PIX RoF

Air Insulated Switchgear up to 17.5 kV
Now with roll-on-floor EasyPact EXE vacuum circuit breaker

Medium Voltage Distribution

schneider-electric.com/PIX RoF
Whether you generate, distribute or use electric power, in today’s economic climate you need an optimized and effective solution which provides reliability, safety and ease of use.
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Your requirements

Safety

Simplicity

Efficiency

Reliability
Our solutions

Safety

• Designed using the latest tools and techniques ensuring that the highest level of operator safety is always provided
• Fully type tested according to the latest IEC standards for 50 and 60 Hz
• Internal arc tested up to 31.5 kA with AFLR
• Full metal partition PM class switchgear
• Embedded mechanical and electrical interlock provides operator safety

Simplicity

• PIX RoF has been designed for easy access to all compartments and is simple to operate and maintain
• PIX RoF design provides effortless rack-in/rack-out circuit breaker feature, closed-door circuit breaker operation, inspection window indicating circuit breaker status
• The intuitive HMI guides the operator to perform various operations and indicates the current status of the components
• VPIS on the front door can instantly indicate voltage presence on a given cable
• Fast access via QR codes to products’ technical documentation (cubicles, breakers, relays), stored in the "digital safe repository"

Efficiency

• Compact dimensions start with a 600 mm wide cubicle for ratings up to 1250 A and a 800 mm wide cubicle for ratings up to 2500 A, for up to 17.5 kV rated voltage
• The bus metering and earthing functions are coupled in a single cubicle to optimize space

Reliability

• Maximizing service continuity to minimize downtime thanks to LSC-2B IEC classification
• Busbar segregation between cubicles (option)
• It is designed to have a 30 year service life in relation to installation, operation and environmental conditions
Overview
# Overview

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A versatile solution

The PIX RoF Air Insulated Switchgear adapts to all electrical power distribution requirements up to 17.5 kV. It is an indoor metal enclosed switchgear intended for Medium Voltage applications such as those found in HV/MV or MV/MV substations, buildings and industries.

**Applications**

**Buildings**
- Healthcare
- Hotels
- Airports
- Banking & Finance

**Energy & Infrastructure**
- Electrical utilities
- Smart cities

**Industry**
- Food & Beverage
- Automotive
- Water and Wastewater
- Small industries
- Life sciences

**PIX RoF offers you:**
- An engineered solution tailored to your specific requirements
- A solution with low ownership costs thanks to reduced maintenance and the highest levels of service continuity
- Enhanced safety for your staff and operators
- Advanced control and monitoring options
- A network of our global support centers
Overview

Safety
High level of operational safety

Notes

LSC2B (Loss of Service Continuity IEC 62272-200)

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

IAC (Internal Arc Classification)
The metal-enclosed switchgear is classified for internal arc protection in accordance with IEC 62271-200 where AFLR is defined as follows:

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

Internal Arc tunnel for enhanced ALFR protection

This internal arc solution protects the operator when in the vicinity of switchgear under normal operating conditions.

- The internal arc classification is an option in accordance with IEC 62271-200 and EN 62271-200. It refers to the effect of internal excess pressure on covers, doors, inspection ports, vents etc. Moreover, the thermal effects of the internal arc and its origins on the enclosure, as well as escaping hot gases or incandescent particles, are taken into account.
- As a reminder, metal-enclosed switchgear and controlgear are granted Internal Arc Classification if all the following criteria are met:
  - No 1: Correctly secured doors and covers cannot be opened
  - No 2: No enclosure fragmentation occurs during the arc fault
  - No 3: Arcing does not cause holes by burning through the classified sides up to a height of 2 000 mm
  - No 4: Indicators do not ignite due to the effect of hot gases
  - No 5: The enclosure remains connected to the earthing point
- Internal Arc Classification IAC has been conducted successfully for PIX Easy

Operator safety

- Enhanced protection against unintended contact provided by a complete metal enclosure around the switchgear components
- PIX RoF, equipped with a digital bay controller, provides enhanced operator safety for control, monitoring and complete automation of the switchgear from a remote control room
- For safety reasons, the switchgear cubicle can only be operated with the enclosure door closed and the operator facing the front
- For protection against operating errors, the PIX RoF features a logically designed, continuous mechanical and electrical interlock system
- Capacitive voltage testing system for zero voltage verification
- PIX RoF has been tested for Internal Arc Classification AFLR in accordance with IEC 62271-200 up to 31.5 kA 1s
Overview

Simplicity
Easy operation providing service continuity

Easy to install
PIX RoF architecture has been designed to accommodate a wide range of installation requirements:
- Face to face
- Connections can be accessed from the bottom
- Easy to access with plenty of space for cable connection and/or to terminate bulky and rigid 3 core cables:
  - 600 mm for 1 250 A
  - 570 mm for 2 500 A

Easy to operate
- Intuitive single line diagrams on the front door of each functional unit provide a clear description of the cubicle components and power flows. This helps to optimize operations
- With the EasyPact EXE breaker, PIX RoF features direct access to an opening pushbutton on the front door: this ensures better service continuity
- Voltage Presence Indicators (VPIS) are present on the front door of each functional unit: this can instantly indicate voltage presence on a given cable!
- A floor rolling trolley provides quick and easy rack-in/rack-out operation for withdrawable devices

Easily access technical documentation
PIX RoF uses Schneider Electric digital innovation to optimize the customer experience:
- A QR code is on the front door of each cubicle: scanning it provides access to a web page displaying technical information
- Safe Repository: it also provides access to a "digital safe" containing customized data related to each cubicle: e.g.: manuals, brochures, reports, maintenance procedures
Overview

Efficiency

OPEX optimization

Compact design = space efficiency

- Thanks to the ingenious design of PIX RoF, many functions can be housed in a compact cubicle
- Outgoing with currents up to 1,250 A are housed in 600 mm wide cubicles. 2,000 and 2,500 A are installed in 800 mm wide cubicles
- Incomers up to 1,250 A are installed in 600 mm cubicles. 800 mm cubicles house these between 1,250 A and 2,500 A maximum
- Bus couplers and risers are installed in 600 mm cubicles for ratings up to 1,250 A and 800 mm cubicle for beyond and up to 2,500 A
- Functions for incomers and feeders are housed in compact cubicles: 600 mm for ratings up to 1,250 A and 800 mm for ratings up to 2,500 A
- With heights of between 2,300 mm and 2,800 mm (in line with the Internal Arc solution), the cubicles can be installed in any building
- The busmetering and earthing functions are coupled in a single cubicle to optimize space
- All cubicles provide energy with natural cooling with no need of forced ventilation
Loss of service continuity

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

- The busbars
- The withdrawable part (circuit breaker, disconnector truck or metering truck)
- The MV connections, earthing switch, current sensors and voltage transformers, as required
- The LV cabinet

In terms of personnel, PIX RoF with EasyPact EXE provides to a high level of protection; when a compartment containing a main circuit is open, the other compartments and/or functional units may remain energised.

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

Four basic cubicle layouts are offered:

- Incomer or feeder
- Busbar coupler
- Busbar riser
- Busbar metering

Strength of experience

- Fully compliant with IEC standards for AC metal-enclosed switchgear for rated voltages above 1 kV and up to 53 kV
- More than 50 years experience in medium voltage switchgear design

High quality design

PIX RoF with EasyPact EXE switchgear only uses key Schneider components that are designed in-house: full breaker (mechanisms, VI bottles), instrument transformers, relays.
Reliability
Systematic Testing

A major asset

In each of its business units or manufacturing plants, Schneider Electric integrates a functional organization whose main role is to check quality and monitor compliance with standards.

This procedure is:

• Uniform throughout all departments
• Recognized by many customers and approved organizations

But above all, its strict application has allowed us to obtain the recognition of an independent organization: Bureau Veritas.

The design and manufacturing quality system is certified in accordance with the ISO 9001:2008 standard for quality management systems.

Strict and systematic checks

During manufacturing, each functional unit is subject to systematic, routine testing with the aim of checking the quality and conformity of the following features:

• Measurement of the opening and closing speeds
• Dielectric test
• Testing of the safety systems and interlocks
• Testing of the low voltage components
• Conformity with drawings and diagrams

The results are recorded and approved by the quality control department on the test report of each device, thereby ensuring product traceability.

Type tested

The electrical and mechanical ratings of the PiX RoF with EasyPact EXE switchgear and controlgear have been proven by comprehensive type tests.

The type tests were performed in independent and accredited test laboratories in accordance with international norms and standards. The results are recorded in the appropriate test records and are made available on request.
EcoStruxure™ ready solutions
What is EcoStruxure™?

The EcoStruxure™ architecture and interoperable technology platform bring together energy, automation, and software. It provides enhanced value around safety, reliability, efficiency, sustainability and connectivity.

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
- Make informed decisions to secure uptime & operational efficiency thanks to real-time control platforms
- Provide complete electrical distribution visibility by measuring, collecting, aggregating and communicating data

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 protection.

EcoStruxure Platform

Apps, Analytics and Services

Edge control

Connected products

End to End Cybersecurity

Cloud and/or On-Premise

End to End Security

Building | Data Center | Industry | Infrastructure

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

CLOSE THE LOOP
Enable local control, ensure safety and uptime

All the Schneider Electric protection, metering and control devices can be connected to our Substation monitoring device. The HMI can be installed anywhere within the substation to provide 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.
Easergy P3

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 excellent alternative for various protection applications.

User-friendliness has always been a value of Schneider Electric products, and the Easergy P3 is not an exception, with the unique option to operate through your smartphone or tablet with “Easergy SmartApp”.

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

Easergy P3 standard
Universal application

- Feeder and Transformer
- Motor
- Voltage
- Frequency
- Capacitor

Easergy P3 advanced
Advanced applications with arc flash fault detection

- P3F30 Feeder and Transformer
- P3M30 Motor
- P3G30 Generator
- P3L30 Line differential and Distance
- P3T32 Transformer differential
- P3M32 Motor differential
- P3G32 Generator differential

EcoStruxure™ ready solutions
Smart protection for distribution networks

Easergy Sepam

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

They provide the following essential 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, thanks to its modular design

Easergy MiCOM

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.

This 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.
Overview

**EcoStruxure™ ready solutions**
Enhance the safety with the arc fault mitigation relays

Modern society relies on an uninterrupted supply of electric power. Prolonged power outages may cause significant damage, which may potentially lead to loss of life and interruption to service continuity.

An arc flash protection unit is a protective device used to enhance availability to the power system and assets.

Schneider Electric covers a wide range of applications, from stand alone protection to a complete system.

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**Integrated**
Protection relay with arc interface

- Integrated arc detection in a 1-box solution with protection relay
- SCADA connectivity via the protection relay
- Small footprint

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**Standalone**

- Single stand-alone VAMP125 unit, protects busbar connections, circuit breakers, CTs

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**Simple system**

- "Master-trip" function, to allow simple selectivity in arc detection without strong configuration

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**High-end system**

- Scalable and Customized Arc Detection system tailored to your needs
- Extended possibilities (number of inputs/outputs, logics, selectivity, etc.)
- Open to several serial & Ethernet communication protocols, including IEC 61850
- Multiple technologies (point sensors, loop sensors, fiber optic, etc.)
EcoStruxure™ ready solutions
Extend protection to the entire substation

- Possible to retrofit non-arc-resistant installations
- Integration in all products for new projects
- Connected to upper levels or stand alone system

Easy retrofit!
Easy to retrofit!
EcoStruxure™ ready solutions
Real-time condition monitoring to optimize asset availability

Easergy CL110 ambient monitoring
This Schneider Electric ambient monitoring system will continuously:
• Monitor ambient moisture and pollution which are detrimental to the switchgear, by automatically calculating the condensation cycle, and combining it with the mission profile conditions, the system will recommend adjustments to the maintenance and cleaning frequency 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 that ensure continuous thermal monitoring of all off-site critical connections allowing to:
• Prevent unscheduled downtimes
• Increase operator and equipment safety
• Optimize and forecast maintenance
Thanks to its very compact footprint and wireless communication, Easergy TH110 has a simple and global installation for a wide range of critical points without impacting the performance of MV switchgear.
By using the Zigbee Green Power communication protocol, Easergy TH110 ensures a 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 that ensures high performance thereby providing accurate thermal monitoring.

Characteristics
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<th>Power supply</th>
<th>Self-powered. Energy harvested from power circuit.</th>
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<tr>
<td>Accuracy</td>
<td>+/- 1 °C</td>
</tr>
<tr>
<td>Range</td>
<td>-25 °C/+115 °C</td>
</tr>
<tr>
<td>Wireless communication</td>
<td>ZigBee Green Power 2.4 GHz</td>
</tr>
<tr>
<td>Dimensions - Weight</td>
<td>31 x 31 x 13 mm - 15 g</td>
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</table>
Schneider Electric services

Peace of mind throughout your installation life cycle

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.

Plan

Schneider Electric helps you plan the full design and execution of your solution, looking at how to improve your processes and optimize your time:

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

Install

Schneider Electric will help you to install solutions based on your plans improving efficiency, reliability and safety.

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

Operate

Schneider Electric helps you improve your installation uptime and control your capital expenditure through its service offer.

- **Asset operation solutions**: Provide the information you need to increase safety, enhance installation performance, and optimize asset maintenance and investment
- **Advantage service plans**: Customize service plans that cover 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 provide an optimized maintenance budget for your spare parts
- **Technical training**: Build the necessary skills and expertise to properly and safely operate your installations

Optimize

Schneider Electric can make recommendations for improved safety, availability, reliability and quality.

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

Renew

Schneider Electric extends the life of your system (under installation, operation and environmental conditions) while providing upgrades.

- **ECOFIT™**: Keep up to date and improve the performance of your electrical installations (LV, MV, protection relays, etc.)
- **MV product end of life**: Recycle and recover outdated equipment with end-of-life services

CONTACT US!

www.schneider-electric.com/b2b/en/services/
Overview

Quality assurance

Quality certified to ISO 9001

The Quality Management System for development, production, sales and servicing of PIX RoF has been certified in accordance with ISO 9001:2008 requirements.

Certified quality: ISO 9001

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

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

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

This process is:

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

Most importantly, there is a strict Quality Management System which is audited on a regular basis by the international independent certification company Bureau Veritas.
PIX RoF range
PIX RoF range

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General characteristics

Technical characteristics

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<tr>
<td>Rated voltage (kV)</td>
<td>12</td>
<td>17.5</td>
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<tr>
<td>Rated power frequency withstand voltage (kV rms)</td>
<td>28</td>
<td>38</td>
</tr>
<tr>
<td>Rated lightning impulse withstand voltage (kV peak)</td>
<td>75(2)</td>
<td>95</td>
</tr>
<tr>
<td>Rated frequency (Hz)</td>
<td>50/60</td>
<td>50/60</td>
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<tr>
<td>Rated time withstand current (1) (kA/3 s)</td>
<td>25-31.5</td>
<td>25-31.5</td>
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<tr>
<td>Rated peak withstand current (kA peak)</td>
<td>65-82</td>
<td>65-82</td>
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<tr>
<td>Rated continuous current</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Busbar (A)</td>
<td>Up to 2 500</td>
<td>Up to 2 500</td>
</tr>
<tr>
<td>Cubicle (A)</td>
<td>Up to 2 500(2)</td>
<td>Up to 2 500(2)</td>
</tr>
<tr>
<td>Earthing switch making capacity (kA peak)</td>
<td>82</td>
<td>82</td>
</tr>
<tr>
<td>Internal arc classification according to IEC 62271-200 AFLR (kA/1 s)</td>
<td>31.5</td>
<td>31.5</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP4X</td>
<td>IP4X</td>
</tr>
</tbody>
</table>

(1) The short time withstand current capability of the current transformers must be considered separately.
(2) Other values available on request.

Dimensions and weights

<table>
<thead>
<tr>
<th>Rated current (1) (A)</th>
<th>800 - 1 250</th>
<th>2 000 - 2 500</th>
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<tr>
<td>Width (mm)</td>
<td>600</td>
<td>800</td>
</tr>
<tr>
<td>Depth (mm)</td>
<td>1 650 (Foundation depth with/without voltage transformer)</td>
<td></td>
</tr>
<tr>
<td>Height (mm)</td>
<td>2 300 (Low voltage cabinet 735 mm) (3)</td>
<td></td>
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<tr>
<td>Feeder panel with vacuum circuit breaker &amp; bus coupler with vacuum circuit breaker</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panel width (mm)</td>
<td>600</td>
<td>800</td>
</tr>
<tr>
<td>Weight approx. (2) (kg)</td>
<td>800</td>
<td>1 200</td>
</tr>
<tr>
<td>Bus Riser Panel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panel width (mm)</td>
<td>600</td>
<td>800</td>
</tr>
<tr>
<td>Weight approx. (2) (kg)</td>
<td>650</td>
<td>1 000</td>
</tr>
<tr>
<td>Busbar Metering Panel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panel width (mm)</td>
<td>600</td>
<td></td>
</tr>
<tr>
<td>Weight approx. (2) (kg)</td>
<td>650 - 1 000</td>
<td></td>
</tr>
</tbody>
</table>

(1) The rated current refers to the feeder circuit
(2) 3 x voltage transformer (optional): + approx. 120 kg
(3) With internal arc tunnel with internal exhaust - 2800 mm
PIX RoF range

General overview
Panel design

Pix Roll on Floor with EasyPact EXE vacuum circuit breaker

1. Low-voltage cabinet with control device
2. Metallic shutter for bus bar side arm of breaker connecting to molded seal-off spouts
3. Vacuum circuit breaker truck
4. Front door
5. Metallic shutter for line side arm of breaker connecting to molded seal-off spouts
6. Breaker guiding rails
7. Earthing switch position indicator
8. Insertion opening for operating lever of the earthing switch
9. Mechanical interrogation interlock of insertion port for the earthing switch
10. Cable compartment cover
11. Cable compartment
12. Ear switch with making capacity
13. Cable connections
14. Current transformers
15. Busbars
16. Voltage transformer with primary fuse

Cubicle view without Internal Arc accessories.

PIX RoF with EasyPact EXE operating facia

1. Orifice to insert rod for breaker opening
2. Knob for door lock
3. Orifice to insert rod for breaker closing
4. Glass window to inspect circuit breaker
5. Space for the panel rating label
6. Pad locking facility
7. Rack-in/rack-out lever insertion
PIX RoF range

Operating conditions and standards

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 (other values available on request)
- Less than or equal to 35 °C on average over 24 hours
- Greater than or equal to – 5 °C

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

Standards

The PIX RoF meets the following international standards:

- **IEC 62271-1**: High-voltage switchgear and controlgear: common specifications
- **IEC 62271-200**: AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV
- **IEC 62271-100**: High-voltage switchgear and controlgear - Alternating current circuit breakers
- **IEC 62271-103**: High-voltage switchgear and controlgear - Switches for rated voltages above 1 kV up to and including 52 kV
- **IEC 62271-102**: High-voltage switchgear and controlgear - Alternating current disconnectors and earthing switches
- **IEC 60255**: Measuring relays and protection equipment - Common requirements
- **IEC 61869-2**: Instrument transformers - Current transformers
- **IEC 61869-3**: Instrument transformers - Inductive voltage transformers
- **IEC 60044-8**: Instrument transformers - Electronic current transformers

PIX RoF has been developed to meet the following conditions:

- Ambient temperature up to 40 °C, without derating and natural cooling
- Corrosive atmospheres (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.
Integrating many of the proven components of the PIX RoF range, it has all the intrinsic features of the standard version i.e. very reliable and of high quality. PIX RoF has been fully tested according to the latest IEC 62271-100 & 200, by internationally accredited test laboratories.

Switchgear units of the PIX RoF series are:
• Metal-enclosed; loss of service continuity category according to IEC 62271-200: LSC 2B-PM
• Type-tested
• Tested for internal arc faults (Internal Arc Classification AFLR)
• Dimensioned for indoor installation

Internal exhaust duct

An internal arc exhaust duct can be provided to discharge the hot gases inside the room in the controlled manner.

External exhaust and deflector solutions can also be implemented. Please contact us for more details.

Notes

LSC2B (Loss of Service Continuity)
IEC 62272-200

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

IAC (Internal Arc Classification)
The metal-enclosed switchgear is classified for internal arc protection in accordance with IEC 62271-200 where AFLR is defined as follows:

Type of accessibility
• A: Restricted access to authorized personnel only. Sides of the enclosure which meet the criteria of the internal arc test
• F: Front side
• L: Lateral side
• R: Rear side
Functions and characteristics
## Functions and characteristics

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<td>Choice of functional units</td>
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<td>31</td>
</tr>
<tr>
<td>BC type cubicles - Bus section</td>
<td>32</td>
</tr>
<tr>
<td>BR type cubicle - Bus riser</td>
<td>33</td>
</tr>
<tr>
<td>BM type cubicles - Metering busbar earthing</td>
<td>34</td>
</tr>
</tbody>
</table>
PIX RoF with withdrawable vacuum circuit breaker has a comprehensive range of functions to suit all requirements for multiple applications.

**Selection guide**

The following guide will help you to define the most appropriate protection corresponding to the type of applications you want to energize.

The equipment shown below are the main functions.

For specific requirements, additional functions are available upon request.

### Functional overview

**Choice of functional units**

<table>
<thead>
<tr>
<th>Function</th>
<th>Incomer</th>
<th>Feeder</th>
<th>Busbar coupler</th>
<th>Bus riser</th>
<th>Metering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cubicle</td>
<td>IC</td>
<td>FD</td>
<td>BC</td>
<td>BR</td>
<td>BM</td>
</tr>
<tr>
<td>Device</td>
<td>Branch-circuit panel</td>
<td>Branch-circuit panel</td>
<td>Bus section coupler panel</td>
<td>Bus riser panel</td>
<td>Bus voltage transformer/ bus earthing switch panel</td>
</tr>
<tr>
<td></td>
<td>• Vacuum Circuit Breaker</td>
<td>• Vacuum Circuit Breaker</td>
<td>• Optional voltage transformers</td>
<td>• Optional voltage transformers</td>
<td>• Voltage transformers</td>
</tr>
<tr>
<td></td>
<td>• Voltage transformers</td>
<td></td>
<td></td>
<td></td>
<td>• Bus earthing switch</td>
</tr>
</tbody>
</table>

### Single line diagram

- [Diagram 1](#)
- [Diagram 2](#)
- [Diagram 3](#)
- [Diagram 4](#)
- [Diagram 5](#)
Functions and characteristics

IC or FD type cubicle - Incomer or feeder

Functional overview

IC or FD

<table>
<thead>
<tr>
<th></th>
<th>Ur (kV)</th>
<th>12</th>
<th>17.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breaking capacity</td>
<td></td>
<td>25</td>
<td>31.5</td>
</tr>
<tr>
<td>Rated current - Vacuum circuit breaker</td>
<td>(A)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ir 800</td>
<td>(3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ir 1250</td>
<td>(3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ir 2000</td>
<td>(4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ir 2500</td>
<td>(4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated peak withstand current</td>
<td>Ip (kA)</td>
<td>65</td>
<td>82</td>
</tr>
<tr>
<td>Short-time withstand current</td>
<td>Ik (kA)</td>
<td>25</td>
<td>31.5</td>
</tr>
<tr>
<td>Duration (s)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Dimensions</td>
<td>H (1) (mm)</td>
<td>2300</td>
<td></td>
</tr>
<tr>
<td>Approximate mass</td>
<td>(kg)</td>
<td>800 - 1200</td>
<td></td>
</tr>
</tbody>
</table>

1. Busbars
2. Main switching device
3. Cable connections (rear access)
4. Earthing switch
5. Current Transformers
6. Voltage Transformers (optional)
7. Low voltage equipment

(1) With the standard LV cabinet
(2) Add 500 mm for Line VTs/other values for extra cables or CTs
(3) Width 600 mm
(4) Width 800 mm
Functions and characteristics

BC type cubicles - Bus coupler

**Functional overview**

<table>
<thead>
<tr>
<th>Component</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Busbars</td>
<td></td>
</tr>
<tr>
<td>Main switching device</td>
<td></td>
</tr>
<tr>
<td>Lateral connections (connection to/from adjacent bus riser cubicle)</td>
<td></td>
</tr>
<tr>
<td>Earthing switch</td>
<td></td>
</tr>
<tr>
<td>Current transformers</td>
<td></td>
</tr>
<tr>
<td>Low voltage equipment</td>
<td></td>
</tr>
</tbody>
</table>

**BC**

<table>
<thead>
<tr>
<th>Specification</th>
<th>12</th>
<th>17.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage Ur (kV)</td>
<td>12</td>
<td>17.5</td>
</tr>
<tr>
<td>Breaking capacity (kA)</td>
<td>25</td>
<td>31.5</td>
</tr>
<tr>
<td>Rated current - Vacuum circuit breaker (A)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ir 800</td>
<td>800</td>
<td>800</td>
</tr>
<tr>
<td>Ir 1 250</td>
<td>1 250</td>
<td>1 250</td>
</tr>
<tr>
<td>Ir 2 000</td>
<td>2 000</td>
<td>2 000</td>
</tr>
<tr>
<td>Ir 2 500</td>
<td>2 500</td>
<td>2 500</td>
</tr>
<tr>
<td>Rated peak withstand current Ip (kA)</td>
<td>65</td>
<td>82</td>
</tr>
<tr>
<td>Short-time withstand current Ik (kA)</td>
<td>25</td>
<td>31.5</td>
</tr>
<tr>
<td>Duration (s)</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Dimensions H (mm)</td>
<td>2 300</td>
<td></td>
</tr>
<tr>
<td>D (mm)</td>
<td>1 650</td>
<td></td>
</tr>
<tr>
<td>Approximate mass (kg)</td>
<td>800  - 1 200</td>
<td></td>
</tr>
</tbody>
</table>

(1) With the standard LV cabinet
(3) Width 600 mm
(4) Width 800 mm
Functions and characteristics

**Functional overview**

**BR type cubicle - Bus riser**

![Diagram of BR type cubicle - Bus riser]

1. Busbars
2. Withdrawable voltage transformer (optional)
3. Lateral connections (connection to/from adjacent bus section cubicle)
4. Low Voltage equipment

### BR

<table>
<thead>
<tr>
<th></th>
<th>Ur (kV)</th>
<th>12</th>
<th>17.5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rated voltage</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Breaking capacity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Rated current</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ir</td>
<td>800</td>
<td>(3)</td>
<td>(3)</td>
</tr>
<tr>
<td>Ir</td>
<td>1,250</td>
<td>(3)</td>
<td>(3)</td>
</tr>
<tr>
<td>Ir</td>
<td>2,000</td>
<td>(4)</td>
<td>(4)</td>
</tr>
<tr>
<td>Ir</td>
<td>2,500</td>
<td>(4)</td>
<td>(4)</td>
</tr>
<tr>
<td><strong>Rated peak withstand current</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ip</td>
<td>65</td>
<td>82</td>
<td>65</td>
</tr>
<tr>
<td><strong>Short-time withstand current</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ik</td>
<td>25</td>
<td>31.5</td>
<td>25</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H (1) (mm)</td>
<td></td>
<td>2,300</td>
<td></td>
</tr>
<tr>
<td>D (mm)</td>
<td></td>
<td>1,650</td>
<td></td>
</tr>
<tr>
<td>Approximate mass</td>
<td>(kg)</td>
<td>650 - 1,000</td>
<td></td>
</tr>
</tbody>
</table>

1. With the standard LV cabinet
2. Width 600 mm
3. Width 800 mm

---

*schneider-electric.com*
Functional overview
BM type cubicles - Busbar metering

BM

<table>
<thead>
<tr>
<th></th>
<th>Ur (kV)</th>
<th>12</th>
<th>17.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breaking capacity</td>
<td>(kA)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated current</td>
<td>(A)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ir 800</td>
<td></td>
<td>(3)</td>
<td>(3)</td>
</tr>
<tr>
<td>Ir 1 250</td>
<td></td>
<td>(3)</td>
<td>(3)</td>
</tr>
<tr>
<td>Ir 2 000</td>
<td></td>
<td>(4)</td>
<td>(4)</td>
</tr>
<tr>
<td>Ir 2 500</td>
<td></td>
<td>(4)</td>
<td>(4)</td>
</tr>
<tr>
<td>Rated peak withstand current</td>
<td>Ip (kA)</td>
<td>65</td>
<td>82</td>
</tr>
<tr>
<td>Short-time withstand current</td>
<td>Ik (kA)</td>
<td>25</td>
<td>31.5</td>
</tr>
<tr>
<td>Duration (s)</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Dimensions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H (1) (mm)</td>
<td>2 300</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D (mm)</td>
<td>1 650</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approximate mass</td>
<td>(kg)</td>
<td>650</td>
<td>1 200</td>
</tr>
</tbody>
</table>

(1) With the standard LV cabinet
(2) Width 600 mm
(3) Width 800 mm
(4) Width 800 mm
Components
### Components

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel components</td>
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<tr>
<td>EasyPact EXE circuit breaker</td>
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<td>General characteristics</td>
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<td>41</td>
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<tr>
<td>Remote control optional auxiliaries</td>
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<td>43</td>
</tr>
<tr>
<td>HVX-C circuit breaker</td>
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<td>Easergy P3 protection relays</td>
<td>46</td>
</tr>
<tr>
<td>Easergy Sepam protection system</td>
<td>47</td>
</tr>
<tr>
<td>Easergy MiCOM protection system</td>
<td>48</td>
</tr>
<tr>
<td>Arc fault protection</td>
<td>49</td>
</tr>
<tr>
<td>Current and voltage transformers</td>
<td>51</td>
</tr>
</tbody>
</table>
Panel components

The withdrawable parts:

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

Circuit breaker
A circuit breaker is a safety device enabling the switching and protection of electrical distribution networks. It protects all components connected to the downstream network by opening the circuit during a fault.

The withdrawable EasyPact EXE vacuum circuit breaker is mounted on an integrated floor rolling trolley enabling easy handling.

Disconnected
A withdrawable disconnector with an integrated floor rolling trolley means disconnection between the busbar and the cables is feasible by racking it out from the service position to the test position.

It is inserted in place of the circuit breaker in the circuit breaker compartment.

Metering device
A withdrawable metering device with voltage transformers mounted on an integrated floor rolling trolley means measurement of the circuit voltage for metering purposes is feasible.

It can be disconnected from the main circuit by racking it out from the service position to the test position.

Earthing switch
The integrated earth switch with fault making capacity makes it possible to earth the cables or the Busbar (depending on the cubicle) and ensures safety during maintenance.

In accordance with IEC 62271-102 the integrated earth switch is Class E1 M0.
EasyPact EXE circuit breaker

General characteristics

EasyPact EXE is our latest range of state-of-the-art vacuum circuit breakers. 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 PIX Easy equipment component.

It has been designed to suit specific applications such as: Infrastructure, Commercial and Industrial buildings, Industrial plants and Distribution substations. The materials used to manufacture this circuit breaker have been selected and designed to operate 10,000 cycles.

Mechanism

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

Vacuum interrupter

This component is the heart of the circuit breaker. This specific Schneider designed component breaks the rated short circuit and this is achieved by:

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

Racking device

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

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

The materials used to manufacture EasyPact EXE racking sub-assemblies have been selected and designed to operate 2,000 cycles under the conditions defined by the IEC standard.
EasyPact EXE circuit breaker

General characteristics

According to IEC 62271-100

<table>
<thead>
<tr>
<th>Common characteristics</th>
<th>12 kV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated short-time withstand current (lk/tk)</td>
<td>kA/3s (50/60 Hz) = Isc</td>
</tr>
<tr>
<td>Rated operating sequence</td>
<td>O-3 min - CO-3 min - CO</td>
</tr>
<tr>
<td></td>
<td>O-0.3 s - CO-3 min - CO</td>
</tr>
<tr>
<td></td>
<td>O-0.3 s - CO-15 s - CO</td>
</tr>
<tr>
<td>Operating times</td>
<td>Opening &lt; 51 ms</td>
</tr>
<tr>
<td></td>
<td>Breaking &lt; 66 ms</td>
</tr>
<tr>
<td></td>
<td>Closing &lt; 71 ms</td>
</tr>
<tr>
<td>Mechanical endurance</td>
<td>Class M2</td>
</tr>
<tr>
<td>Electrical endurance</td>
<td>Class E2</td>
</tr>
<tr>
<td>Rated line-charging breaking current</td>
<td>A-class 10-C2</td>
</tr>
<tr>
<td>Rated cable-charging breaking current</td>
<td>A-class 25-C2</td>
</tr>
</tbody>
</table>

Mechanical endurance

EasyPact EXE installed under normal service conditions with a preventive maintenance program is designed to:

<table>
<thead>
<tr>
<th>Circuit Breaker</th>
<th>MCH</th>
<th>MXXF/MN release</th>
<th>Mechanical interlocks</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 000 operation cycles/30 years</td>
<td>10 000 charging operations</td>
<td>10 000 operations</td>
<td>2 000 operation cycles</td>
</tr>
</tbody>
</table>
The remote control auxiliaries comprise an electric motor (MCH), a shunt closing release (XF) and a shunt opening release (MX1).

### Electric motor (MCH)

The electric motor operates by charging the closing spring as soon as it is connected to the auxiliary power supply. This allows the circuit breaker to close after opening according to the rated operating sequence.

A lever is located on the front of the circuit breaker that enables the closing spring to be charged manually if the auxiliary power supply is unavailable.

The electric motor is equipped with an electrical contact to indicate the "spring charged" status of the mechanism.

The electric motor includes a gear reducer.

- **Power supply**
  - DC: 24-30 V, 48-60 V, 110-130 V, 200-250 V
  - AC (50 Hz/60 Hz): 48-60 V, 100-130 V, 200-240 V

- **Operating range**: 0.85 to 1.1 Ua
- **Consumption (VA or W)**
  - Triggering: 180
  - Latched: 4.5
- **Motor overcurrent**: 2 to 3 In for 0.1 s
- **Charging time**: ≤7 s
- **CH contact**: 10 A / 240 V

### Shunt closing release (XF)

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

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>DC: 24-30 V, 48-60 V, 100-130 V, 200-250 V</th>
<th>AC (50Hz/60Hz): 24 V, 48 V, 100-130 V, 200-250 V</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operating range</strong></td>
<td>0.85 to 1.1 Ua</td>
<td></td>
</tr>
<tr>
<td><strong>Consumption (VA or W)</strong></td>
<td>Triggering: 200 (for 200 ms)</td>
<td>Latched: 4.5</td>
</tr>
</tbody>
</table>

### Shunt opening release (MX1)

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

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>DC: 24-30 V, 48-60 V, 100-130 V, 200-250 V</th>
<th>AC (50 Hz/60 Hz): 24 V, 48 V, 100-130 V, 200-250 V</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operating range</strong></td>
<td>DC: 0.7 to 1.1 Ua</td>
<td>AC: 0.85 to 1.1 Ua</td>
</tr>
<tr>
<td><strong>Consumption (VA or W)</strong></td>
<td>Triggering: 200 (for 200 ms)</td>
<td>Latched: 4.5</td>
</tr>
</tbody>
</table>
EasyPact EXE circuit breaker
Remote control optional auxiliaries

Second shunt opening release (MX2)
The second shunt opening release operates by opening the circuit breaker when the voltage at the terminals of the release is between 70% and 110% (for a direct current)- or between 85% and 110% (for an alternative current)- of its rated voltage.

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

Characteristics
<table>
<thead>
<tr>
<th>Power supply</th>
<th>DC: 24-30 V, 48-60V, 100-130 V, 200-250 V</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AC (50Hz/60Hz): 24 V, 48 V, 100-130 V, 200-250 V</td>
</tr>
<tr>
<td>Operating range</td>
<td>DC: 0.7 to 1.1 Ua</td>
</tr>
<tr>
<td></td>
<td>AC: 0.85 to 1.1 Ua</td>
</tr>
<tr>
<td>Consumption (VA or W)</td>
<td>Triggering 200 (for 200 ms)</td>
</tr>
<tr>
<td></td>
<td>Latched 4.5</td>
</tr>
</tbody>
</table>

Undervoltage release (MN)
The undervoltage release operates by opening the circuit breaker when the voltage at the terminals of the release falls below 35% of its rated voltage, even if the fall is slow and gradual.

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

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

Characteristics
<table>
<thead>
<tr>
<th>Power supply</th>
<th>DC: 24-30 V, 48-60 V, 100-130 V, 200-250 V</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AC (50Hz/60Hz): 24 V, 48 V, 100-130 V, 200-250 V</td>
</tr>
<tr>
<td>Operating range</td>
<td>Opening 0.35 to 0.7 Ua</td>
</tr>
<tr>
<td></td>
<td>Closing 0.85 Ua</td>
</tr>
<tr>
<td>Consumption (VA or W)</td>
<td>Triggering 200 (for 200 ms)</td>
</tr>
<tr>
<td></td>
<td>Latched 4.5</td>
</tr>
</tbody>
</table>

Release combination table

<table>
<thead>
<tr>
<th>MCH</th>
<th>XF</th>
<th>MX1</th>
<th>MX2</th>
<th>MN</th>
</tr>
</thead>
<tbody>
<tr>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

![Shunt opening release MX2 or Under voltage release MN](image1)

![Shunt opening release MX2](image2)

![Undervoltage release MN](image3)
Components

EasyPact EXE circuit breaker
Remote control indication auxiliaries

Position contacts (OC)

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

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Standard delivery</th>
<th>Maximum quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 (1 block of 4 contacts)</td>
<td>3 (3 blocks of 4 contacts)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Breaking capacity (A)</th>
<th>Standard</th>
<th>Min. load: 100 mA / 24 V</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>V AC</td>
<td>240 / 380 10 / 6</td>
</tr>
<tr>
<td></td>
<td>V DC</td>
<td>24 / 48 10 / 6 *</td>
</tr>
<tr>
<td></td>
<td>125</td>
<td>10 / 6</td>
</tr>
<tr>
<td></td>
<td>250</td>
<td>3</td>
</tr>
</tbody>
</table>

* standard contacts: 10 A; optional contacts: 6 A (temperature derating)

"Ready to close" contact (PF)

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

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

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

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Standard delivery</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Breaking capacity (A)</th>
<th>Standard</th>
<th>Min. load: 100 mA / 24 V</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>V AC</td>
<td>240 / 380 5</td>
</tr>
<tr>
<td></td>
<td>V DC</td>
<td>24 / 48 3</td>
</tr>
<tr>
<td></td>
<td>125</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>250</td>
<td>0.15</td>
</tr>
</tbody>
</table>

Operation counter (CDM)

An operation counter counts the number of operating cycles (close-open) that the device has carried out.

EasyPact EXE is always delivered with an operation counter showing the number of close-open cycles that have been performed for the factory routine test (usually 50).
HVX is our latest range of vacuum circuit breakers. It offers a proven state-of-the-art design to meet your specifications for power switching devices in air-insulated switchgear up to 36 kV. HVX provides a valuable solution for your projects. Thanks to their improved contact design, our interrupters provide unrivalled performance.

Operating mechanisms have been simplified to increase reliability and service life with very low maintenance. Instead of the traditional spring operating mechanism, HVX has implemented a single-shaft system with only one torsion spring, reducing the number of parts and increasing reliability.

Application

HVX is designed to suit all types of applications (utilities, power generation, O&G, industry, etc.) and for breaking short-circuit currents.

Standard

HVX-C used in PIX Roll on Floor has been fully tested according to IEC 62271-100 and belongs to the M2, C2, E2 class of circuit breakers as defined by the standard.

<table>
<thead>
<tr>
<th>Electrical characteristics</th>
<th>HVX 17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>(kV)</td>
</tr>
<tr>
<td>Rated current</td>
<td>(A)</td>
</tr>
<tr>
<td>Rated frequency</td>
<td>(Hz)</td>
</tr>
<tr>
<td>Rated breaking capacity</td>
<td></td>
</tr>
<tr>
<td>Short-circuit current</td>
<td>(kA)</td>
</tr>
<tr>
<td>Cable charging current</td>
<td>(A)</td>
</tr>
<tr>
<td>Line charging current</td>
<td>(A)</td>
</tr>
<tr>
<td>Single capacitor bank</td>
<td>(A)</td>
</tr>
<tr>
<td>Rated making capacity</td>
<td>(kA peak)</td>
</tr>
<tr>
<td>Rated operating time</td>
<td></td>
</tr>
<tr>
<td>Opening (ms/max)</td>
<td>50</td>
</tr>
<tr>
<td>Breaking (ms/max)</td>
<td>60</td>
</tr>
<tr>
<td>Arcing (ms/max)</td>
<td>10</td>
</tr>
<tr>
<td>Closing (ms/max)</td>
<td>60</td>
</tr>
<tr>
<td>Rated operating sequence</td>
<td></td>
</tr>
<tr>
<td>O-0.3s-CO-3 min-CO</td>
<td></td>
</tr>
<tr>
<td>O-3min-CO-3 min-CO</td>
<td></td>
</tr>
<tr>
<td>Mechanical (C/O) for switching</td>
<td>30 000</td>
</tr>
<tr>
<td>chamber</td>
<td></td>
</tr>
<tr>
<td>Mechanical (C/O) for mechanism</td>
<td>10 000</td>
</tr>
<tr>
<td>Electrical (C/O at I(_{p}))</td>
<td>10 000</td>
</tr>
<tr>
<td>Electrical (C/O at I(_{sc}))</td>
<td>100</td>
</tr>
</tbody>
</table>

\(^{(1)}\) Contact us for higher values  
\(^{(2)}\) Contact us for other values
In order to maximize operator safety and minimize erroneous operations, PIX RoF provides a large number of integral interlocks. All mandatory interlocks in accordance with IEC are available and in addition, there are several optional interlocks that can be chosen to enhance operator safety.

A list of basic interlocks to enhance operator safety are described below:

<table>
<thead>
<tr>
<th>Interlock</th>
<th>Function of interlock</th>
<th>Method of operation of interlock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between truck and low voltage connector</td>
<td>The truck cannot be actuated unless the low-voltage connector is inserted.</td>
<td>Rack in handle can not be inserted for operation.</td>
</tr>
<tr>
<td></td>
<td>The low voltage plug cannot be removed when the truck is not in the test position.</td>
<td>MV compartment door cannot be opened in transit/service position.</td>
</tr>
<tr>
<td>Between truck and earthing switch</td>
<td>The truck cannot be racked in if the earthing switch is ON.</td>
<td>The opening in the front door for the truck crank is locked.</td>
</tr>
<tr>
<td></td>
<td>The earthing switch can no longer be switched on if the truck has left its test position.</td>
<td>The interrogation slide below the earthing switch is locked. The insertion of the earthing switch lever is blocked.</td>
</tr>
<tr>
<td>Between the circuit breaker and the truck</td>
<td>Circuit breaker cannot be racked in or out while it is switched on.</td>
<td>Rack in handle can not be inserted for operation.</td>
</tr>
<tr>
<td></td>
<td>Circuit breaker cannot be switched on/off unless the truck is completely in its test or service position.</td>
<td>The circuit breaker cannot be switched ON or OFF.</td>
</tr>
<tr>
<td>Between truck and cubicle</td>
<td>If the truck front frame is not locked in the cubicle, the truck cannot be actuated.</td>
<td>The crank cannot be inserted to the truck if both truck handles in the front frame are not moved outwards.</td>
</tr>
<tr>
<td></td>
<td>If the truck has left its test position the truck front frame cannot be unlocked in the cubicle.</td>
<td>Both truck handles in the front frame are locked.</td>
</tr>
<tr>
<td>Between the truck and the front door (optional)</td>
<td>The front door can only be opened if the truck is in its test position.</td>
<td>The double-bit key cannot be turned Provision available in the front door to open the interlock</td>
</tr>
<tr>
<td></td>
<td>If the front door is open, the truck cannot be moved into the service position. This interlock is standard.</td>
<td>The crank cannot be inserted into the truck if the front door is open.</td>
</tr>
<tr>
<td></td>
<td>If the front door is not locked, the truck cannot be actuated.</td>
<td>The opening in the front door for the truck crank is locked.</td>
</tr>
<tr>
<td>For the truck in a disconnected position</td>
<td>CB can only be moved into the service position when the key is inserted in the lock.</td>
<td>Rack in access is available only after insertion of the key.</td>
</tr>
<tr>
<td>(optional key lock)</td>
<td>Key is blocked in the lock when the circuit breaker is in the service position.</td>
<td></td>
</tr>
</tbody>
</table>
Components

Protection, monitoring and control

Easergy P3 protection relays

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 customers feedback.

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 excellent 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 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 as standard, including IEC 61850
- Option to use two active communication protocols at the same time
- Increased number of inputs and outputs gives you more options

Enhanced safety

- Embedded arc protection
- Built-in virtual injection testing
- Compliant to international standards (e.g. IEC 60255-1)

Ease of use

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

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

The informative human machine interface provides the information the user needs, in addition to customized legend texts.

Enhanced usability

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

Protection, monitoring and control
Easergy Sepam protection system

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 designed to provide an optimal solution for each application, and includes, for example:

- 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 that can be adapted to your specific requirements.

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.

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 catalogue which sensor to use with each Sepam version.

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 the withdrawable part
- Various auxiliaries: secondary circuit test units, etc.
Protection, monitoring and control

Easergy MiCOM protection system

Easergy MiCOM protection relays

Easergy MiCOM protection provides the user with a choice of cost-effective 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 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
• Thanks to the continuous development of these products, compatibility with technical progress in the field of switchgear and controlgear communication is guaranteed

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.
### Protection, monitoring and control

**Arc fault protection**

### Arc fault detectors selection guide

<table>
<thead>
<tr>
<th>Vamp 125</th>
<th>Vamp 121</th>
<th>Vamp 321 (+I/O units)*</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Image" /></td>
<td><img src="image2" alt="Image" /></td>
<td><img src="image3" alt="Image" /></td>
</tr>
</tbody>
</table>

#### Functions

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

An arc flash protection maximises personnel safety and minimizes material damage caused by arc faults.

#### System features

- Typical operation on light only principle
  - Input for current criteria for I> and L> operation
  - Integrated 19 - 256 V AC/DC aux. supply
- Optimised 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 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 current, zero-sequence voltage and current
- Event logs, disturbance recording and real-time clock
- Operation on simultaneous current and light or on light only
- Direct connection of arc sensors in the central unit without using I/O units
- 7 ms operation time with trip contact and 2 ms with high speed output (HSO)
- Programmable operation zones
- Communication protocol support for SCADA and automation interfacing
- Supports 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

**Point sensor - pipe**

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

**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
- Enhanced personnel safety

#### IEC standards

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

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*schneider-electric.com*
Components

Protection, monitoring and control
Arc fault protection

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

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

Vamp arc flash range

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

Minimized damage also minimizes repair work which means the power supply can be restored as quickly as possible.

Advantages

Enhanced personnel safety
The shorter the operating time of the arc flash protection unit, the smaller the damage caused by the arc fault thereby minimizing possible power outages.

Extended switchgear life cycle
The arc protection unit increases the lifecycle expectancy of switchgear installations, so that investment in new switchgear installations can be postponed and money can be saved by re-Vamping existing switchgear systems.

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

Low investment costs and fast installation
A comprehensive arc protection system is characterized by low investment costs and fast installation and commissioning times. One successful arc flash protection unit operation provides an immediate return on your investment.

Reliable Operation
Operation is based on the appearance of light or alternatively on the appearance of light and current from an external device. The system is immune to faulty trippings due to dual tripping criteria: light & current.
**Current and voltage transformers**

**Block type current transformers**

- Single, Double or Triple primary
- 1 A or 5 A secondary current
- Class 0.2, 0.5 or 1 for measurement
- 5P10, 5P15 or 5P20 for protection

For specific burdens or accuracy class please contact us.

**Window type current transformers**

- Single, Double or Triple primary
- 1 A or 5 A secondary current
- Class 0.2, 0.5 or 1 for measurement
- 5P10, 5P15 or 5P20 for protection

For specific burdens or accuracy class please contact us.

**Ring type Current transformer**

- Single, Double or Triple primary
- 1 A or 5 A secondary current
- Class 0.2, 0.5 or 1 for measurement
- 5P10, 5P15 or 5P20 for protection

For specific burdens or accuracy class please contact us.

**Voltage transformers**

- Primary voltage from 3/√3 up to 15/√3 kV
- First secondary voltage available in different ratios with burden up to 100 VA and accuracy class 0.5
- Secondary voltage available with burden up to 50 VA and protection class 3P

For specific burdens or accuracy class please contact us.
Installation and connection
# Installation and connection

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Installation and connection

Room planing

Installation non-IAC

Switchgear Room

All dimensions are in mm
Room planing
Installation IAC internal tunnel

Switchgear room

All dimensions are in mm
Installation and connection

Layout
Back-to-the-wall installation - IAC AFL

Space allocation plan

Installation example top view
PIX RoF with 2 incomers, 1 bus coupler, 1 bus riser, 1 metering, 5 feeders up to 1 250 A:

Incomer 1 250 A
Feeder 1 250 A
Feeder 1 250 A
Bus coupler 1 250 A
Bus riser 1 250 A
Feeder 1 250 A
Feeder 1 250 A
Bus PT 1 250 A

800 mm 600 mm 600 mm 600 mm 600 mm 600 mm 600 mm 600 mm 600 mm 800 mm
25 mm ≥ 100 mm 25 mm

Installation example top view
PIX RoF with 2 incomers, 1 bus coupler, 1 bus riser up to 2 500 A, 5 feeders up to 1 250 A and 1 bus voltage metering panel:

Incomer 2500 A
Feeder 1250 A
Feeder 1250 A
Feeder 1250 A
Bus coupler 2 500 A
Bus riser 2 500 A
Feeder 1250 A
Feeder 1250 A
Bus PT 1250 A

800 mm 600 mm 600 mm 800 mm 600 mm 600 mm 600 mm 600 mm 600 mm 800 mm
25 mm ≥ 100 mm 25 mm
Civil engineering

Standard foundation/ground plan for PIX Roll-on-Floor switchgear

600 mm width

800 mm width
Accessories

Installation and connection

Operation accessories

These accessories are supplied with the switchboard.
The switchboard switchgears may be operated using these accessories.

Double-bit key

• Standard double-bit key is provided to lock/unlock the door of the low-voltage cabinet where applicable

Earthing switch operating lever

• Operating lever to operate the earth switch of the switchgear on the front of panel
• Thanks to its ergonomic design, minimum effort is required by the operator to operate the earth switch

Breaker operating rod

• Breaking operation rod is provided along with switchboard to operate the breaker inside the switchgear with the door closed
• The operator can close or open the breaker by inserting this rod into the respective orifice provided on the front door of each switchgear

Crank for breaker trolley

• This crank is provided along with switchboard to rack-in and rack-out the HVX breaker along with trolley inside the switchgear
• This handle is also used to rack-in and rack-out the voltage transformer’s disconnecting link, housed at the rear of Incomer cubicle
• The operation of racking-in and racking-out the breaker is performed with the door closed, by inserting the crank in the respective slot, which is provided on the front door of each switchgear

Crank for EasyPact EXE breaker trolley

• This crank is provided along with switchboard to rack-in and rack-out the EasyPact EXE breaker along with trolley inside the switchgear.
• The operation of racking-in and racking-out the breaker is performed with the door closed, by inserting the crank in the respective slot, which is provided on the front door of each switchgear
This international web site allows you to access all the Schneider Electric solutions and product information via:

- Comprehensive descriptions
- Range datasheets
- A download area
- Product selectors

You can also access information for your business and contact your respective Schneider Electric in-country support.

Training

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

For example, the training catalog includes a beginner’s courses in electrical distribution, knowledge of MV and LV switchgear, operation and maintenance of installations, and design of LV installations.

Web selector

This site allows you to access the Schneider Electric products in just two clicks via a comprehensive range of datasheets, with direct links to:

- Complete libraries: technical documents, catalogs, FAQs, brochures
- Selection guides from the e-catalog
- Product discovery sites with animations

You will also find illustrated overviews, news subscription, and a list of country contacts.