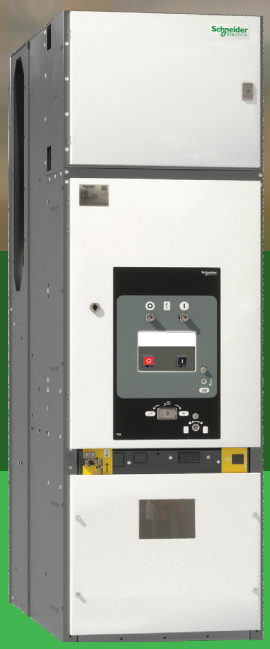
EcoStruxure™
Innovation At Every Level

PIX

Air insulated switchgear

Catalog 2023

Up to 24 kV, up to 40 kA, up to 4000 A
With Evo**Pact** HVX circuit breaker



se.com/pix

Life Is On | Schneider Electric

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PIX



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Your concerns

Our solutions

Safety



Operator and equipment protection

- Protection against internal arc according to the latest IAC test AFLR, 40 kA, 1s
- Quick arc flash detection with our sensors to limit the impact of an internal arc
- Remote operation with motorized switchgear and digital control
- Thermal monitoring with our TH110 sensors and environmental monitoring with our CL110 sensors, for realtime online information about health status, available 24/7

Reliability



Reliable power supply

- PIX is compliant with IEC standards for metal enclosed switchgear and tested according to IEC 62217-200: 2011
- It is designed for extended use under harsh environment thanks to a vacuum circuit breaker and SE-high quality approach
- User-friendly and ergonomic operator interface to avoid any misuse
- Vacuum technology for minimal maintenance

Flexibility and Ease of use



Flexible & Easy to use

- Efficient tools helping you to save time at every step, from design and deployment to operations:
  - QR-code to provide all product information
  - Cyber secure – compliant with the latest standards
  - Environmental sensors for online health status
- Front and rear cable access for flexible installations
- Green premium product to minimize environmental impact

Overview

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Field of application

PIX switchgear with vacuum circuit-breaker has been designed for the various operating requirements in public and industrial medium-voltage distribution systems.

Applications

PM106266



Power supply companies

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

PM106267



Industry

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

PM106662



Infrastructure

- Airports
- Tower blocks
- Water plants

PE90958_2



Marine

- Cruisers
- Container ships
- Off-shore platforms
- Army navy ships
- LNG ships

PM106663



Extra large data center

Safety

PM108204



Operator protection

- Protection against unintended contact where all switchgear components are in a complete metal enclosure.
- PIX has been type tested for the Internal Arc Classification in accordance with IEC 62271-200: 2011, achieving an AFL or AFLR protection.
- Different solutions for gas exhaust are available: outside the switchgear room with tunnel, inside the switchgear room with tunnel and gas absorber or with deflector.
- All operations are carried out from the front with the door closed which enables the operator to see the status of the switchgear without exposure.
- Mechanical and electrical interlocks have been designed to guide the operator and improve operations. These can be reinforced using key-operated locks or padlocks.
- Cubicles are fitted with different types of voltage indication devices, present on the front door of each functional unit checking the presence of voltage of multiple cubicles can be completed in the blink of an eye! Check voltage, before operating the earthing switch:
  - Voltage Presence Indicators (VPIS)
  - Voltage Detecting Systems (VDS)
  - Voltage Detecting and Indicating System (VDIS).
- Motorization of the circuit breaker and the earthing switch allow full remote operation and control avoiding to stand in front of the panels.
- PowerLogic PD100 (Partial Discharge monitoring) as an option can be provided as per customer request.

PM108835



Equipment protection

- PIX includes active protection against an internal arc by fast switching. An internal arc limiter quickly detects an internal arc and switches off in order to limit the damage to the switchgear and the switchgear housing
- Two systems are available to detect the light caused by an internal arc and to switch off the upstream breaker:
  - VAMP-system with optical sensors
  - Schneider Electric protection relay series "Easergy P3 or P5" with integrated optical sensors

PM106411



Vamp 125

PM106574



Easergy P3

Reliability

A fundamental quality requirement for a global leader

PM108834



A wealth of experience

- Compliant with IEC standards AC metal enclosed switchgear for rated voltages above 1 kV and up to 52 kV
- More than 50 years of experience in medium voltage switchgear design
- The PIX platform has been installed worldwide in very harsh environments providing electrical distribution

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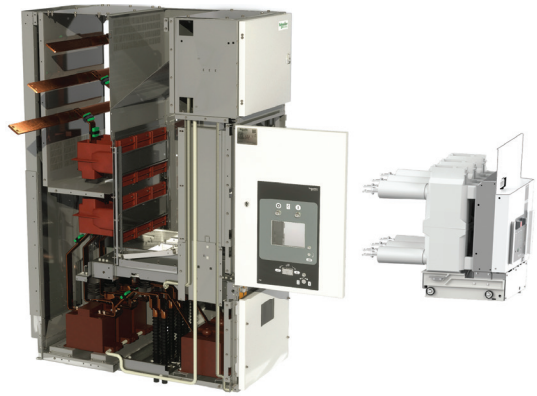



High quality design

- PIX switchgear only uses key Schneider components that are designed in-house: breakers (mechanism, VI bottles), main busbars and contacts, earthing switches, etc.
- Simulation of di-electric strength, temperature rise and internal arc behaviour helps to optimize critical parts
- Design Failure Mode and Effect Analysis (DFMEA) ensures reliable parts
- Even without auxiliary voltage all operations can be executed manually
- Busbar segregation is available as an option

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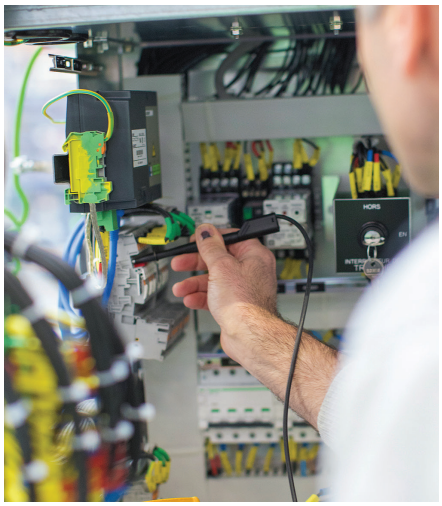

Independant type tests and systematic checks

Design tests

Specific design tests are performed to check behaviour of aging in specific environmental conditions.

Type tests

The electrical and mechanical performance of PIX have been proven successful by comprehensive type tests.These type tests were performed in independent and accredited laboratories in accordance with IEC international standards.

Factory acceptance test

Each PIX functional unit undergoes a systematic routine test during production to verify conformity with the relevant standards and targeted performances.

Flexibility and Ease of Use

Easy operation providing service continuity

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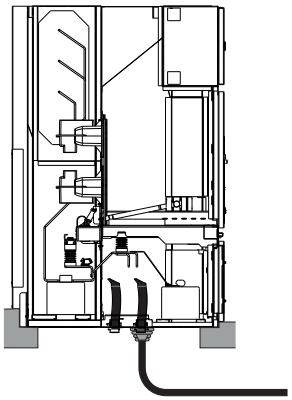

Easy to install

PIX architecture has been designed to accomodate a wide range of installation requirements depending on the architecture of the switchgear room in buildings, containers, E-Houses, Marine environment, etc.

- Connections with cables or busbars
- Entry of cable or busbar into the panel from bottom side or from top side
- Access to cable or busbar connections from front side or from rear side for flexible installations
- Face to face or back-to-back installation

Easy access of technical support

PIX embarks Schneider Electric digital innovation targeting to ease customer life:

- A QR code is on the front plate of each circuit breaker: scanning it provides access to a web page displaying technical informationSchneider Electric has set up call centers
  and e-mail contacts in more than 190 countries to provide a rapid response to customer inquiries. Personnel in each country using PIX are trained to provide qualified answers to customer questions
- A service contract for the switchgear room can be provided by the local Scneider Electric service team with packages such as predictive maintenance, preventive maintenance, 24/7 hotline, emergency on-site intervention, and emergency spare part delivery. The availability of the service plan offer varies in different countries

Easy to operate

- Intuitive single line diagrams on the front door of each functional units provide a clear description of the cubicle components and power flows. This helps to optimize operations
- PIX design allows direct switching of the circuit breaker from the front door to ensure better service continuity

Versatile for many applications and switching conditions

PIX includes special vacuum circuit breaker for generator switching and contactors for motor switching. Tested under Marine conditions, seismic stress and low temperatures it can be used in many geographies under different ambient conditons.

Versatile constructions follow the specific conditons in Marine, Oil&Gas, automotive segments with limited space, harsh environmment and high demand on reliability.

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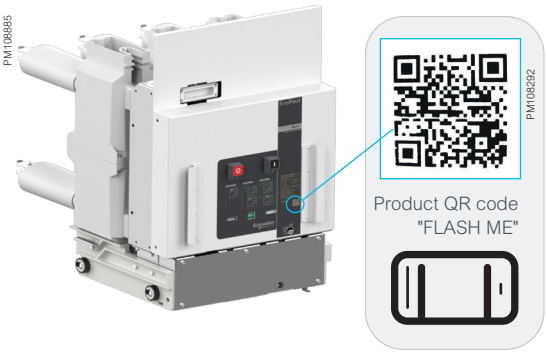


Compact design

The compact design of PIX helps to reduce the footprint in the installations.

- Width: 650/750/800/1000 mm
- Depth: 1405/1505/1605/1805 mm
- Height: 2150/2250/2350mm, additional height for arc tunnel 600 mm

EcoStruxure™ ready solutions

What is EcoStruxure™?

500 000

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

EcoStruxure™ ready

Efficient asset management

Greater efficiency with **predictive** maintenance helping to reduce downtime

24/7 connectivity

Real-time data **everywhere anytime** to make better-informed decisions

Increased safety

Proven design and experience combined with fast **embedded arc detection** to enhance people's safety and equipment's protection

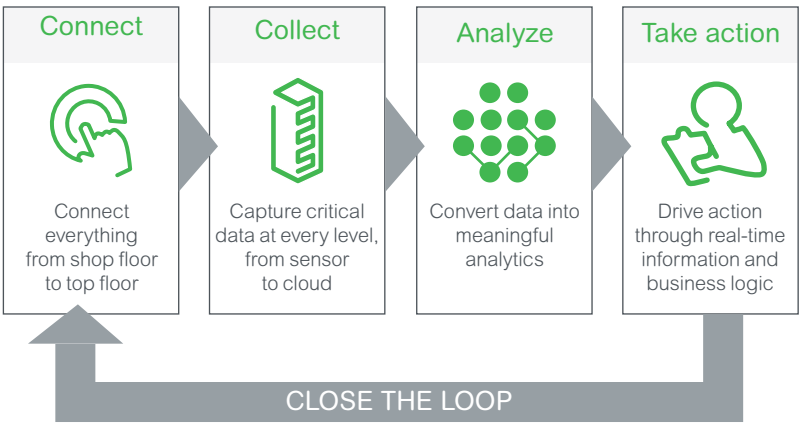
EcoStruxure™ is our open, interoperable, IoT-enabled system architecture and platform. EcoStruxure delivers enhanced value around safety, reliability, efficiency, sustainability, and connectivity for our customers. EcoStruxure leverages advancements in IoT, mobility, sensing, cloud, analytics, and cybersecurity 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



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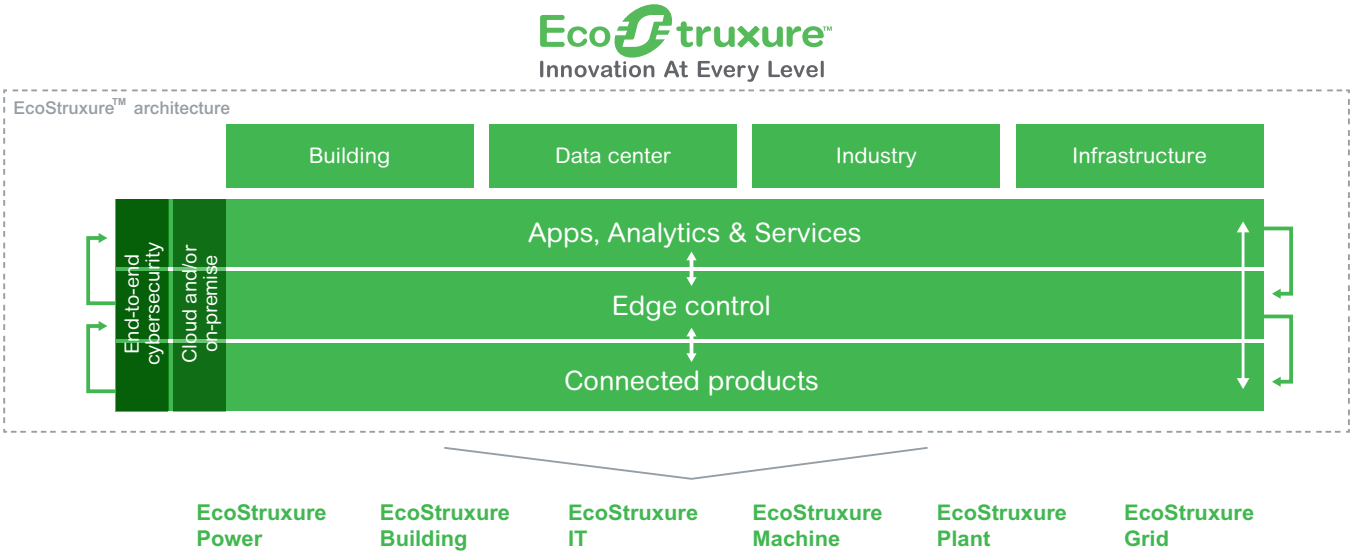


EcoStruxure™ ready solutions

EcoStruxure Grid

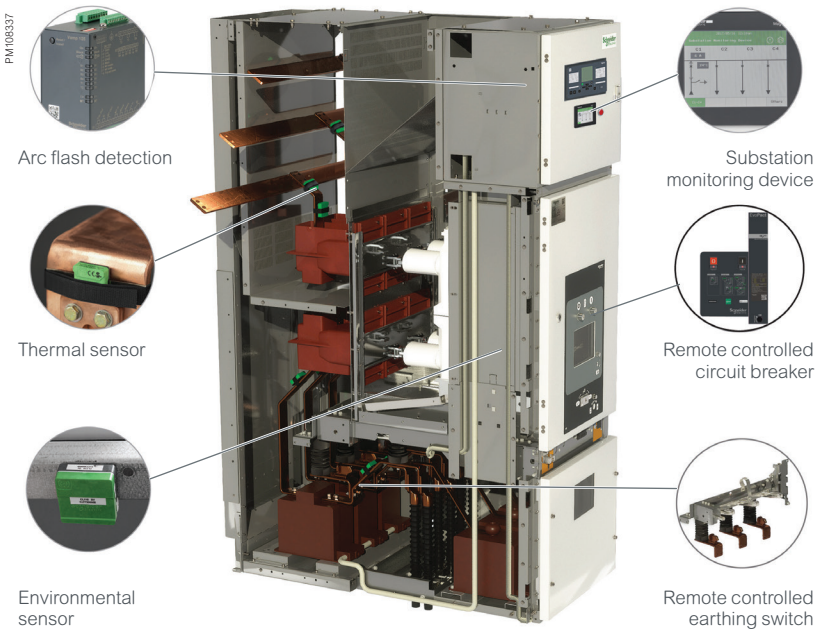
Enable nearby control, ensure safety and uptime

All the Schneider Electric protection, metering and control devices can be connected to our Substation monitoring device.

The Human-Machine Interface (HMI) can be installed anywhere within the substation to allow local control and monitoring, independent of any external systems.

The monitoring information and control functions can be scaled to the needs of each customer.

Optionally, the Magelis control and monitoring functions can be mirrored on a tablet through Wifi connection thanks to our Vijeo Design Air application. The technician can operate the switchgear remotely, while maintaining visual contact with it.



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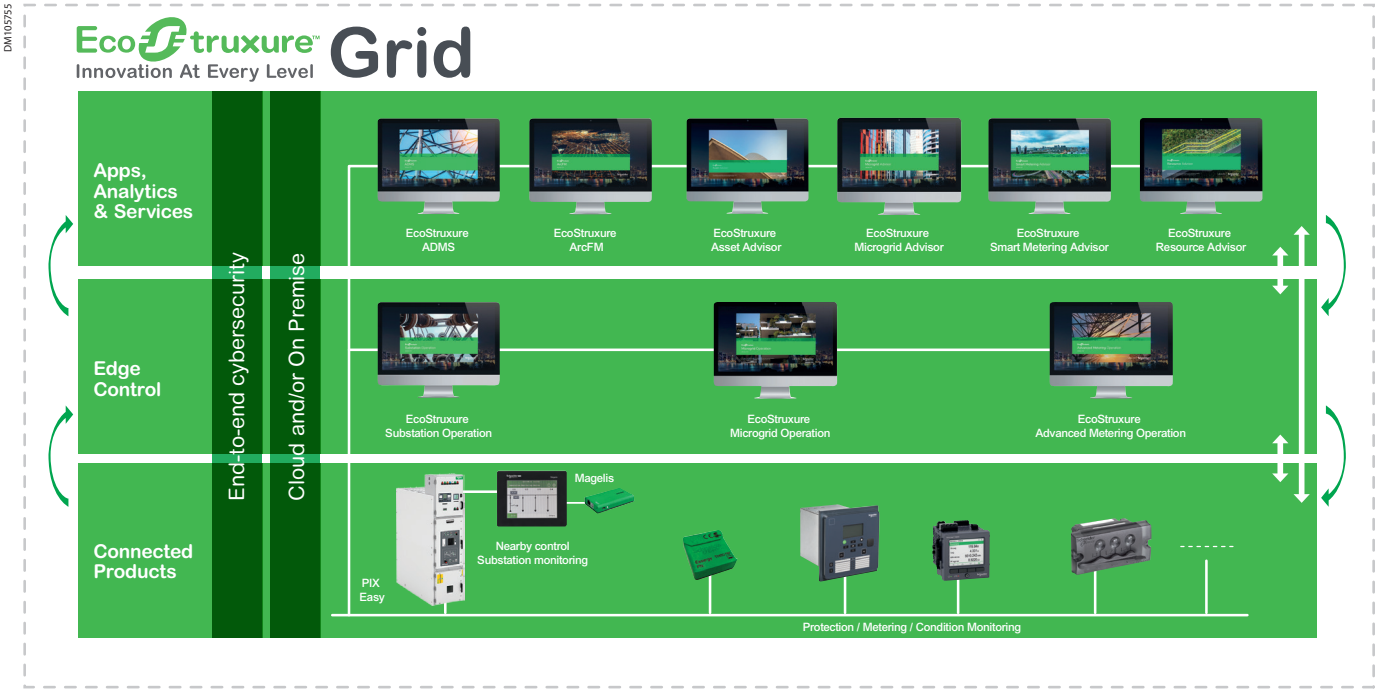

EcoStruxure™ ready solutions

EcoStruxure Power

Power distribution is changing

The world is getting smarter. Every day, it is becoming more decentralized, decarbonized, and digitized. And as your products become more connected, so do you.

With these innovations come increased demand, new regulations, and an opportunity to improve your existing infrastructure.

That's why it's more important than ever to install equipment, software, and services that will **keep everything running smoothly in the present, and prepared for the future.**

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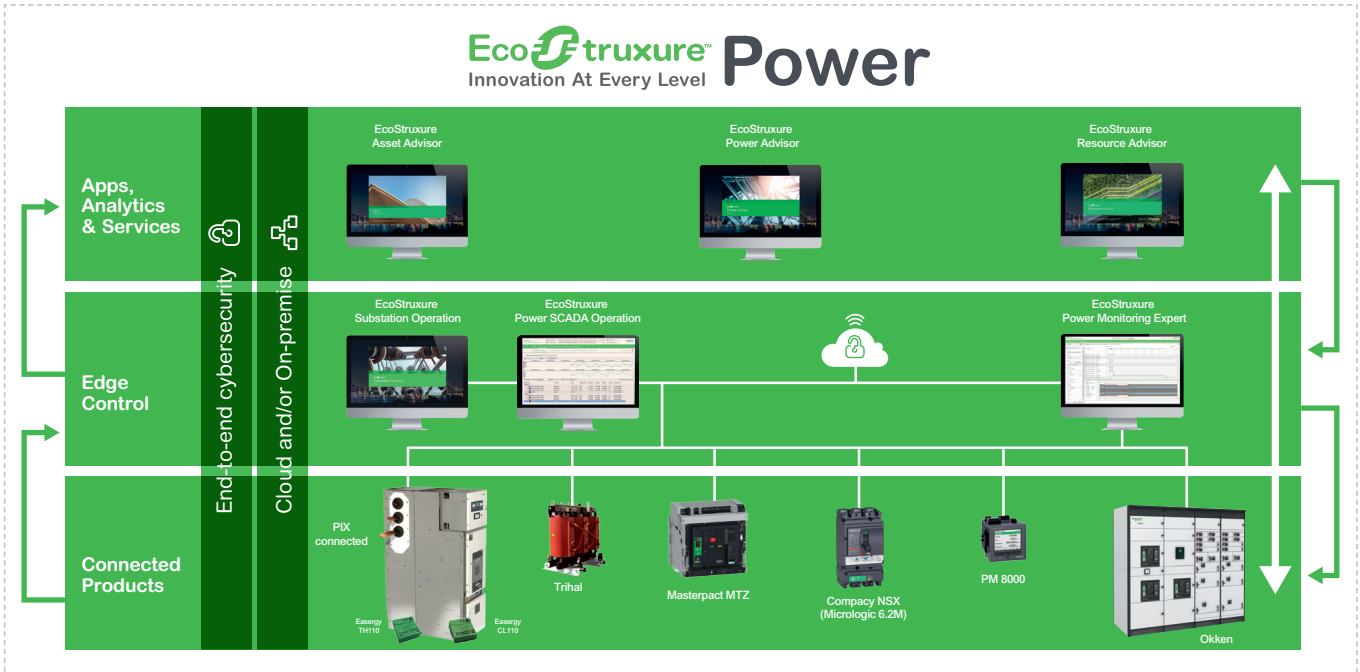


EcoStruxure™ ready solutions

Smart protection for distribution networks

Easergy P3

PM107987



The Easergy P3 protection relay family has been developed to cover standard protection needs for industrial and commercial building applications.

Thanks to its cost-effective and flexible design, Easergy P3 provides an alternative for various protection applications.

User-friendliness has always been a value of Schneider Electric products, and the Easergy P3 is no exception, with the unique possibility to operate through your smartphone or tablet with the “Easergy SmartApp”.

Rapid setup is achieved with the unique “eSetup Easergy Pro” software which improves usability.

Easergy P5

PM107994



Features

The Easergy P5 presents a major step forward for protection relays, bringing the most sought-after features together in one device.

Benefits

- **Industry-leading protection and control functions** with built in **arc-flash protection**, latest cybersecurity and nearby operation with a mobile application
- Go beyond withdrawable with its unique design and industry-leading 10-minute recovery time
- **Easy to install, use and maintain** meaning simple integration and engineering for panel builders, and reduced total cost of ownership for end-users
- **Advanced connectivity** with support for seven communication protocols, including **IEC 61850** compliance
- The Easergy P5 is even more powerful and is connected to its comprehensive digital toolbox, which includes: **EcoStruxure Power Build - Medium Voltage, eSetup EasergyPro**, embedded web server, EcoStruxure Power Device app. and mySchneider mobile applications.

Easergy MiCOM

PM106625



Offers scalable levels of functionality and hardware options to suit your protection requirements, and allows you to choose a cost effective solution for your application.

The versatile hardware and common relay management software (Easergy MiCOM S1 Studio) provides simple configuration and installation for different applications.

A standard and simple user interface across the entire range makes Easergy MiCOM ideal in any environment, from the more complex bay level control with mimic, to the most simple LCD display with menu interrogation.

Easergy Sepam

Easergy Sepam series digital protection relays take full advantage of Schneider Electric’s experience in electrical network protection.

PM106624



They provide the necessary functions:

- Effective fault diagnosis and protection planning
- Accurate measurements and detailed diagnosis
- Integral equipment control
- Local or remote indication and operation
- Easy upgrading: communication, digital I/O, analog outputs, or temperature acquisition systems can be added, due to its modular design

EcoStruxure™ ready solutions

Real-time condition monitoring to optimize asset availability

Easergy CL110 ambient monitoring

The Schneider Electric ambient monitoring system will continuosly:

- Help the maintenance manager to monitor ambient moisture and pollution which are harmful to the switchgear
- By automatically calculating the condensation cycle, and combining it with the declared mission profile conditions, the system will recommend maintenance and cleaning frequency adjustment in order to maintain the switchgear in its nominal status

Easergy TH110 thermal monitoring

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 equipments safety
- Optimize and predict maintenance

Thanks to its very compact footprint and its wireless communication, Easergy TH110 has a simple and global installation for a wide range of critical points without impacting on the performance of MV switchgear.

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

Easergy TH110 is self powered by the network current and it can ensure high performance providing accurate thermal monitoring.

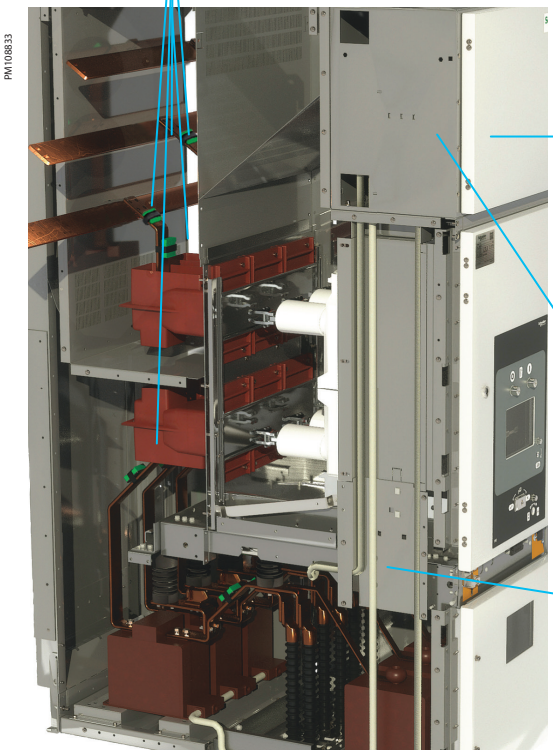


PM105623b

TH110

Characteristics

Power supply	Self powered. Energy harvested from power circuit.
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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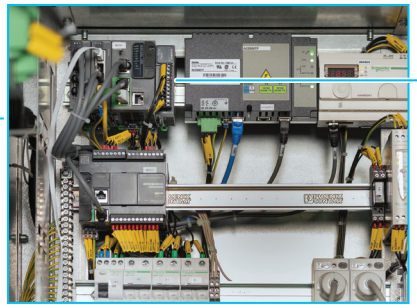
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CL110

EcoStruxure™ ready solutions

EcoStruxure™ Asset Advisor

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Asset Advisor Dashboard

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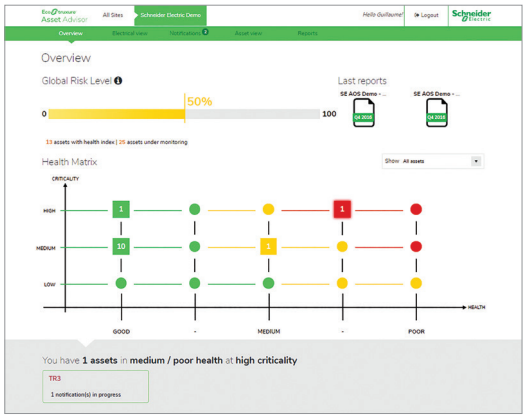


Asset Health Matrix

Schneider Electric approach cybersecurity as a group...

- Data collected through secured gateways
- Secured data transport to prevent data access or manipulation
- Your data are hosted in Schneider Electric Data Center
- Results displayed on secured dashboard (reports, diagnostics, notifications...
- You remain the owner of your data.

Clic **here** to download the free version of

EcoStruxure Asset Advisor

Apps, analytics & services to improve operations efficiency

Imagine having access to key data about your electrical distribution equipment whenever you need. And experienced professionals who help you make better informed decisions.
That's what you get with EcoStruxure Asset Advisor from Schneider Electric connected service.
You know exactly which assets need to be serviced or replaced. So you can better plan your expenses.

Are you...

- Planning to introduce Condition Base Maintenance (beyond corrective and regular maintenance) with benefits associated to reduced time to adress an issue ?
- Looking for innovative solutions to scale their corporate reliability programs? Mostly started on rotatory machines before.
- Striving to dive into IoT complexity with actionable deliverables (not operational alarming)? Or get them defined by manufacturer.

Our EcoStruxure Asset Advisor solution

- Support your journey into predictive maintenance
- Designed for risk of failure mitigation and maintenance optimization
- Turning your data into short term actions and long term decisions
- Our platform is ready-to-use by plug-in connectable electrical assets under our flexible model.
- EcoStruxure Asset Advisor brings tangible benefits on failure risk mitigation and maintenance optimization.

Operation Performance

- Lower unscheduled downtimes
- Increased asset useful life
- Reduce time to fix
- Better compliance with regulations

Financial Efficiency

- Lower Total cost of Ownership (TCO)
- Decreased failure cost
- Decreased average maintenance cost/fix

Safety

- Reduced personnal risk through:
  - Maintenance expertise continuity in high turnover environment
  - Early warming of impending equipment failures

Peace of Mind

- New asset ecosystem insights
- Consistent experience across sitest
- Right people at the right time

Quality assurance

Quality certified to ISO 9001

The Quality Management System for the development, production, sales and servicing of PIX has been certified in accordance with ISO 9001:2015.

DM107623

Certified quality: ISO 9001

At Schneider Electric, customer satisfaction is the Number One priority for everybody:

- We find a solution for each of our customers
- We are enthusiastic about our customers; our thinking and actions are clearly customer-oriented
- We encourage and train our staff to quality requirements

Each Schneider Electric production site has an established functional organization which ensures, monitors and improves quality in line with norms and standards.

This process is:

- Uniform across all sites
- Acknowledged by many customers and recognized organizations

Above all, there is a strict Quality Management System which is audited on a regular basis by the international independent certification company Bureau Veritas.

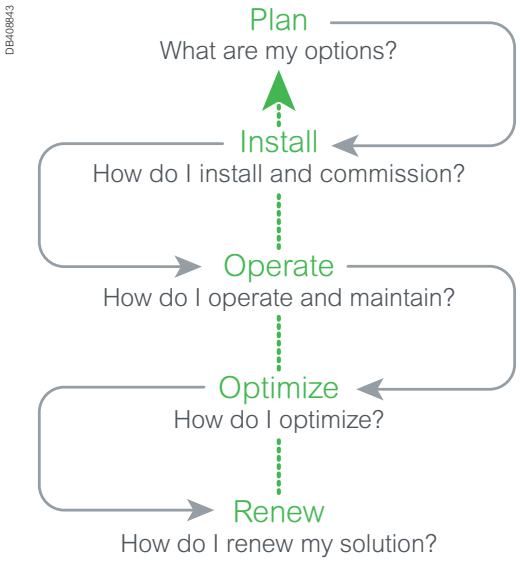
Schneider Electric Services

Greater peace of mind throughout your installation lifecycle

How can you cut costs and improve performance at the same time?

When it comes to your electrical distribution infrastructure, the answer is straightforward: get professional expertise.

Lifecycle services



When it comes to your electrical distribution installation, we can help you:

- Mitigate risk and limit downtime
- Keep equipment up to date and extend lifespan
- Cut costs and increase savings
- Improve your return on investment

CONTACT US!

https://www.schneider-electric.com/en/work/services/

Plan

Schneider Electric helps you plan the full design and execution of your solution, looking at how to make your process more dependable and optimize time:

- **Technical feasibility studies:** Design a solution in your environment
- **Preliminary design:** Accelerate turnaround time to reach a final solution design

Install

Schneider Electric will help you to install more efficient, more reliable solutions based on your plans.

- **Project management:** Complete your projects on time and within budget
- **Commissioning:** Ensure your actual performance matches the design, through on-site testing and commissioning, tools, and procedures

Operate

Schneider Electric helps you maximize your installation uptime and control your capital expenditures through its service offering.

- **Asset operation solutions:** Provide the information you need to enhance installation performance, and optimize asset maintenance and investment
- **Advantage service plans:** Customize service plans that include preventive, predictive, and corrective maintenance
- **On-site maintenance services:** Deliver extensive knowledge and experience in electrical distribution maintenance
- **Spare parts management:** Ensure availability of spare parts and an optimized maintenance budget for your spare parts
- **Technical training:** Build necessary skills and competencies to properly operate your installations

Optimize

Schneider Electric proposes recommendations to help with availability, reliability, and quality.

- **MP4 electrical assessment:** Define an improvement and risk management program

Renew

Schneider Electric's solutions extend the original life of your system, while providing upgrades.

Notes

Range description

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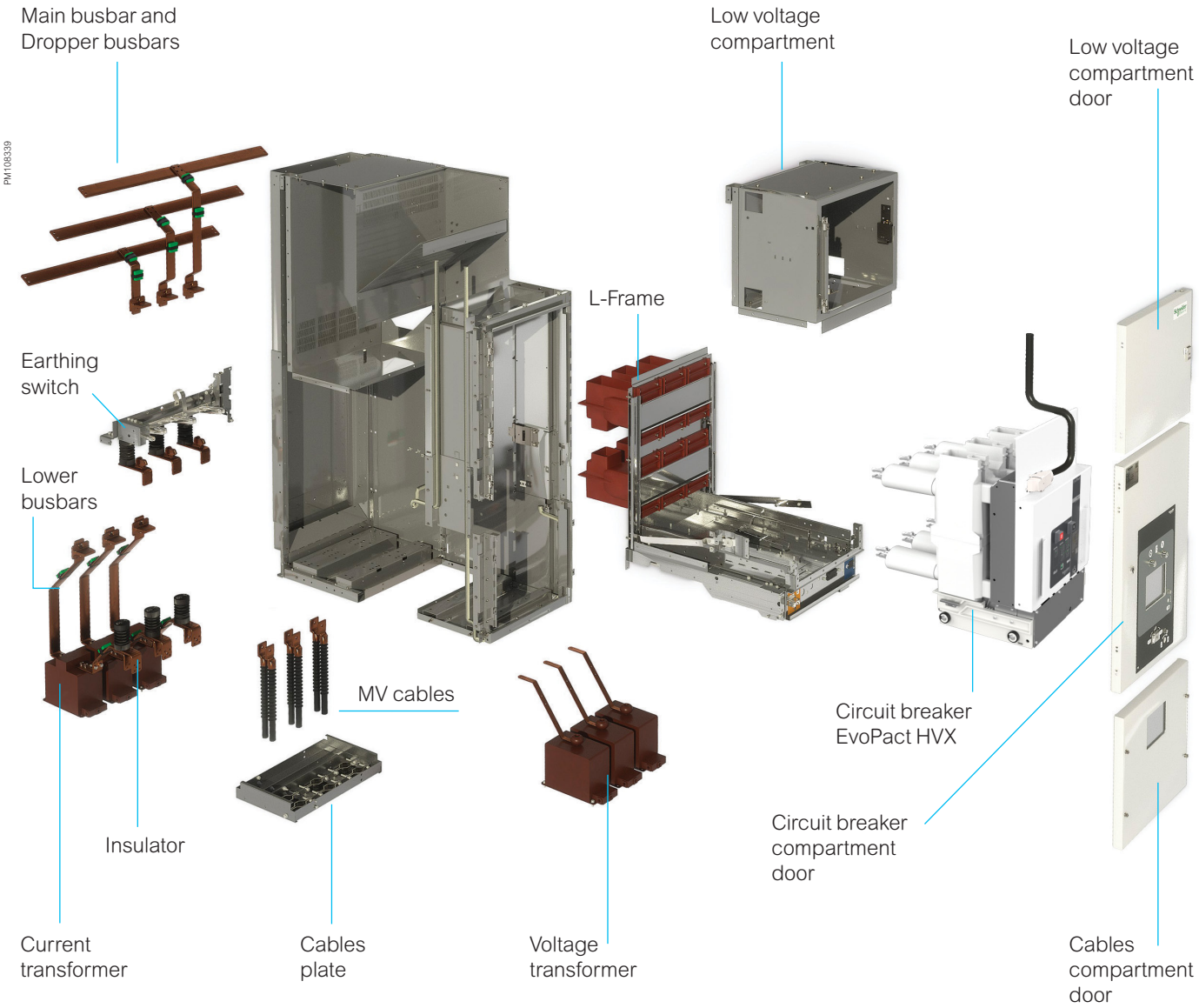
Description



Description

PIX switchboard components

- PIX switchboards consist of several 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 unit's earthing busbar to the switchboard's 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. 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

LSC2B (Loss of Service Continuity IEC 62271-200: 2011)

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

The cubicle

The high voltage part of the cubicle is separated in 3 compartments using metal partitions (PM class):

- Busbars compartment
- Cables compartment
- Compartment for switching device

Each compartment is connected to earth. These partitions are defined Loss of Service Category class "LSC2B-PM" by IEC standard IEC 62271-200: 2011.

When a compartment containing a main circuit is open, the other compartments and/or functional units may remain energized.

The high voltage compartments consists of:

- The metal frame
- The high voltage copper bar connections
- The main switching device (circuit breaker, contactor or disconnector on a truck)
- The earthing circuit
- The metering devices (current and voltage measuring, voltage indication)

The low voltage auxiliaries and monitoring unit are in a control cabinet separated from the medium voltage section.

The following basic cubicle layouts are offered:

• Incomer or feeder	**F**
• Bus section coupler	**BSC**
• Bus section riser	**BSR**
• Busbar metering and earthing	**BME**
• Feeder with contactor	**FC (PIX-M)**
• Feeder with switch	**FS**

Technical characteristics

Normal operating conditions according to IEC 62271-200: 2011 and IEC 62271-1: 2017

Rated voltage	Ur	kV	12	17.5	24
Rated power frequency withstand voltage - 1 min	Ud (3)	kV	28	38	50
Rated lightening impulse withstand voltage - peak	Up	kV	75	95	125
Rated frequency	f	Hz	50/60	50/60	50/60
Rated short circuit breaking current	Isc	kA	up to 40	up to 40	up to 31.5
Rated peak withstand current	Ip @50Hz	kA	100	100	80
	Ip @60Hz	kA	104 (2)	104 (2)	82 (2)
Rated duration of short circuit	tk	s	3	3	3
Rated current busbar, max	Ir bb	A	up to 4000 (1)	up to 4000 (1)	up to 3150 (4)
Rated current circuit breaker	Ir	A	630	630	630
	Ir	A	1250	1250	1250
	Ir	A	2000	2000	2000
	Ir	A	2500	2500	2500
	Ir	A	3150	3150	3150 (1)
	Ir	A	4000 (1)	4000 (1)	
Rated current contactor (see detail in PIX-M)	Ir	A	195	NA	NA
Rated current switch disconnector	Ir	A	630	630	630
Rated current fused switch disconnector	Ir	A	200	200	200
Internal arc classification					
Internal arc	Isc	kA	40	40	31.5
Arc duration	t	s	1	1	1
Classification			AFLR	AFLR	AFLR
Degree of protection					
Enclosure	StandardOption		IP3X	IP3X	IP3X
			IP4X	IP4X	IP4X
Between compartments			IP2X	IP2X	IP2X

(1) Forced cooling / **(2)** 60 Hz / **(3)** Ratings above IEC on request / **(4)** On request – to be evaluated with SLD

PM108840



IAC (Internal Arc Classification)

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

For identification purposes in terms of the different sides of the enclosure, the following code shall be used (according to the IEC 62271-200: 2011 standard):

- **A**: 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 & Standards

PM106682



Standards

The PIX meets the following international standards:

- **IEC 62271-1: 2017**: High-voltage switchgear and controlgear: common specifications
- **IEC 62271-200: 2011**: AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kA
- **IEC 62271-100: 2008**: High-voltage switchgear and controlgear - Alternating current circuit-breakers
- **IEC 62271-106: 2011**: High-voltage switchgear and controlgear - Alternating current contactors, contactor-based controllers and motor-starters
- **IEC 60282-1: 2020**: High-voltage fuses - Current-limiting fuses
- **IEC 62271-102: 2018**: High-voltage switchgear and controlgear - Alternating current disconnectors and earthing switches
- **IEC 60255-1: 2009**: Measuring relays and protection equipment - Common requirements
- **IEC 61869-2: 2012**: Instrument transformers - Current transformers
- **IEC 61869-3: 2011**: Instrument transformers - Inductive voltage transformers
- **IEC 60044-8: 2008**: Instrument transformers - Electronic current transformers

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 (-25°C on request)

Altitude

- Less than or equal to 1000 m;
- Above 1000 m, a derating coefficient is applied (please consult us)

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 (please consult us)

PIX has been developed to meet the following specific conditions:

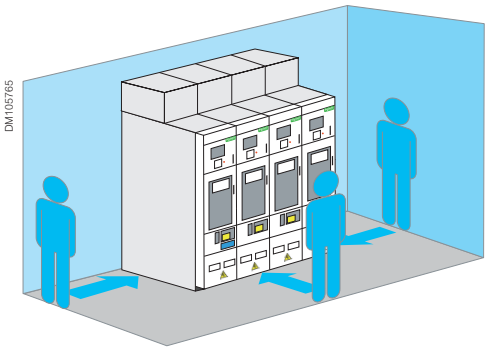
- High ambient temperature (possible derating)
- Corrosive atmospheres, vibrations, (possible adaptation)

Storage conditions

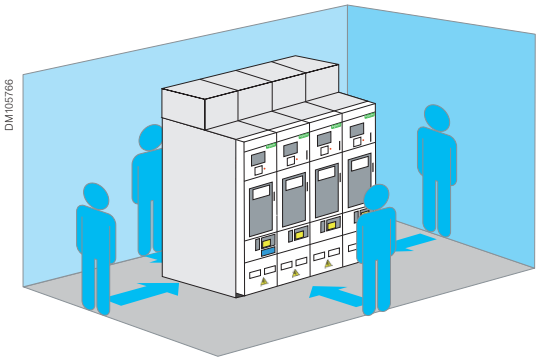
In order to retain all of the functional unit's qualities when stored for prolonged periods, we recommend that the equipment is stored in its original packaging, in dry conditions, and sheltered from the sun and rain at a temperature ranging from - 25°C up to + 55°C.

Protection of people

Internal Arc classification



Internal arc classification IAC: accessible sides FL



Internal arc classification IAC: accessible sides FLR

IAC	**I**nternal **A**rc **C**lassification
A	Accessibility **A** Restricted to authorized personnel only
F	For **f**ront side
L	For **l**ateral side
R	For **r**ear side
40 kA	Arc fault current **40 kA**
1s	Arc fault duration **1 s**

Example of PIX with internal arc classification IAC

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: 2011 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 criteria 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 PIX, access via the front and the side walls is standard (IAC A FL)
  - The switching compartment depth can be minimized by wall-mounting the switchgear
  - In this design, the PIX 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 PIX 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)

Marine applications

PM106686



A Marine version has been developed to meet specific conditions when used on ships or offshore platforms (vibration, inclination, dry heat, damp heat, cold).

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).

PIX 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 caused by 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
- Skids are available as an option to group together several cubicles on a platform for improved rigidity
  They also facilitate handling and installation of the switchboard.
- Motor starter applications: see PIX with contactor

Environmental conditions

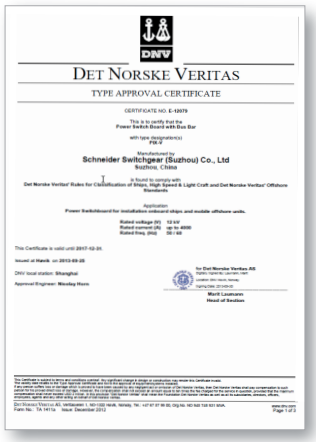
Ambient temperature		-5 to +45°C
Humidity	Over 24 h	95%
	Over 1 month	90%
Vibrations (IEC 60068-2-6)		
Frequency range	**Displacement**	**Acceleration**
2 to 13.2 Hz	± 1.0 mm	
13.2 Hz - 100 Hz		0,7 g

Certifications

PIX Marine			
Panel		**Vacuum CB**	**Vacuum contactor**
BUREAU VERITAS	Bureau VERITAS (BV)	Bureau VERITAS (BV)	Bureau VERITAS (BV)
DNV	DNV-GL	DNV-GL	DNV-GL

For other certifications please contact Schneider Electric.

PM108841


DNV

DET NORSKE VERITAS

TYPE APPROVAL CERTIFICATE

PM108842


TYPE APPROVAL CERTIFICATE

Marine applications

Characteristics for Marine applications

Operating conditions according to IEC 62271-200: 2011 and IEC 62271-1: 2017 and specific environmental conditons for Marine application

Rated voltage	Ur	kV	12	17.5
Rated power frequency withstand voltage - 1 min	U d	kV	28	38
Rated lightening impulse withstand voltage - peak	Up	kV	75	95
Rated frequency	f	Hz	50/60	50/60
Rated short circuit breaking current	Isc	kA	up to 40	up to 40
Rated short circuit withstand current	Ip	kA	104	104
Rated duration of short circuit	tk	s	3	3
Rated current busbar, max	Ir	A	up to 4000	up to 4000
Rated current circuit breaker	Ir	A	1250	1250
	Ir	A	2000	2000
	Ir	A	2500	2500
	Ir	A	3150	3150
	Ir	A	4000 (1)	4000 (1)
Rated current contactor	Ir	A	195	–

(1) Forced cooling

PM106692



PM106687



PIX Marine design

With Marine specificities (anti-rolling features, handle).
Please contact Schneider Electric for IP42.

PM108843



Function/module description

Functional overview	**28**
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Busbar Voltage Metering&Busbar Earthing - BME type cubicles	32
Feeder with contactor - PIX Motor control center	33
Feeder with fuse switch - FS type cubicle	34
PIX Duplex	35

Functional overview

Choice of functional units

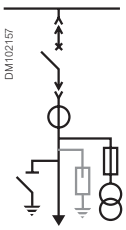
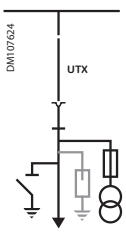
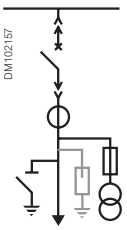
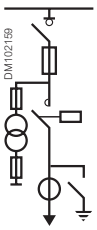
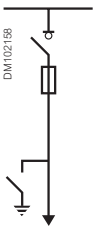
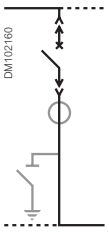
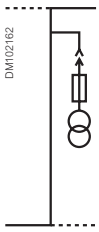
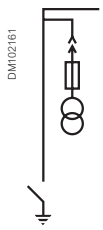
PIX has a comprehensive range of functions to suit all requirements for many applications.

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 **feeder-transformer-circuit breaker.**
The corresponding functional unit and panel architecure will therefore **be a feeder**.
The main functions of the equipment are shown below.

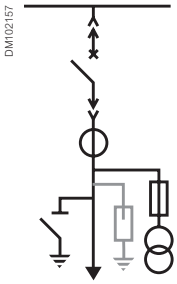
Additional functions are available upon request to answer specific requirements.

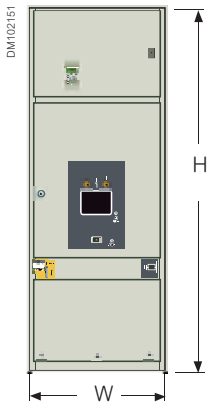
PANEL ARCHITECTURE	Feeder					Bus coupler	Bus riser	Busbar metering&busbar earthing	
APPLICATION	**Line transformer generator**	**Line**	**Line transformer motor capacitor**	**Motor capacitor**	**Auxiliary transformer**	**Bus section coupler**	**Bus section riser**	**Voltage transformer**	**Earthing switch**
Main device	Circuit breaker	Disconnector or fix copper bar	Circuit breaker	Contactor with fuse	Load break switch with fuse	Circuit breaker	Voltage transformer, disconnector or fix copper bar	Voltage transformer	Earthing switch
Type of device	EvoPact HVX	EvoPact UTX	EvoPact HVX	CVX	LTRI	EvoPact HVX	EvoPact MTX, UTX or copper bar	EvoPact MTX	earthing switch
Panel function	Incomer	Direct incomer	Feeder			Bus sectioning		bb voltage metering	Busbar earthing
Panel name, code	**F**	**F**	**F**	**FC (PIX-M)**	**FS**	**BSC**	**BSR**	**BME**	
Single line diagram									

Functional overview

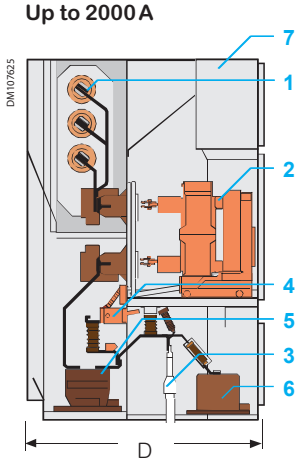
Feeder - F type cubicles

F type cubicles

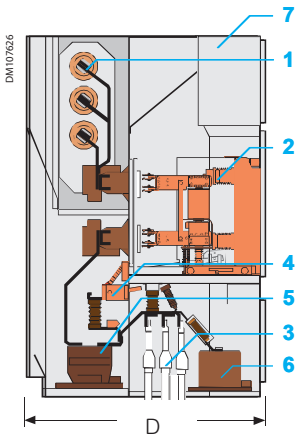




Up to 2000 A



From 2500 A to 4000 A



MV devices

1 Busbars for cubicle interconnection
2 Main switching device
3 MV connections by cables accessible from the front face
4 Earthing switch
5 Current transformers
6 Voltage Transformers

LV control cabinet

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

Options

- VT's with fuses
- Withdrawable cable VT's with removable fuses
- Fixed VT's without fuses
- Surge arresters
- Circuit breaker truck motorisation
- Earthing switch motorisation

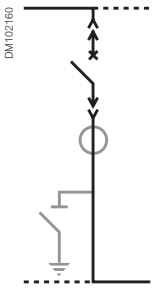
F type characteristics			PIX 12							PIX 17							PIX 24					
Rated voltage	Ur	kV	12							17.5							24					
Rated short circuit breaking current	Isc	kA	25-40							25-40							25-31.5					
Rated short time withstand circuit	Ip@ 50 Hz	kA	63-100							63-100							63-80					
	Ip@ 60 Hz	kA	65-104							65-104							65-82					
Rated duration of short circuit	tk	s	3							3							3					
Rated current busbar, max	Ir bb	A	up to 4000 (1)							up to 4000 (1)							up to 3150 (1)					
Rated current circuit breaker	Ir	A	630	1250	1600	2000	2500	3150	4000 (1)	630	1250	1600	2000	2500	3150	4000 (1)	630	1250	1600	2000	2500	3150 (1)
Dimensions	H	mm	2130							2200							2330					
	D	mm	1405/1605 (2)							1505							1605/1805 (3)					
	W	mm	650/800 (4)		800/1000 (4)		1000			750/1000 (4)				1000			800/1000 (4)				1000	
Approximate mass		kg	820		850		870			850				870			850				870	

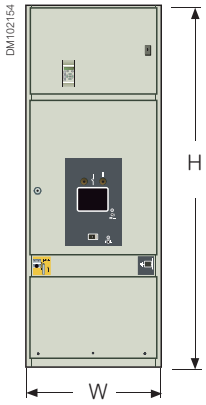
(1) Forced cooling / (2) 2 set of CT or 40 kA / (3) 2 set of CT / (4) Wider panel on request

Functional overview

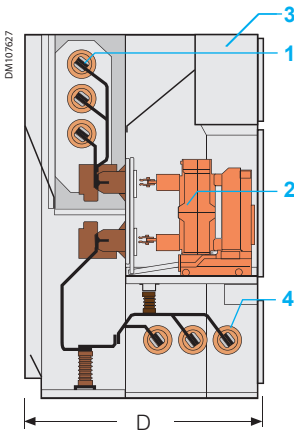
Bus section coupler - BSC type cubicles

BSC type cubicles (left or right coupling)

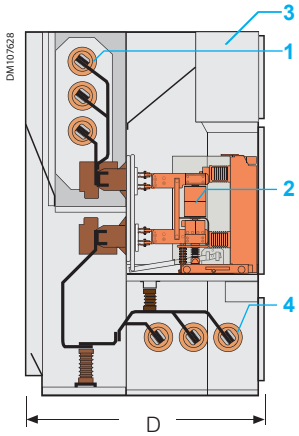




Up to 2000 A



From 2500 A to 4000 A



MV devices

1 Busbars for cubicle interconnection
2 Main switching device
4 Busbars for cubicle interconnection with bus riser (right or left coupling)

LV control cabinet

3 Low voltage auxiliaries and the protection, monitoring and control unit are in a control cabinet which is separated from the medium voltage part

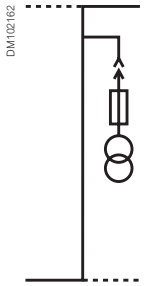
BSC type characteristics			PIX 12							PIX 17							PIX 24						
Rated voltage	Ur	kV	12							17.5							24						
Rated short circuit breaking current	Isc	kA	25-40							25-40							25-31.5						
Rated short time withstand circuit	Ip@ 50 Hz	kA	63-100							63-100							63-80						
	Ip@ 60 Hz	kA	65-104							65-104							65-82						
Rated duration of short circuit	tk	s	3							3							3						
Rated current busbar, max	Ir bb	A	up to 4000 (1)							up to 4000 (1)							up to 3150 (1)						
Rated current circuit breaker	Ir	A	630	1250	1600	2000	2500	3150	4000 (1)	630	1250	1600	2000	2500	3150	4000 (1)	630	1250	1600	2000	2500	3150 (1)	
Dimensions	H	mm	2130							2200							2330						
	D	mm	1405/1605 (2)							1505							1605/1805 (3)						
	W	mm	650/800 (4)			800/1000 (4)			1000	750/1000 (4)						1000	800/1000 (4)						1000
Approximate mass		kg	820			850			870	850						870	850						870

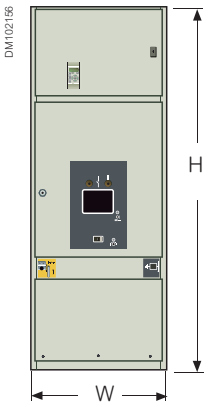
(1) Forced cooling / (2) 2 set of CT or 40 kA / (3) 2 set of CT / (4) Wider panel on request

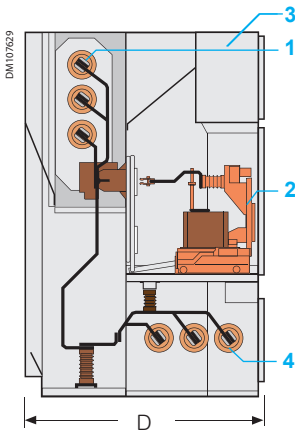
Functional overview

Bus section riser - BSR type cubicles

BSR type cubicles (left or right coupling)







MV devices

1 Busbars for cubicle interconnection
2 Withdrawable Voltage Transformer
4 Busbars for cubicle interconnection with bus riser (right or left coupling)

LV control cabinet

3 Low voltage auxiliaries and the protection, monitoring and control unit are in a control cabinet which is separated from the medium voltage part

Options

- Voltage transformers

BSC type characteristics			PIX 12							PIX 17							PIX 24						
Rated voltage	Ur	kV	12							17.5							24						
Rated short circuit breaking current	Isc	kA	25-40							25-40							25-31.5						
Rated short time withstand circuit	Ip@ 50 Hz	kA	63-100							63-100							63-80						
	Ip@ 60 Hz	kA	65-104							65-104							65-82						
Rated duration of short circuit	tk	s	3							3							3						
Rated current busbar, max	Ir bb	A	up to 4000 (1)							up to 4000 (1)							up to 3150 (1)						
Rated current circuit breaker	Ir	A	630	1250	1600	2000	2500	3150	4000 (1)	630	1250	1600	2000	2500	3150	4000 (1)	630	1250	1600	2000	2500	3150 (1)	
Dimensions	H	mm	2130							2200							2330						
	D	mm	1405/1605 (2)							1505							1605/1805 (3)						
	W	mm	650/800 (4)			800/1000 (4)			1000	750/1000 (4)						1000	800/1000 (4)						1000
Approximate mass		kg	750			750			750	850						870	750						750

(1) Forced cooling / (2) 2 set of CT or 40 kA / (3) 2 set of CT / (4) Wider panel on request

Functional overview

Busbar Voltage Metering&Busbar Earthing - BME type cubicles

MV devices

1 Busbars for cubicle interconnection
2 Earthing switch
4 Withdrawable Voltage Transformers

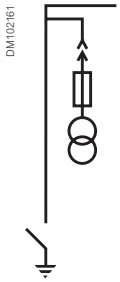
LV control cabinet

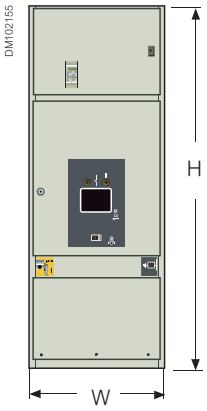
3 Low voltage auxiliaries and the protection, monitoring and control unit are in a control cabinet which is separated from the medium voltage part

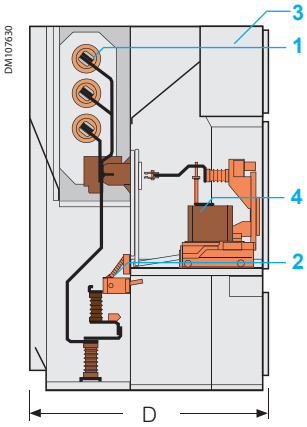
Options

- Fixed Voltage Transformers
- Surge arrester

BME type cubicles







BME type characteristics			PIX 12	PIX 17	PIX 24
Rated voltage	Ur	kV	12	17.5	24
Rated short circuit breaking current	Isc	kA	25-40	25-40	25-31.5
Rated short time withstand circuit	Ip@ 50 Hz	kA	63-100	63-100	63-80
	Ip@ 60 Hz	kA	65-104	65-104	65-82
Rated duration of short circuit	tk	s	3	3	3
Rated current busbar, max	Ir bb	A	up to 4000	up to 4000	up to 3150
Rated current	Ir	A	NA	NA	NA
Dimensions	H	mm	2130	2200	2330
	D	mm	1405/1605 (1)	1505	1605/1805 (1)
	W	mm	650	750	800
Approximate mass		kg	600	350	700

(1) Alignment with switchboard

Functional overview

Feeder with contactor - PIX Motor control center

PIX-M type cubicles

With today's large and medium-sized industrial installations using MV motors to drive their plants, the controlgear must provide maximum reliability and minimum down time.

To meet these specific requirements, **PIX contactor panel** supplements our PIX switchgear range.

Medium voltage motors are one of the biggest consumers of electricty in heavy industry. They can be operated and controlled with a contactor instead of a circuit breaker.

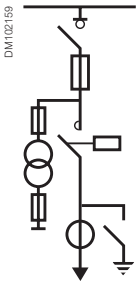
A contactor provides:

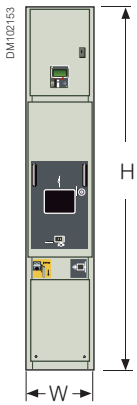
- A high number of switching operations up to 3.000.000 cycles
- High efficient protection with fuses
- A slim cubicle design

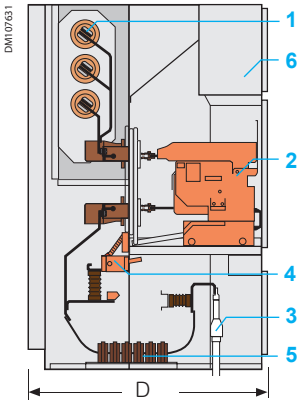
The PIX contactor panel meets these specific requirements. The design philosophy and operation are similar to the PIX switchgear range helping to reduce training time and to minimize the risk of improper use.

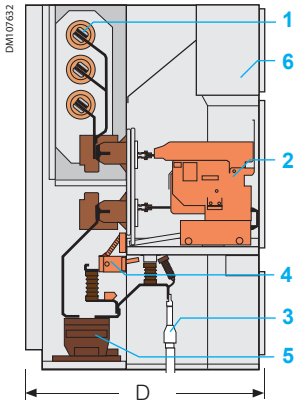
The combination of PIX and the PIX contactor panel provides a complete solution for power plants, process plants and Oil&Gas applications.

PIX-M type cubicles (Feeder with contactor)









MV devices

1 Busbars for cubicle interconnection
2 Withdrawable fused contactor
3 MV connections by cables accessible from the front face
4 Earthing switch
5 Current Transformers

LV control cabinet

6 Low voltage auxiliaries and the protection, monitoring and control unit are in a control cabinet which is separated from the medium voltage part

Options

- Voltage Transformers
- Rear top/bottom cable entry
- Control voltage transformer (up to 7.2 kV)
- Circuit breaker truck motorisation PIX-M on request

PIX-M type characteristics			PIX-M7	PIX-M12
Rated voltage	Ur	kV	7,2	12
Rated power frequency withstand voltage - 1 min	Ud *3	kV	20	28
Rated lightening impulse withstand voltage - peak	Up	kV	60	75
Rated short circuit breaking current	Isc	kA	25-40	25-40
Rated short time withstand circuit	Ip @50Hz	kA	63-100	63-100
	Ip @60Hz	kA	65-104	65-104
Rated duration of short circuit	tk	s	3	3
Rated current busbar, max	Ir bb	A	up to 4000	up to 4000
Rated current contactor	Ir	A	270-315	195
Current transformer type			ring	block
Busbar segregation			no	yes
Dimensions	H	mm	2130	2130
	D	mm	1405/1605 (1)	1405/1605 (1)
	W	mm	400	650
Approximate mass		kg	700	700

(1) 40 kA

Functional overview

Feeder with fuse switch - FS type cubicle

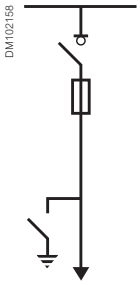
MV devices

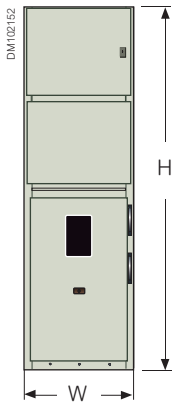
1 Busbars for cubicle interconnection
2 Switch disconnector
3 MV connections by cables accessible from the front face
4 Fuses

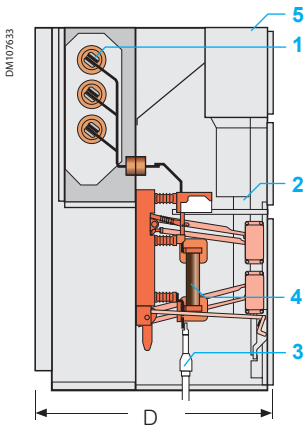
LV control cabinet

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

FS type cubicles







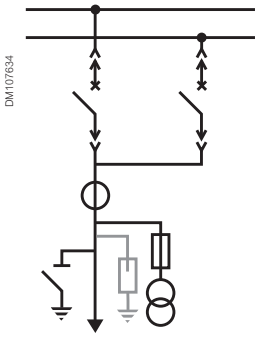
FS type characteristics			PIX 12	PIX 17	PIX 24
Rated voltage	Ur	kV	12	17.5	24
Rated power frequency withstand voltage	Ud, 1 min	kV	28	38	50
Rated power frequency withstand voltage - open switch	Ud, 1 min	kV	32	45	60
Rated lightening impulse withstand voltage	Up, 1 min	kV	75	95	125
Rated lightening impulse withstand voltage - open switch	Up, 1 min	kV	85	110	145
Rated short time making current	Ip @50Hz	kA	63	63	63
Rated short time withstand circuit, without fuse	Ip @50Hz	kA	63	63	63
Rated short time withstand circuit, protected by fuse	Ip @50Hz	kA	63-100	63-100	63-80
	Ip @60Hz	kA	65-103	65-103	65-82
Rated duration of short circuit	tk	s	3	3	3
Rated current busbar, max	Ir bb	A	up to 4000	up to 4000	up to 3150
Rated current switch disconnector without fuse	Ir	A	630	630	630
Rated current switch disconnector with fuse	Ir	A	200	200	200
Dimensions	H	mm	2130	2200	2330
	D	mm	1405/1605 (1)	1505	1605/1805 (1)
	W	mm	650	750	800
Approximate mass		kg	600	650	700

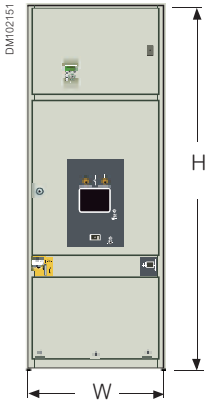
(1) Alignment with depth of switchboard

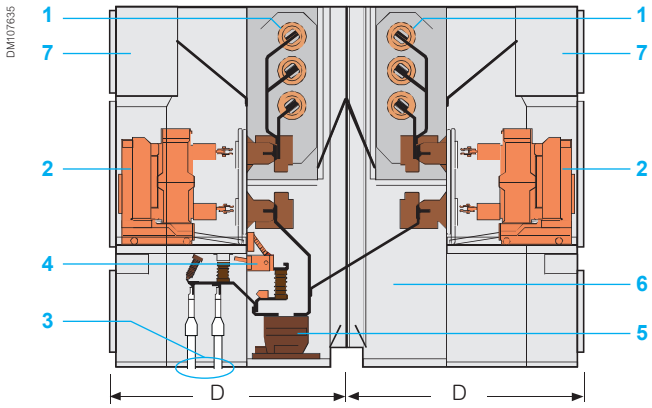
Functional overview

PIX Duplex

PIX Duplex type cubicles







MV devices

1 Busbars for cubicle interconnection
2 Circuit breaker EvoPact HVX
3 MV connections by cables accessible from the front face
4 Earthing switch
5 Current transformers
6 Busbar connection front panel - rear panel

LV control cabinet

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

FS type characteristics			PIX 12							PIX 24				
Rated voltage	Ur	kV	12							24				
Rated short circuit breaking current	Isc	kA	25-40							25-31.5				
Rated short time peak withstand current	Ip @50Hz	kA	63-100							63-80				
	Ip @60Hz	kA	65-104							65-82				
Rated duration of short circuit	tk	s	3							3				
Rated current busbar, max	Ir bb	A	up to 4000 (1)							up to 2500				
Rated current circuit breaker	Ir	A	630	1250	1600	2000	2500	3150	4000 (1)	630	1250	1600	2000	2500
Dimensions	H	mm	2130							2330				
	D	mm	1455							1655				
	W	mm	650		800		1000			800			1000	
Approximate mass		kg	1480		1530		1570			1530			1570	

(1) Forced cooling

Notes

Components and accessories

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Easergy P5 protection relay 47

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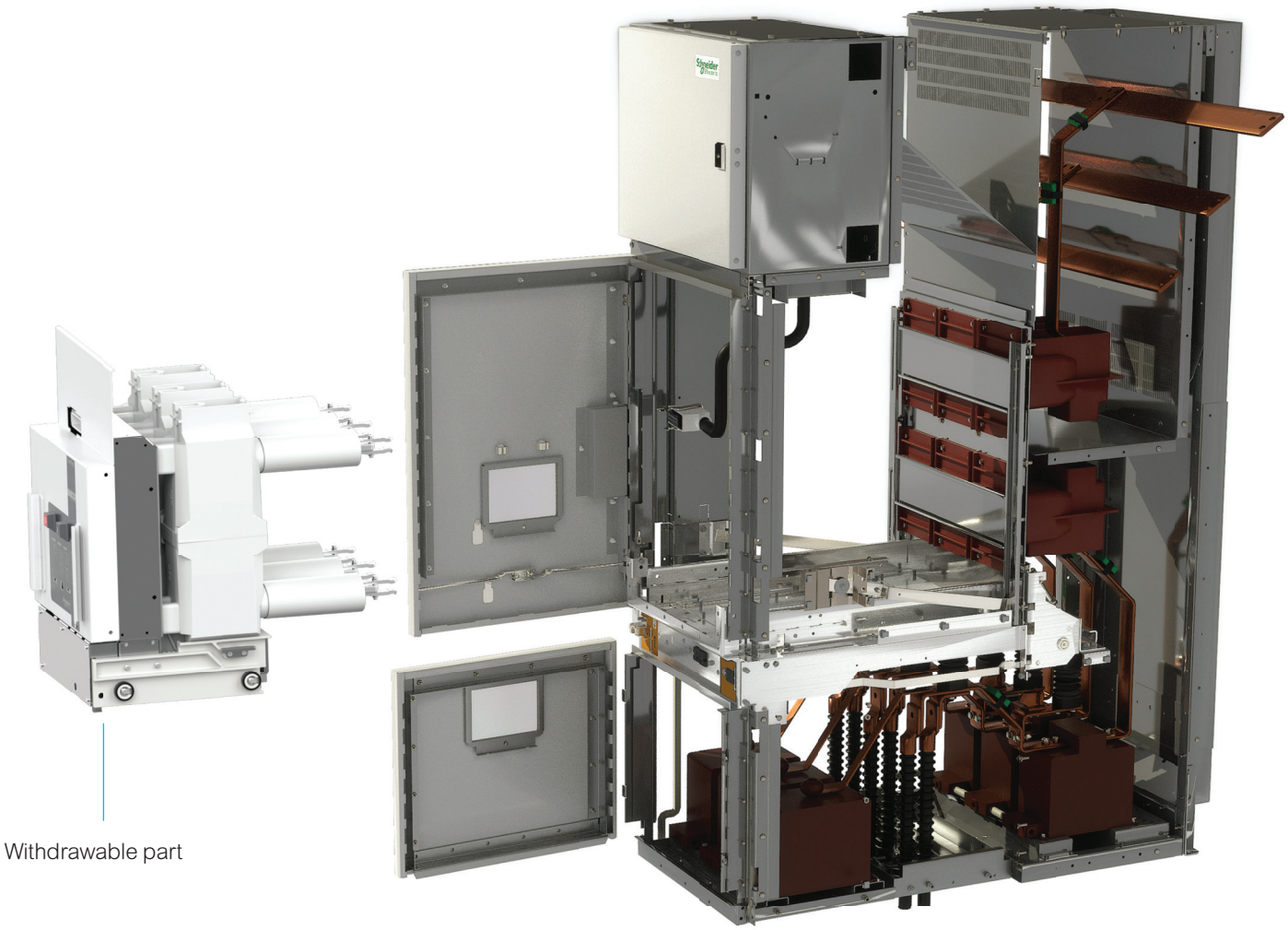
Arc fault protection 50

Thermal monitoring Easergy TH110 52

Environmental monitoring Easergy CL110 53

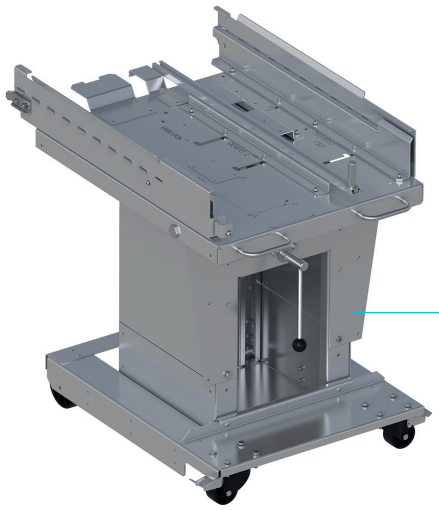
PIX design

PM108852



Withdrawable part

DM102188



Handling trolley

Protection of persons and property

The devices used to equip the PIX 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

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

PM108836

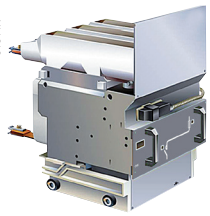


EvoPact HVX
Circuit breaker

EvoPact HVX Circuit breaker

The vacuum circuit breaker is the main device for switching the rated current and protecting against overcurrent and short circuit current.
Installed in the PIX cubicle it protects all components situated downstream during a short-circuit. The live parts are housed in an insulating enclosure. It is tested acc. to IEC 62271-100: 2008.

61011N

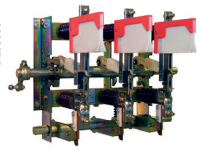


CVX
Contactor

CVX contactor

The CVX vacuum contactor is used for multiple opening and closing operations at rated current. In combination with a fuse it protects all downstream installations.
It fits into a PIX cubicle with a width of 400 mm or a width of 650 mm and it uses operation features and interlocks similar to EvoPact HVX circuit breaker. It is tested acc. to IEC 62271-106: 2011.

DE59565

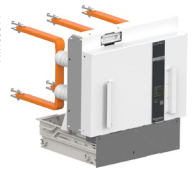


Switch
disconnector

Switch disconnector

The air switch disconnector LTRI is used for switching of small loads such as auxiliary transformers. Downstream installations are protected by a fuse. It is tested acc to IEC 62271-105.

PM108844

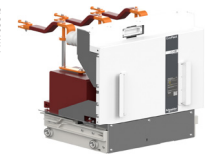


Disconnector
truck

Disconnector truck

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

PM108845

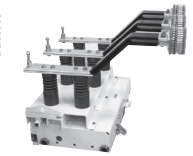


EvoPact MTX
Metering truck

Metering truck

The metering truck carries a voltage transformer to measure the busbar voltage. It is installed instead of a circuit breaker and it has similar interlock possibilities.

DE59565

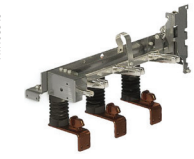


Earthing
truck

Earthing truck

The earthing truck is a safety feature used during maintenance. It allows the injection of voltage for testing the cables or it allows earthing of the busbars. It is installed instead of a circuit breaker and has the same interlock capabilities.

PM108846



Earthing
switch

Earthing switch

The earthing switch earths the main current paths with a fast closing mechanism in accordance with IEC 62271-102: 2018.

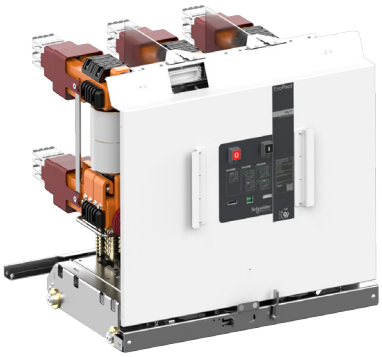
EvoPact HVX circuit breaker

PM109836



EvoPact HVX up to 2 500 A

PE59246



EvoPact HVX above 2 500 A

Description

EvoPact HVX is a globally used, 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 PIX equipment.

Application

EvoPact HVX is designed to break rated currents and short circuit currents under heavy switching conditions such as inductive loads and capacitive loads for various applications such as transformers, generators, motors and capacitors.

Design

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 provides remote rack in and rack out the circuit breaker.

The EvoPact HVX 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 the EvoPact HVX racking trolley sub-assemblies have been selected and designed to operate 1 000 cycles under the conditions defined by the IEC standard.

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 Schneider Electric owned design breaks 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

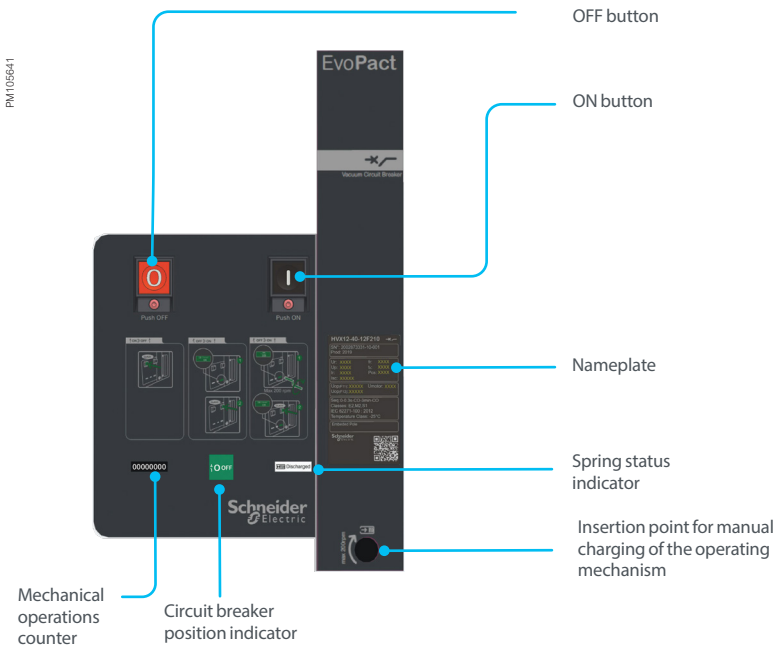
Standard

EvoPact HVX has been fully tested according to IEC 62271-100: 2008 at 50 Hz and 60 Hz and the latest GOST standards. The highest level of the above mentioned standards has been passed including M2, E2, C2.

EvoPact HVX has also been certified acc. to IEC 62271-C37.013: 2015 for generator circuit breaker up to 40 kA.

EvoPact HVX circuit breaker

Interface

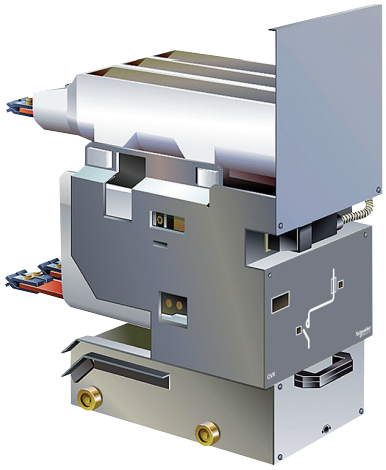


EvoPact HVX - Electrical characteristics according to IEC 62271-100: 2008					
For the cubicles			**PIX 12**	**PIX 17**	**PIX 24**
Circuit breaker designation			**HVX 12**	**HVX 17**	**HVX 24**
Rated voltage		kV	12	17.5	24
Rated current		A rms	Up to 3150	Up to 3150	Up to 2500
Rated breaking capacity	Short circuit current	kA rms	16/25/31.5/40	25/31.5/40	16/25/31.5
	Cable charging current	A	25	31.5	31.5
	Line charging current	A	10	10	
	Single capacitor bank	A	400	400	
	No load transformer	A	10	10	
Rated making capacity		kA peak	40/63/80/100	63/80/100	40/63/80
Rated operating time	Opening	ms	40-47	40-47	40-47
	Breaking	ms	55-62	55-62	55-62
	Arcing	ms	2-15	2-15	2-15
	Closing	ms	50-58	50-58	50-58
Rated operating sequence		O-3 min-CO-3 min-CO	●	●	●
		CO-15 s-CO	●	●	●
		O-0.3 s-CO-3 min-CO	●	●	●
		O-0.3 s-CO-15 s-CO	●	●	●
Endurance	Mechanical (C/O) for switching chamber		30000	30000	30000
	Mechanical (C/O) for mechanism		10000	10000	10000

CVX contactor

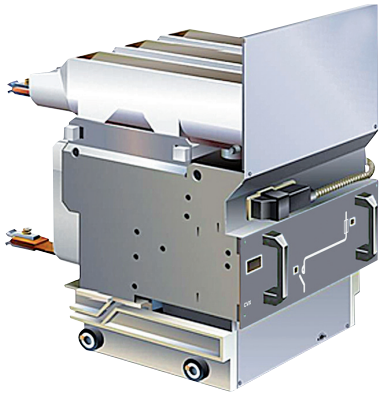
Withdrawable fuse vacuum contactor for PIX switchgear

PE90531



CVX 7, up to 40 kA in conjunction with fuses

PE90532



CVX 12, Up to 40 kA in conjunction with fuses

Description

The CVX fused vacuum contactor has been specifically developed for switching motors, transformers or capacitive loads.

- 3 phase or single phase
- Magnetic holding or mechanical latch
- Electronic auxiliary supply to allow a wide range of control voltages
- High endurance
- Excellent capacitive switching perfomance

Application

- Starting and protection of medium voltage motors
- Single and back-to-back capacitor banks
- Transformer neutral earthing
- Arc furnaces

Standard

IEC standards.

Design

Embedded pole

The vacuum interrupter is integrated in a pole housing for small dimensions and to protect all parts of the pole against harsh environments.

Racking device

The racking device moves the disconnector from the disconnected position to the service position and vice versa.
The racking device follows the same design principles as the circuit breaker.

The CVX racking device has a robust interlocking system with the contactor position and contactor switching condition and the switchgear door, the low voltage plug and the earthing switch.

A motorized version is available on request.

CVX contactor

Withdrawable fuse vacuum contactor for PIX switchgear

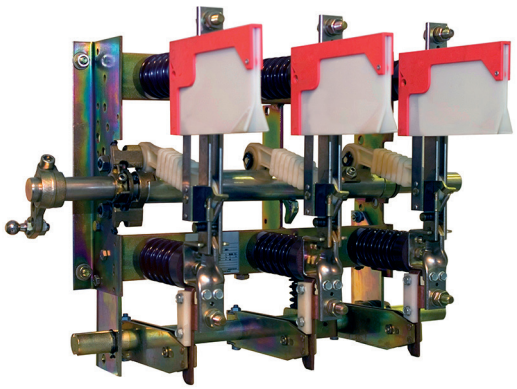
Electrical characteristics according to IEC 62271-106					
For the cubicles				**PIX-M7**	**PIX-M12**
Designation of contactor with racking truck				**CVX 7**	**CVX 12**
Phase to phase distance			mm	106	185
Rated voltage		Ur	kV 50/60 Hz	7.2	7.2
Insulation level	power frequency withstand	Ud	kV 50/60 Hz 1 min (1)	20	20
	lightning impulse withstand	Up	kV peak	60	60
Rated operational current		Ie	A	400 (2)	400 (2)
Utilization category				AC3-AC4	
Rated thermal current		Ith	A	400 (2)	400 (3)
Rated short-circuit breaking current		Isc	kA	6 (4)	6 (4)
Rated short-time withstand current		Ik/tk	kA/1 s	6	6
Rated peak withstand current		Ip	kA	15	15
Rated back to back capacitor bank breaking current			A	N/A	N/A

(1) Ud 32 kV, 50 Hz, 1 min available in standard
(2) The rated current linked to the capacity of the fuse: 270 A with a maximum fuse size of 315 A
(3) The rated current linked to the capacity of the fuse: 195 A with a maximum fuse size of 250 A
(4) The rated current linked to the capacity of the fuse: 50 kA for the standard DIN fuse

L-TRI

Air switch disconnector for PIX

PM103211



Transformer disconnector L-TRI 5F

Description

L-TRI 5 switch disconnectors are designed for use in indoor medium-voltage switchgear systems.

The L-TRI 5 range of switch disconnectors, incorporating proven flat-chamber arcing technology, can perform a wide variety of switching functions in medium-voltage distribution systems.

The simple, low-maintenance and highly economic indoor switch disconnectors in the L-TRI 5 range have a proven service record, with hundreds of thousands of units installed and operating on a wide range of systems.

Standard

L-TRI switch disconnectors comply with the requirements of IEC 62271-103.

L-TRI switch disconnectors comply with the requirements of IEC 62271-103 + Fuse complying with DIN 43624.

L-TRI 5F additionally, selected variants are available, complying with IEC 62271-105.

L-TRI Electrical characteristics

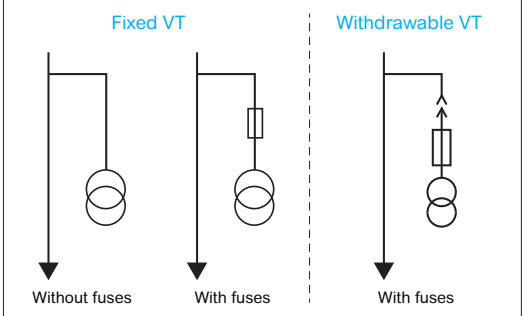
Mobile part designation		**L-TRI 5**			**L-TRI 5F**		
Type		**Switch-disconnector (62271-103) + Fuse (DIN 43624)**			**Switch-disconnector Fuse combination (IEC 622771-105)**		
Rated voltage	kV	12	17.5	24	12	17.5	24
Rated current	A	400/630			200 (1)		
Rated short-time current	kA 1 s	25			16		
	kA 3 s	18			–		
Rated peak current	kA	63			40		
Rated short-circuit making current	kA	63			40		
Mechanical operations	n	1500			1500		

(1) In general, the rated current of a switch disconnector fuse combination is lower than the rated current specified by the fuse manufacturer

Voltage Transformers

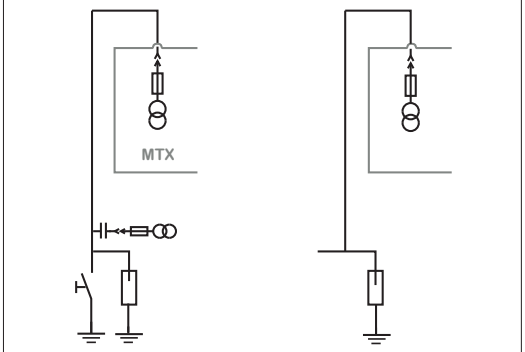
DM107636

Voltage metering on cable side

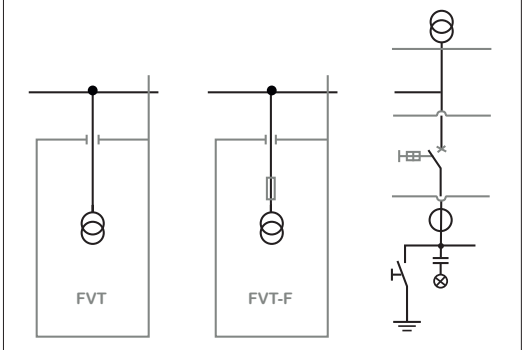


Voltage metering on busbar side

Withdrawable VT type MTX with fuses and shutters



Option: fixed VT on busbar side



PE90627



Voltage metering for busbar voltage, EvoPact MTX-type

Conventional voltage transformers provide a low voltage output (100 V or 110 V) for:

- Protection devices
- Measuring, metering and monitoring devices

They are based on the inductive principle according to IEC 61869-3: 2011.

They include the following models:

- Single pole version for measuring between phase and neutral
- Double pole version for metering between two phases

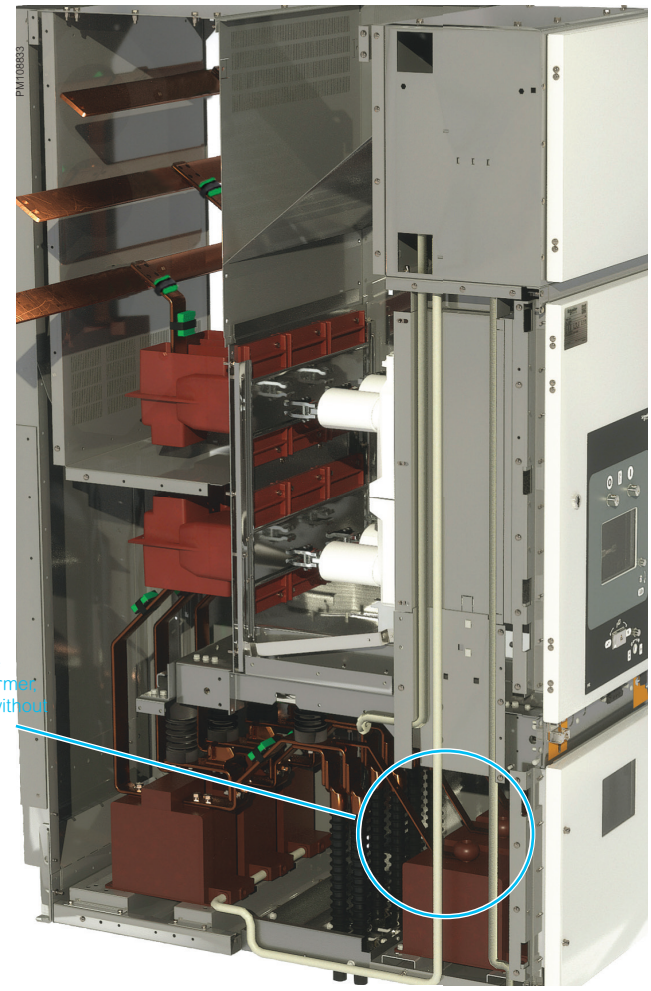
Options for voltage metering on the cable side

- Fixed type version with or without fuses
- Withdrawable version with fuses

Options for metering the busbar voltage

- Withdrawable voltage metering truck EvoPact MTX in panel type BME or BSR
- Fixed VT installed in the panel type BME
- Fixed VT on top of a feeder panel (on request)

PM108833

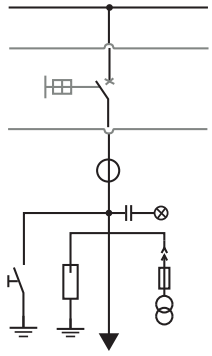


Current transformers

DM107637

Current metering on cable side

CT DIN type, 1 or 2 sets of CT available



Current metering on busbar side

CT in busbar compartment



Conventional current transformers provide a power signal for:

- Protection devices
- Measuring, metering and monitoring devices

They measure the value of the primary current from 10 A to 4000 A. They are based on the inductive principle aaccording to IEC 61869-2: 2012.

They are installed at the bottom of the panel for current metering on the cable side If a second set of current transformers is needed, they are installed at the rear side of the cable compartment.

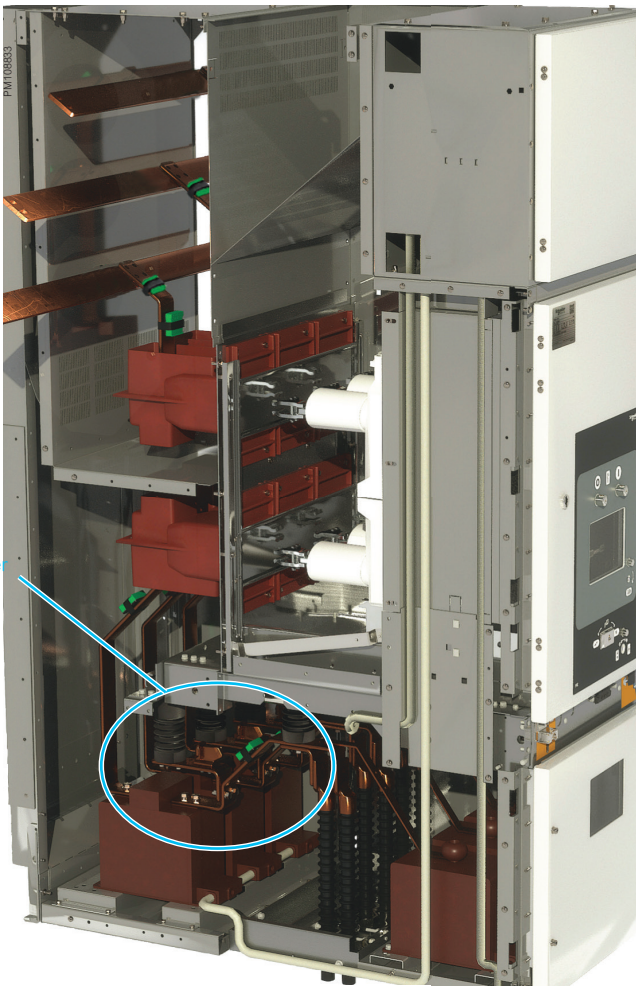
They are offered with the following models:

- Block type, epoxy resin insulated
- Ring type or toroidal type

Ring type current transformers can be used to measure both the current per phase or to detect an earth fault by comparing three phases. They can be epoxy resin insulated or foil insulated.

PM108883

Current transformer



Protection, monitoring & control

Easergy P5 protection relay

PM108233



Easergy P5: All-in-one best-in-class features

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

Built-in arc flash protection

By detecting if an arc flash exists, the device takes action within milliseconds to disconnect and mitigate risks. This means the arc does not have a chance to grow and cause unexpected outages or dangers.

Advanced cybersecurity

IEC 62443 compliant, the P5 has been designed with an optional cybersecurity package. This means reduced exposure to cyber threats and improved operational security. By default, the Easergy P5 includes important features such as password management, port hardening, and secure communication.

PM108234



Intuitive withdrawable design

With a handle built in as part of the design, the P5 can be quickly disconnected or exchanged to speed up maintenance. Wiring, data, communication, and settings stay safely on the panel and will be there when the relay is reconnected.

Improved recovery time

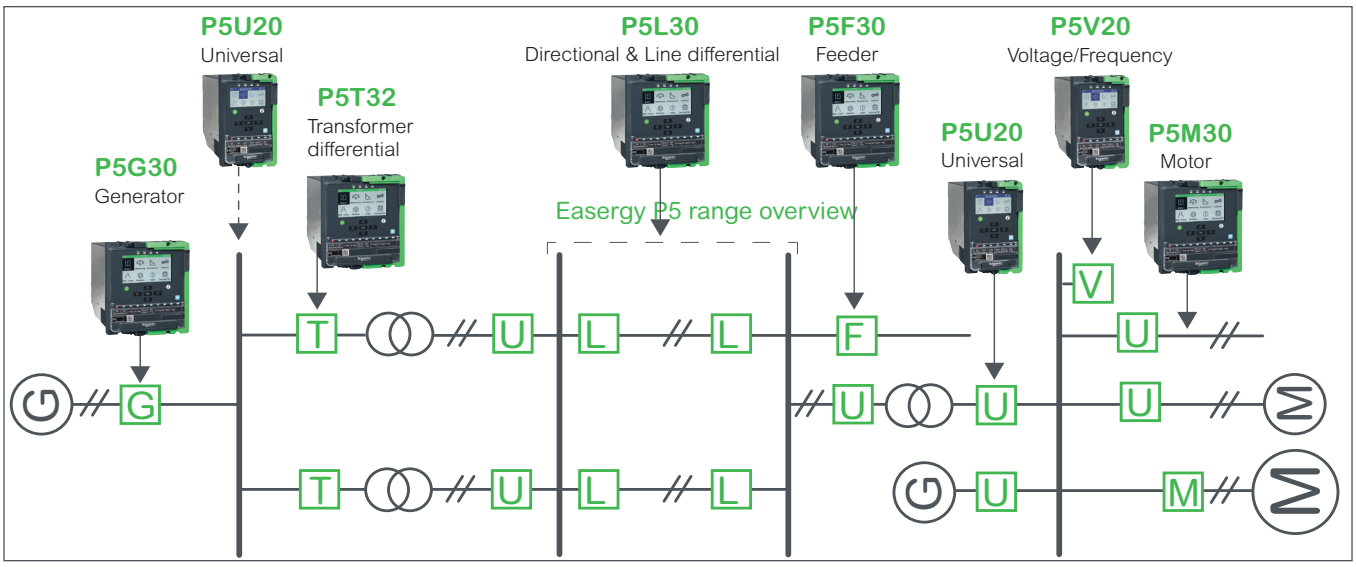
When maintenance or testing is required, Easergy P5 helps dramatically decrease your outage recovery time. The backup memory can automatically restore settings, you can continue your operations in as little as 10 minutes. *

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

Greater connectivity

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

DM107110



Protection, monitoring & control

Easergy P3 protection relay

Easy to use

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



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

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

Enhanced usability

The Easergy P3 protection relay concept has been extended with a number of features that make installation and testing of the relays even more efficient and user-friendly, like the virtual injection testing accessible with eSetup Easergy Pro setting software.

Easergy P3: Solid protection meets unparalleled efficiency

The Easergy P3 protection relay family is based on proven technology designs developed in close cooperation with our customers. Easergy products have been designed around user-friendliness, a feature which is highlighted in our customer feedback day after day.

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

Easergy P3 combines additional protection functions such as directional earth fault for feeder and motor protection.

Unparalleled efficiency

- Simple selection and ordering with product selector EcoReal MV
- Faster delivery with instant availability for standard configurations
- Simplified configuration with the new eSetup Easergy Pro setting tool

Better Connectivity

- Simpler operation and maintenance with the Easergy P3 SmartApp
- All communication protocols included natively, including IEC 61850
- Option to use two active communication protocols in the same time
- Increased number of inputs and outputs for more options

Enhanced safety

- Embedded arc protection
- Built-in virtual injection testing
- Compliant to international standards (IEC 60255-1: 2009)

P3 Standard Universal applications	**P3 Advanced** Advanced applications with arc flash fault detection
	
P3U 10/20/30: Universal protection • Feeder and Transformer • Motor • Voltage • Frequency • Capacitor	• **P3F30:** Feeder and Transformer • **P3M30:** Motor • **P3G30:** Generator • **P3L30:** Line differential and Distance • **P3T32:** Transformer differential type • **P3M32:** Motor differential • **P3G32:** Generator differential type

Protection, monitoring & control

Easergy MiCOM and Easergy Sepam protection relays

PM106625



Easergy MiCOM offers varying levels of functionality and hardware

- **Series 30** is designed to meet the rigorous requirements of MV & HV applications with particular focus on feeder and transformer protection and control.
- **Series 40** fulfills the protection requirements for a wide market of utility and industrial systems and offers a complete range of protection functions.

Easergy MiCOM protection relays

Easergy MiCOM protection provides the user with a choice of cost-optimized solutions for specific protection requirements within the distribution network.

The Easergy MiCOM relay series offers comprehensive protective function solutions for all power supply systems, as well as for the various functional and hardware project stages.

With their modular design, the Easergy MiCOM device platforms provide the user with multifunctional equipment that can act as:

- Grid protection equipment, and
- Combined protection and control systems
- Easergy MiCOM devices integrate most standard communication protocols used in station control systems and SCADA systems
- Due to the continuous further development of these products, compatibility with technical progress in the field of switchgear and controlgear communication is ensured

PM106624



Each functional unit can be equipped with a comprehensive protection, monitoring and control system comprising:

- Instrument transformers to measure the necessary electrical values (phase current, residual current, voltages, etc.)
- Protection relays, providing functions adapted to the part of the network to be protected
- Metering equipment, to inform operators
- Low voltage relaying, to provide control of the breaking device and of the withdrawable part
- Various auxiliaries: secondary circuit test units, etc.

Easergy Sepam: protection digital relays

Easergy Sepam is a range of digital monitoring protection and control units.

Easergy Sepam is the centre of the protection, monitoring and control system functional units: all the necessary protection, metering, control, monitoring and signalling functions are carried out by Easergy Sepam.

The Easergy Sepam range is a range of units defined to provide an optimal solution for each application, and includes (e.g.):

- Easergy Sepam S, substation incomer and feeder
- Easergy Sepam B, bus sectioning
- Easergy Sepam T, transformer feeder
- Easergy Sepam M, motor feeder
- Easergy Sepam G, generator feeder
- Easergy Sepam C, capacitor feeder

The Easergy Sepam range consists of the Easergy Sepam series 20, series 40, series 60 and series 80, a range of modular protection relays to adapt precisely to your needs.

The power of a multi-functional digital unit

Easergy Sepam is more than a simple protection relay; it is a truly multi-functional unit offering, in particular:

- Circuit-breaker diagnosis functions (switching counter and time, rearming time, cumulated broken A2)
- Direct circuit-breaker control, whatever the type of release unit
- Remote equipment operation using the communication option

(*) Please check in the Sepam catalog the sensor to use with each Sepam version.

Protection chain

The Easergy Sepam protection units combined with innovative current sensors, provide a comprehensive measurement, protection and energy management chain.*

A high-performance, economical solution

The modular Easergy Sepam offer provides a cost-effective solution tailored to every requirement.

Easy to order and install

All the components of the protection chain are referenced and can be delivered very quickly.

Protection, monitoring & 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 quickly trips the feeding breaker.

System features

- Typical operation on light only principle
  - Input for current criteria for I> and L> operation
  - Integrated 19 - 256 V AC/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-effective 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-effective solution
- Self-supervision
- Binary input for blocking or resetting the unit (programmable)
- Option for double arc channel activation trip criteria
- BIO light transfer option to other Vamp devices

- 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 curent, 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 spport for SCADA and automation interfacing
- Supports a maximum of 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 & 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.

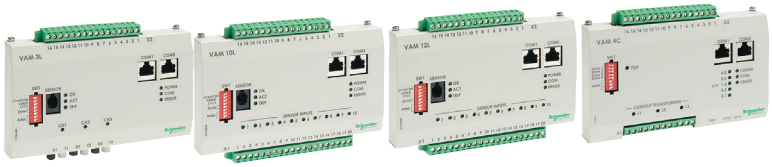
Arc flash protection minimizes material damage to the installation in most hazardous power system fault situations.

Minimized damage also means limited need for repair work and enables rapid restoration of the power supply.

Vamp arc flash range



Vamp 321



Advantages

People protection

The shorter the operating time of the arc flash protection unit, the smaller the damage will be 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

Cost savings can be made with fast and suitable protection systems for a power installation.

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 & current.

Protection, monitoring & control

Thermal monitoring Easergy TH110

Key benefits

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

PM105638



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 harsh operating conditions also due to limited accessibility and visibility of the contacts.

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

Easergy TH110 Thermal Sensor

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

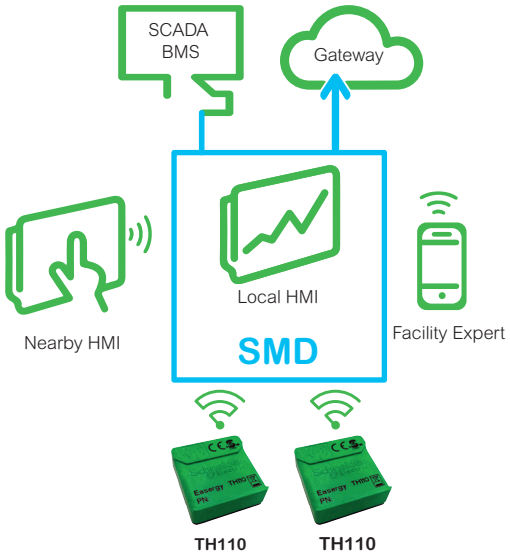
- Prevent unscheduled downtime
- Increase operator and equipment safety
- Optimize and predict maintenance

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 on the performance of MV switchgear.

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

Easergy TH110 is **self-powered** by the network current and it can ensure **high performance** 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 harvests the data for local signaling, data analyses and nearby control.

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

The **remote monitoring and alarming** includes remote connection for SCADA or Services, access to Cloud-based Apps and digital services and alarming through SMS or the 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 & control

Environmental monitoring Easergy CL110

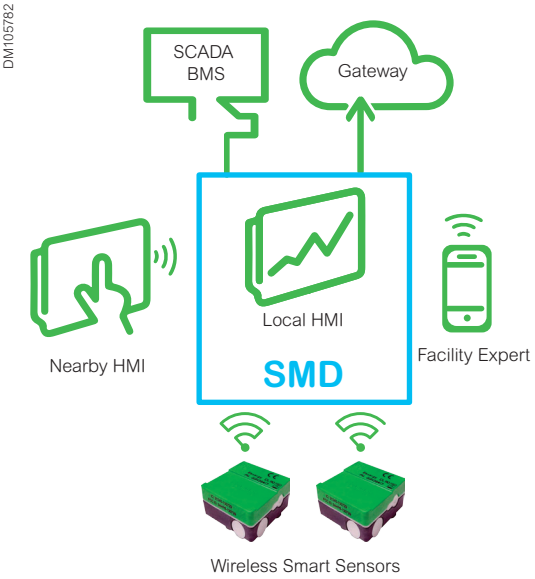
Key benefits

- Long battery life
- Wireless communication
- High performance
- 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 2,4GHz
Protection degree	IP54
Dimension - weight	40x40x21 mm – 34g
Power supply	3V battery



Continuous Environmental Monitoring

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

In **MV Switchgear** a harsh environment generates dirt that, on the surface of the shielded insulators, can lead to partial surface discharges up to a complete flashover.

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

Continuous environmental monitoring is the most appropriate way to detect installation issues early, thereby optimizing maintenance with predictive information.

Easergy CL110 Environmental Sensor

Easergy CL110 is part of the **new generation of wireless smart sensors** enabling the continuous environmental condition monitoring to perform, over a de-energized surface, the measurement of the:

- 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** the Easergy CL110 allows an easy and widespread installation also providing IP54 degree of protection in indoor applications.

Easergy CL110 is **battery powered with a life expectancy of >15 years** and it allows a simple fixing on magnetic metal surfaces thanks to its **powerful magnets.**

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

Easergy CL110 provides accurate temperature monitoring of the metal surface because it is 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** detect drifts from the threshold based on the specific installation characteristics.

The remote **monitoring and alarming** includes remote connection for SCADA or Services, access to Cloud-based Apps and digital services and alarming through SMS or the Facility Hero mobile App.

Notes

Installation and connection

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Implementation example - PIX 24 kV line-up switchboard 57

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PIX 61

Accessories and extraction withdrawable parts

Door locking key



Handle switching compartment



Earthing switch operating lever



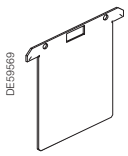
Plug in handle



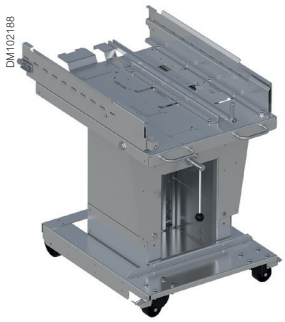
Circuit breaker mechanism reset handle



L-TRI isolating sheet



Handling trolley



Installation

Implementation example - PIX 24 kV line-up switchboard

Line-up switchboard

2 supply cubicles and 1 bussection at 24 kV

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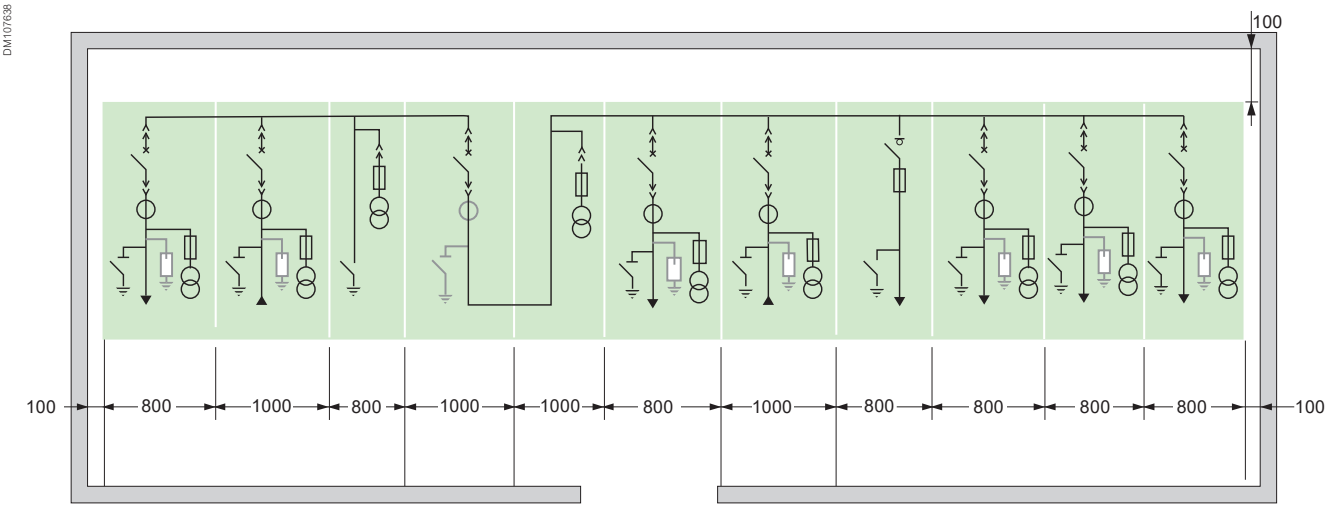
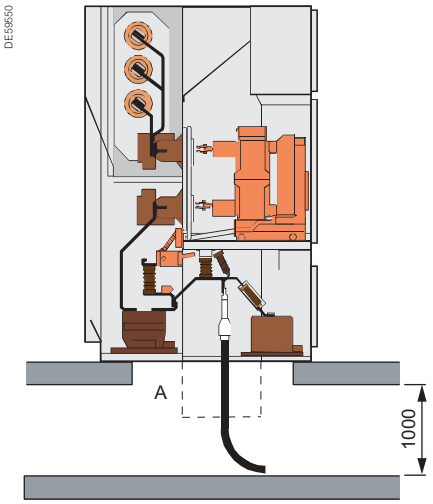
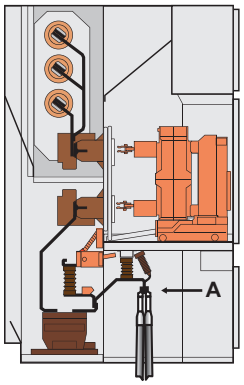


Connections

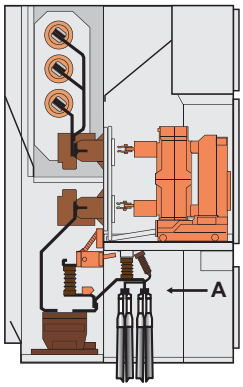
PIX width 650, 750 and 800 mm



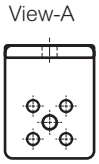
Note: A - Cable box below cubicle is optional and under customization.



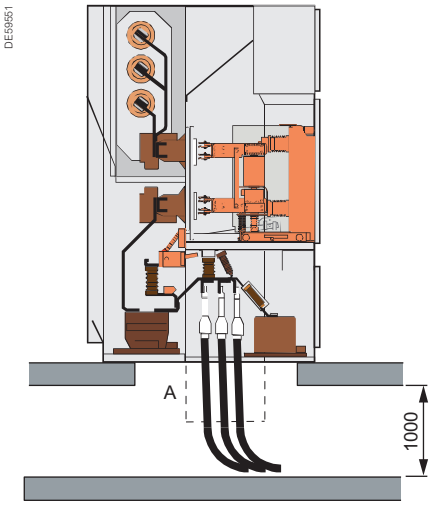
- 1 x cable per phase
- 2 x cable per phase



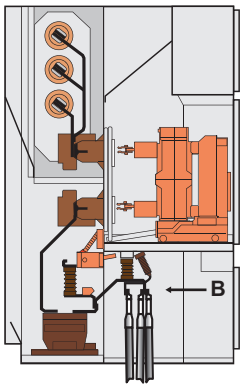
- 3 x cable per phase
- 4 x cable per phase



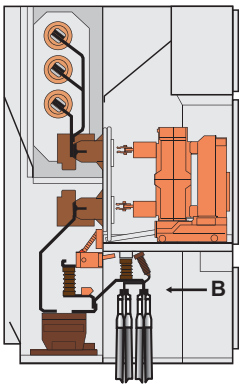
PIX width 1000 mm



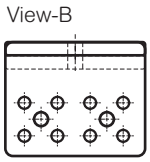
Note: A - Cable box below cubicle is optional and under customization.



- 2 x cable per phase
- 4 x cable per phase
- 6 x cable per phase



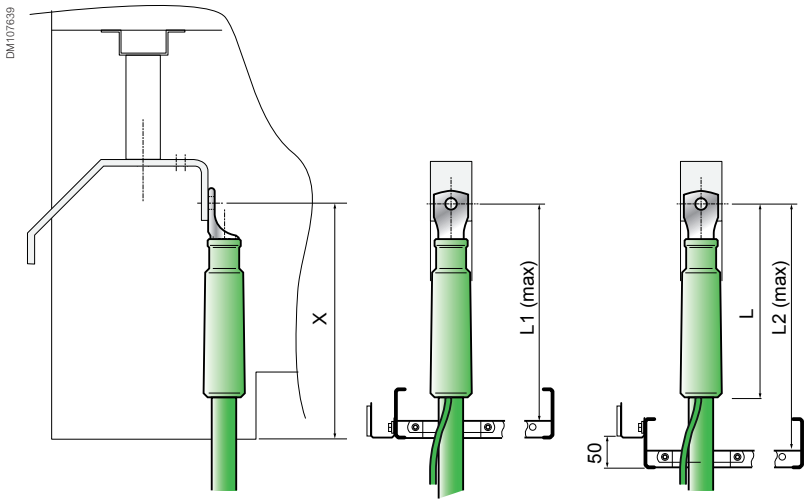
- 8 x cable per phase



Standard cable connection: Max. size and number per phase	12 kV		17.5 kV		24 kV	
Functions	**Width (mm)**	**Cable max. (no. x size) (1)**	**Width (mm)**	**Cable max. (no. x size)**	**Width (mm)**	**Cable max. (no. x size)**
CB incoming/outgoing Direct incoming	650	4 x 630	750	4 x 630	800	4 x 630
	800	4 x 630	1000	6 x 630 (3)	1000	6 x 630 (3)
	1000	8 x 630	–	–	–	–
Switch-disconnector without fuse (LTRI)	650	1 x 630	750	1 x 630	800	1 x 630
Switch-disconnector with fuse (LTRI)	650	1 x 95	750	1 x 95	800	1 x 95
Contactor: CVX 12 (2)	650	2 x 240	–	–	–	–

(1) Cable size is the cross sectional area in mm^2 based on a single core cable.
(2) For PIX 7.2 kV with CVX, see PIX-MCC.
(3) 8 cables are subject to customisation.

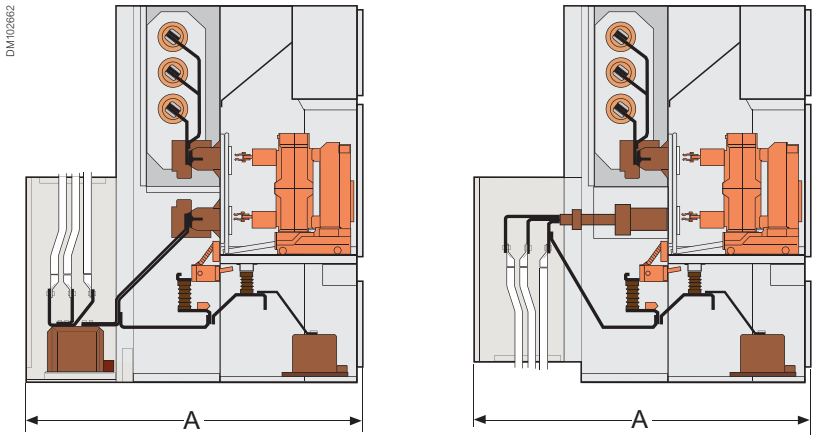
Connections



Note: position of the standard cable floor and clamp can be adjusted 50 mm deeper during installation if necessary.

Dimensions (mm)	PIX 12	PIX 17	PIX 24
X	430	460	555
L1	400	430	525
L2	450	480	575

PIX rear cable box top and bottom entry

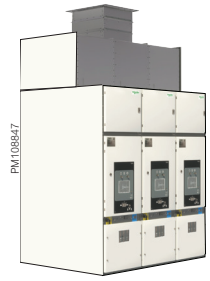


- Maximum 6 cables per phase (630 mm²).
- Maximum 2 cables per phases (1200 mm²).
- Depth A on demand.

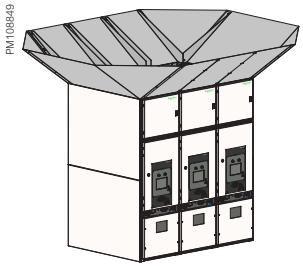
Civil engineering

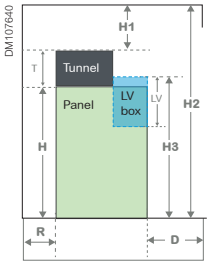
Pressure relief			
Outside the building	Inside the building		
Tunnel	Tunnel & absorber	Deflector AFL	Deflector AFLR

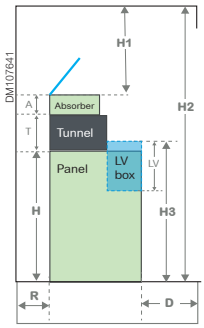


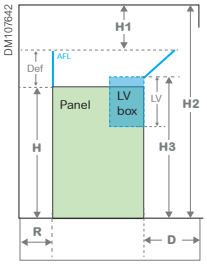


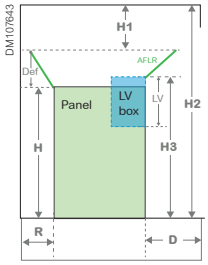












Basic structure panels				Pressure relief									
				Outside the building			Inside the building						
				Tunnel			Tunnel & absorber				Deflector		
Ur	H (mm) *	LV (mm)	H3 (mm)	T (mm)	H1 (mm) **	H2 (mm)	T (mm)	A (mm)	H1 (mm)	H2 (mm)	Def (mm)	H1 (mm)	H2 (mm)
12 kV	2130	530	2130	600	500	3230	600	450	800	3980	560	600	3290
		630	2230										3390
		730	2330										3490
17 kV	2200	600	2200	600	500	3300	600	450	800	4050	560	600	3360
		700	2300										3460
		800	2400										3560
24 kV	2330	530	2330	600	500	3430	600	450	800	4180	560	600	3490
		630	2430										3590
		730	2530										3690

H	Panel height, basic structure	* With standard LV cabinet 530 mm. Increased height of LV cabinet is available, without impact on the ceiling height
LV	LV box height	
H3	Basic panel including LV box height	
T	Tunnel height	
H1	Distance to ceiling	** Minimum 150 mm
H2	Height of ceiling	
A	Absorber height	
Def	Deflector height	

		Tunnel	Tunnel & Absorber	Deflector AFL	Deflector AFLR
R	Distance to rear wall	>100 mm	>100 mm	>100 mm	>1000 mm
D	Width of control aisle	1500 mm	1500 mm	1500 mm	1500 mm

Cubicle equipment

PIX

Equipment			Type of cubicle						
			F	PIX-M7		PIX-M12	BSR	BME	FS
Switchgear									
Circuit-breaker			●			●			
Contactor				●	●				
Fuse switch									●
Disconnector truck			●	●	●	●			
Earthing truck			○	○	○	○			
Fixed busbars							●	●	
Racking position indication contact for the withdrawable part		4 NO + 4 NC	■			●	●		
		2 NO + 2 NC		●	●				
Padlocking of isolating shutters for withdrawable parts			●	●	●	●			
Locking of withdrawable part/cable compartment			○	○	○	○			
Automatic discharge mechanism			○						
Voltage present indicator			●	●	●	●	●	●	●
Locking of mechanical racking of the withdrawable part (padlock)			●	●	●	●			
Locking of mechanical racking of the withdrawable part (keylock)			○	○	○	○			
Locking of the electromagnetic racking of the withdrawable part			○	○	○	○			
Earthing switch									
Earthing switch			○	○	○	○	○	○	○
Earthing switch position indication contacts		4 NO + 4 NC	○ (1)	○ (1)	○ (1)	○ (1)	○ (1)	○ (1)	○ (1)
Earthing switch position key locking			○	○	○	○	○	○	○
Electromagnetic earthing switch position locking			○	○	○	○	○	○	
Transformers									
Voltage Transformers (1 per phase)	Without fuse	Phase-phase							
		Phase-earth	○	○		○	○	○	
	With plug-in fuses	Phase-phase							
		Phase-earth	○	○		○	○	○	
Fuse melting indication contact		1 NO							
Current Transformer	Single set	3 CT's	●	●		○	○		
	Double set	6 CT's	○	○					
	LV toroid transformer CT (3)		○						
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 (6)	Enclosure	IP3X	●	●	●	●	●	●	●
		IP4X	○	○	○	○	○	○	○
		IPX1							
		IPX2							
	Compartments (4)	IP2XC	●	●	●	●	●	●	●
Anti-arcing protection (2)		25 kA - 1 s	○	○	○	○	○	○	○
		31.5 kA - 1 s	○	○	○	○	○	○	
		40 kA - 1 s	○	○	○	○	○	○	
Thermal diagnosis system (6)			○	○	○	○	○	○	
Surge arrester			○	○	○			○	
Busbars									
1250 A / 2500 A / 3150 A / 4000 A (5)		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 PIX switchboard is installed, you can choose an option for 3 or 4 sides, and possibly an exhaust tunnel for hot gases (see page E-9) / (3) Connection of 1 or 2 cables per phase / (4) Compartment protection / (5) For 4000 A equipped with fans / (6) Consult us.

TOOLS

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- Range datasheets
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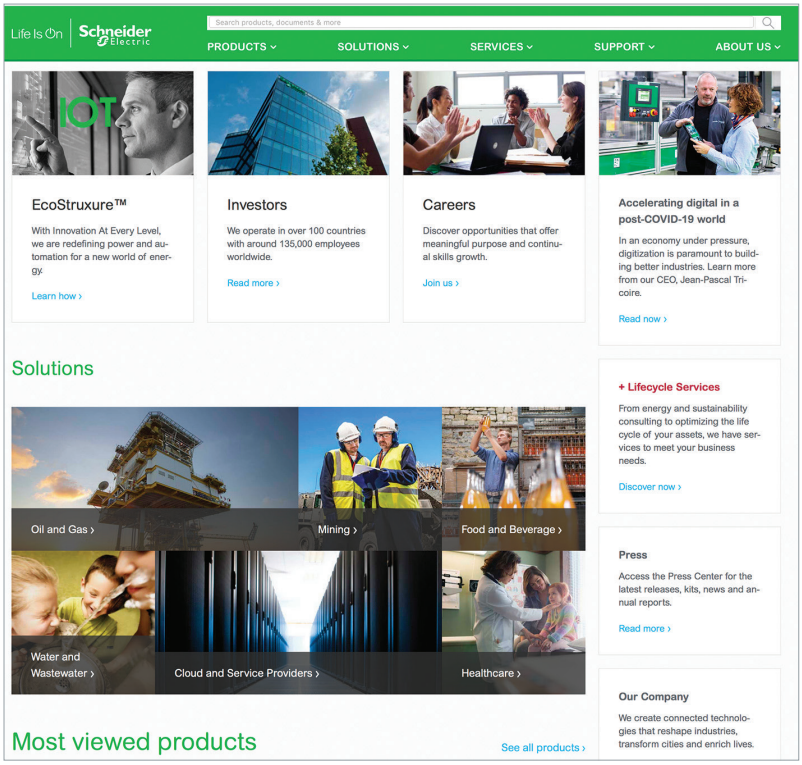

Web selector

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Training

Training allows you to acquire the expertise (installation design, work with power on, etc.) to increase efficiency and improve customer service.

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