2 sets of 3 CTs	438
AD3	1250 A	1 set of 3 CTs	477
		2 sets of 3 CTs	459
	2500 A	1 set of 3 CTs	428
		2 sets of 3 CTs	428
	3150 A	1 set of 3 CTs	404
	3600/4000 A	1 set of 3 CTs	653
DI2			450
M1		1 set of 3 CTs	525

(1) When installing a LV core balance CT, use a type ARC3 LV core balance CT when connecting with two cables (see page **77**).

- The cubicles and cables requiring the maximum depth should be taken into consideration when determining the depth **P** of a switchboard cable duct (Figure 1).
- For reconstructed cables of length exceeding 460 mm, provide for the installation of an additional compartment under the cubicle (refer A, Figure 2).

DE56774

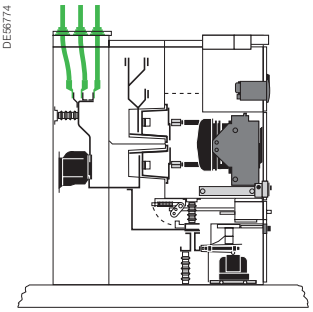


Figure 3

Top Cable Connection

(Optional, Figure 3)

Two depths are available, function of the number of cables and the internal arc withstand of the cubicle: 2000 mm and 2275 mm respectively.

DM109887

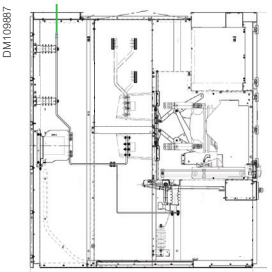


Figure 4

Top Busbar Connection

(Optional, Figure 4)

Up to 17.5 kV, the cubicle depth is equal to 2000 mm and can be equipped with 1 or 2 CTs. For a standard 24 kV cubicle, the additional depth is 500 mm.
Rated current In: 1250 A and 2500 A.

Cubicle Equipment

MCSet 17.5 kV

Equipment			Type of cubicle												
			AD1 RD1	AD2 RD2	AD3 RD3	CL1	CL2	CL3	GL1	GL2	GL3	TT1	TT2	DI2	M1
Switchgear															
Circuit breaker			●	●	●	●	●	●							
Contactor															●
Fuse switch														●	
Disconnector truck			○	○	○	○	○	○							
Earthing truck			○	○	○	○	○	○							
Fixed busbars									●	●	●	●	●		
Racking position indication contact for the withdrawable part		6 NO + 6 NC	●	●	●	●	●	●							
Padlocking of isolating shutters for withdrawable parts			○	○	○	○	○	○							
Locking of the withdrawable part/cable compartment			○	○	○	○	○	○							
Disabling of the circuit breaker operating mechanism			○	○	○	○	○	○							
Voltage present indicator			●	●	●	○	○	○				●(1)	●(1)	●	
Locking of the mechanical racking of the withdrawable part (padlock)			●	●	●	●	●	●							
Locking of the mechanical racking of the withdrawable part (keylock)			○	○	○	○	○	○							
Locking of the electromagnetic racking of the withdrawable part			○	○	○	○	○	○							
Earthing switch (SMALT)															
Earthing switch			●	●	●	●	●	●				○	○	●	
Earthing switch position indication contacts		3 NO + 3 NC	○(1)	○(1)	○(1)	○(1)	○(1)	○(1)				○(1)	○(1)	○(4)	
Earthing switch position key locking			○(1)	○(1)	○(1)	○(1)	○(1)	○(1)				●(1)	●(1)	○	
Electromagnetic earthing switch position locking			○	○	○	○	○	○				○	○		
Transformers															
Voltage Transformers (1 per phase)	Without fuse	Phase-phase		○	○		○	○		○	○		○		
		Phase-earth	○	○	○	○	○	○	○	○	○	○	○		
	With plug-in fuses	Phase-phase		○	○		○(8)	○(8)		○	○		○		
		Phase-earth	○	○	○	○(8)	○(8)	○(8)	○	○	○	○	○		
Fuse melting indication contact		1 NO	○	○	○	○	○	○	○	○	○	○	○		
Current Transformer	Single set	3 CTs	○	○	○	○	○	○	○	○	○				
	Double set	6 CTs	○	○	○										
	LV toroid transformer CT(3)		○	○											
	LPCT		○	○	○	○	○	○							
Connections															
Connection with cable terminal height > 460 mm			○	○	○									○	
Connection from top bar			○	○	○										
Connection by cable from the top			○	○	○										
Connection by cable from the bottom			●	●	●									●	
Cubicle															
Protection index(7)	Enclosure	IP3X	●	●	●	●	●	●	●	●	●	●	●	●	
		IP4X	●	●	●	●	●	●	●	●	●	●	●	●	
		IPX1	○	○	○	○	○	○	○	○	○	○	○	○	
		IPX2	○	○	○	○	○	○	○	○	○	○	○	○	
	Compartments(5)	IP2XC	●	●	●	●	●	●	●	●	●	●	●	●	
Anti-arcing protection (2)		25 kA - 1 s	○	○	○	○	○	○	○	○	○	○	○	○	
		31.5 kA - 1 s	○	○	○	○	○	○	○	○	○	○	○	○	
		40 kA - 1 s		○	○		○	○		○	○		○		
		50 kA - 1 s		○	○		○	○		○	○		○		
Thermal diagnosis system(7)			○	○	○										
Lightning arrester			○	○	○				○	○	○	○	○		
Busbars															
1250A/2500 A/3150 A/4000 A(6)		Exposed	●	●	●	●	●	●	●	●	●	●	●	●	
		Insulated	○	○	○	○	○	○	○	○	○	○	○	○	
LV control cabinet key locking			○	○	○	○	○	○	○	○	○	○	○	○	
LV control cabinet lighting			○	○	○	○	○	○	○	○	○	○	○	○	
Anti-condensation heating element			○	○	○				○	○	○	○	○	○	

●: Basic equipment. ○: Option.

(1) Basic equipment with earthing switch option.

(2) According to the room in which the MCSet switchboard is installed, you can choose an option for 3 or 4 sides, and possibly an exhaust tunnel for hot gases (see page **29**).

(3) Connection 1 or 2 cables per phase.

(4) 1 NO + 1 NC available.

(5) Compartment protection.

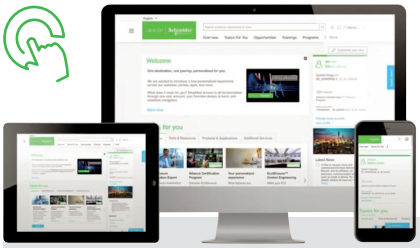
(6) For 4000 A/95 kV impulse: insulated busbar compulsory.

(7) Contact Schneider Electric.

(8) Not possible with the **earthing switch** option.

Register to mySchneider & simplify your life at all steps of your business

Connect mySchneider



Register to mySchneider portal and discover your personalized experience giving you access to tools and resources helping you being more efficient, productive, develop your skills and collaborate.

You'll get:

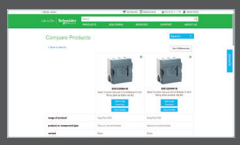
- Productivity tools
- Personalized resources
- Collaborative sales support
- Trainings

Get Support anytime

- Access 24/7 self-service, mobile catalog & access to expert help
- Offline & online catalog
- Get trainings, Advanced support

Collaborate, find solution and make business

- Get to Schneider Electric Exchange find solution develop business
- Schneider Electric Exchange is an online community where individuals can do business
- Whether you're seeking find Solutions or have products, services, and advice to share
- We'll help you connect with peers, technology partners, and experts to gain a competitive edge



Select and Design

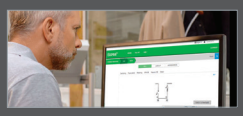
Advanced WEB functionalities that help to:

- Select and compare components
- Build easily your technical documentation with ready to use tools (CAD, export files…)

Manage your installed base

Digital Logbook, where you can find all of the documents you'll need during your circuit breakers' manufacturing, installation, operation, and maintenance from anywhere, in a single, secured paperless environment.

- User manuals
- Design drawings
- Single-line drawings
- Factory and site acceptance tests
- Spare parts lists
- Maintenance records, schedules and more



Configure and Quote

Simplified and validated configuration

- Always updated technical content
- Ready to use data and documentation for your projects
- Last minute changes
- Manage and track your orders

Notes

Life Is On | Schneider Electric

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