

PIX Double Busbar

Air Insulated Switchgear up to 17.5 kV



Your requirements



Service continuity



High safety

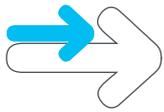


Reliability

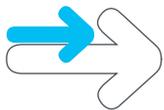
Our solution



PIX Double Busbar Air Insulated Switchgear up to 17.5 kV



- Two busbars grant highest level of **uninterruptible power supply**
- Extensions are made simply, permitting to **improve your installation**

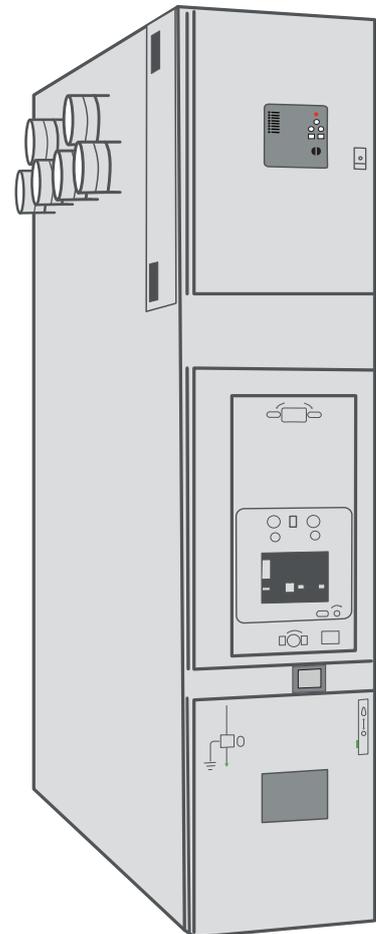


- **Fully tested** to all the latest IEC standards
- **Highest levels of Internal Arc Classification** thanks to the 'safe door' design
- High-pressure resistant front doors with interlocking flanges on all sides – **'safe door'**
- All **operations** can be carried out directly **from the front** of the cubicle with the **door closed**
- **Mechanical interlocks** and indications fully in line with IEC standards
- The **ergonomic interface** indicates clearly states of operation and position of the contacts



- **Partition construction** for side walls makes each cubicle independent from the other, permitting to **limit the effect of faults** in a function
- The design, manufacturing and testing are carried out **according to the ISO 9001 and 9002 standards**
- The **Rigid cubicle** design is ensured by advanced computer modeling techniques

DN1028F4



PIX Double Busbar



Uninterruptible power supply

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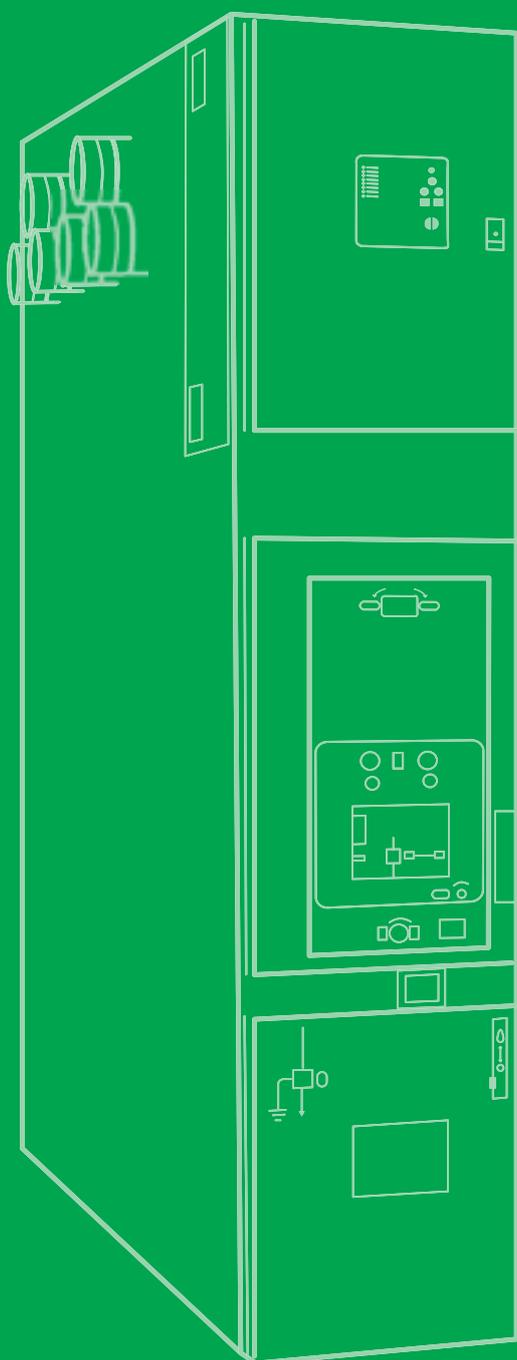
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PIX Double busbar

General





The Air Insulated Switchgear **with double busbar**, is an indoor metal-enclosed device intended for the MV section of HV/MV substations and high power MV/MV substations.

Air Insulated Switchgear with double busbars offers you:

- Pre-engineered and adaptable solutions tailored to your specific requirements
- Significantly reduced maintenance
- Local support centres throughout the world

Air Insulated Switchgear with double busbars gives you the advantages of:

- Continuity of service for your networks
- Enhanced safety for your staff and operations
- Two busbars grant highest level of uninterrupted power supply
- Extensions are made simply, permitting to improve your installation
- Optimised investment throughout the life of your installation
- The possibility of integrating your medium voltage switchboard in a monitoring and control system

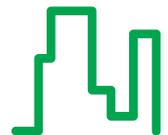
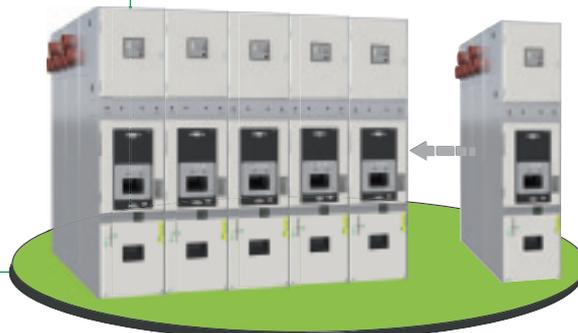
PE68263



PE6010



PM103561



Our Air Insulated Switchgear PIX Double Busbar adapts to all electrical power distribution requirements from 1 to 17.5 kV.



Our Air Insulated Switchgear PIX Double Busbar provides the most efficient means to control and protect a wide range of applications.

Thanks to the wide range of functions contained, they can be easily integrated into a monitoring and control system.

To know and manage two increasingly essential requirements for all Medium Voltage networks.

Faced with demand for an increasing number of energy production sources and the increasingly significant obligations of network adaptability, operators are looking for more flexible, responsive, scalable and simply reconfigurable solutions ("Smart Grids"). It is fundamental for operators to know, understand and act correctly.

- To know the switchboard status at all times.
- To act with full knowledge of the facts.



Sepam range



MiCOM range



GemControl front panel



PowerLogic range



Vamp range

Protection and control relays

Sepam

Sepam series 20, series 40, series 60 and series 80 digital protection relays take full advantage of Schneider Electric's experience in electrical network protection.

They provide all the necessary functions:

- Effective fault diagnosis and protection planning
- Accurate measurements and detailed diagnoses
- Integral equipment control
- Local or remote indication and operation

Easy upgrading: addition of communication, digital I/O's, analog output, or temperature acquisition systems can be added due to its modular design.

MiCOM

MiCOM protection provides the user with a choice of cost-optimised solutions for specific protection requirements within the distribution network. The MiCOM relay series offers comprehensive protective function solutions for all power supply systems as well as for various functional and hardware project stages.

Control relays

GemControl

Smart switchgear management: a basic unit for control, monitoring, measurement, processing and data transmission.

PowerMeter and Circuit Monitor metering units

The PowerLogic PowerMeter replaces a full complement of basic analog meters. This cost effective, high performance meter provides a full complement of accurate true-rms metering values.

The PowerLogic series 3000/4000 Circuit Monitor is designed for critical power users and large energy consumers in order to provide the information needed to confidently enter the evolving world of deregulation. It can be adapted to meter almost any time-of-use or at a real-time.

Vamp arc flash protection

The arc protection unit detects an arc flash in an installation and trips the feeding breaker. Arc flash protection maximises personnel safety and minimises material damage to the installation in the most hazardous power system fault situations.



Schneider Electric Services - by your side throughout the life of your installation

To learn more do not hesitate to visit our site: Services/Electrical Distribution Services www.schneider-electric.com

Installation & Commissioning

Because without these, you increase the risk of start-up delays and premature equipment failure.

Technical training

Having well-trained employees is key to the long-term health of your electrical distribution equipment.

On-demand maintenance

You need to adopt the right best practices and minimise downtime, while working with limited budgetary and maintenance resources.

Modernisation

Ageing, outdated equipment can be modernised, dramatically improving its performance and lifetime, as well as achieving compliance with current regulations.

End-of-life

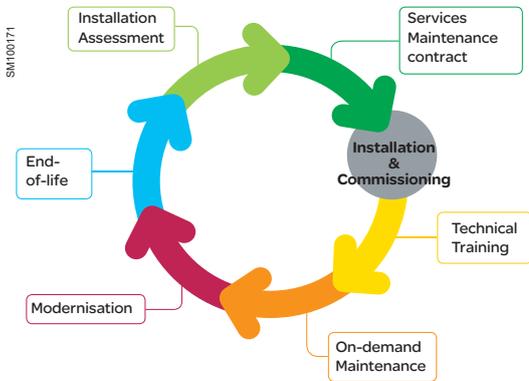
Dispose of outdated equipment in a way that's both green and transparent.

Installation assessment

For a comprehensive assessment and a clear analysis of the results.

Maintenance Services Contracts

To prevent such issues, these contracts can focus on predictive and preventive maintenance that is specifically tailored to your site and processes.



Examples of services provided

Warranty extension

A warranty extension will be proposed if your installation is checked by us before being commissioned.

Circuit breaker diagnosis

Throughout the life of the equipment it is possible to carry out routine measurement of its characteristics in order to optimise maintenance. This service may be part of a global installation maintenance contract.

Help with preventive maintenance

A Maintenance & Services guide is available and gives the most important general instructions to:

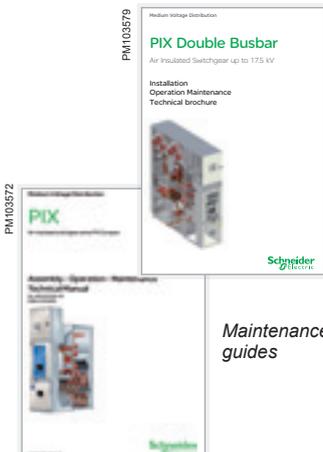
- Reduce equipment wear and tear (and/or failure)
- Ensure that the equipment is safe during all installation, repair and servicing operations

In the pages of this guide, all the information needed for:

- Operation on control mechanisms, insulating materials and vents, power circuits, auxiliary circuits
- Recommended frequency for interventions is according to operating conditions: normal, in a corrosive atmosphere, for marine use

End-of-life recycling

Schneider Electric Services has an operational subsidiary allowing you to recycle your medium voltage switchgear.



Maintenance & Services guides

PEE6733



A major asset

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

This procedure is:

- Uniform throughout all departments
- Recognised by many customers and approved organisations

But above all, its strict application has allowed us to obtain the recognition of an independent organisation as example: The French Quality Assurance Association (AFAQ).

The quality system for the design and manufacture is certified to be in conformity with the requirements of the ISO 9001: 2008 quality assurance standard.

Strict and systematic checks

During manufacture, 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
- Measurement of the operating torque
- Dielectric test
- Testing of the safety systems and interlocks
- Testing of the low voltage components
- Conformity with drawings and diagrams

The results obtained are recorded and approved by the quality control department on the test report of each device.

This, therefore, guarantees product traceability.

Protected environment

Schneider Electric is committed to a long-term environmental approach.

All necessary measures have been taken in conjunction with our services, suppliers and subcontractors to ensure that the materials used in the composition of the equipment do not contain any substances prohibited by regulations and directives.

In order to help you protect the environment and relieve you of any concerns in terms of stock or dismantling, Schneider Electric Services offers to take back your equipment at the end of its life.

Our Air Insulated Switchgear PIX Double Busbar is designed with environmental protection in mind:

- The materials used, insulators and conductors are identified, easily separable and recyclable
- The environmental management system adopted by Schneider Electric's production sites for the manufacture of our Air Insulated Switchgear has been assessed and recognised as conforming to the requirements of the ISO 14001 standard

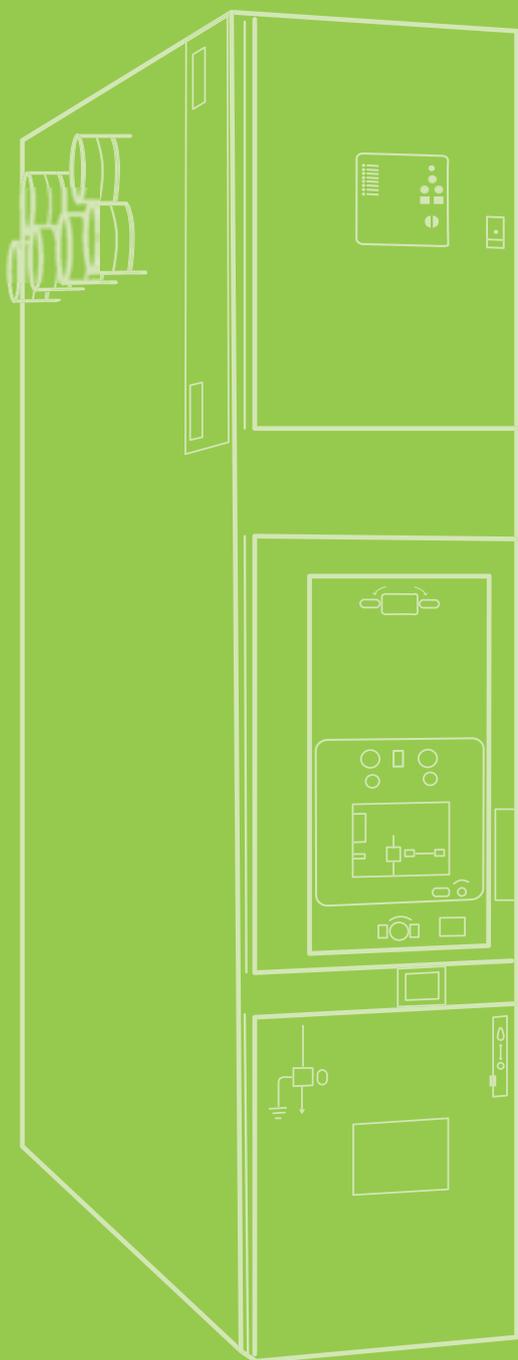
PEE6266



Certified quality under
ISO 9001 and ISO 9002

PIX Double Busbar

Product description





Panel architecture

PIX Double busbar unit consists of all of the equipment in the main circuit (high voltage level) and auxiliary circuits (at low voltage level) which together provide a protection function. Each functional unit combines all of the components which are required to fulfill this function:

- The cubicle, and
- The protection, monitoring and control system (including the withdrawable switching device).

Access to main circuit compartments

Interlock-controlled accessible compartment:

- Withdrawable MV part (circuit breaker) compartment

Tool-based accessible compartments:

- Cable compartment
- Busbar compartment
- Fixed parts compartment

The cubicle

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 disconnectors
- The withdrawable part (circuit-breaker, disconnecter truck or earthing truck), and
- The MV connections, earthing switch, current transformers and voltage transformers, as required.

PIX Double Busbar guarantees a high level of protection of people; 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 units are in a control cabinet separated from the medium voltage section.

Six basic cubicle layouts are offered:

- Incomer or feeder with circuit breaker
- Busbar coupler
- Bus section
- Bus riser
- Busbar metering and earthing
- Direct incomer with circuit breaker

The withdrawable part

The withdrawable function gives the ability to disconnect devices.

It includes:

- The circuit breaker or the earthing truck
- Interlocks to fix the withdrawable part either in service or disconnecting position

The protection, monitoring and control system

This includes:

- Sepam or MiCOM protection, monitoring and control unit
- The GemControl monitoring and control unit
- The Vamp arc flash protection system
- Current transformers:
- Voltage Transformers

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

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



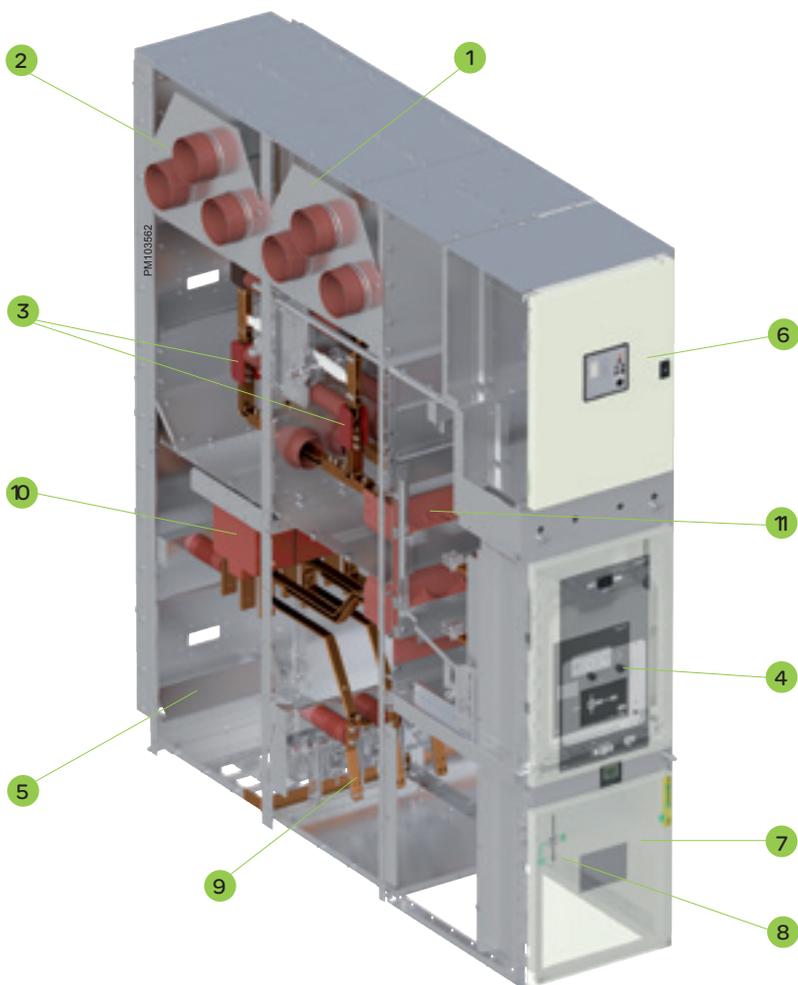
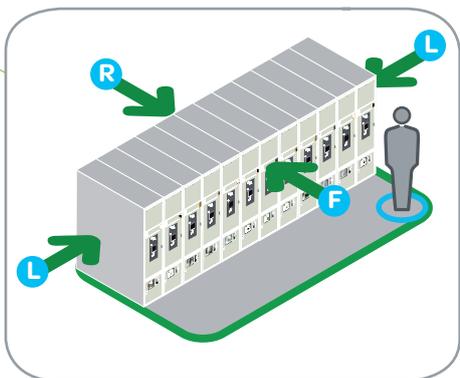
IAC (internal arc fault classification):

Architecture based on safe access to compartments: protection of operators in the event of internal arcing complies with 5 criteria:

- correctly secured doors and covers do not open
- no fragmentation of the enclosure occurs within the time specified for the arcing test
- does not cause holes in the accessible sides
- do not ignite due to the effect of the hot gases indicators
- the enclosure remains connected to its earthing point

IAC (Internal Arc Classification):

- A: restricted access to authorised personnel only
- F: access to the front side
- L: access to the lateral side
- R: access to the rear side



Compartments design

- 1 Front Bus Bar compartment
- 2 Rear Bus Bar compartment
- 3 Bus Bar disconnectors
- 4 Withdrawable part: vacuum circuit breaker type HVX
- 5 Cable compartment
- 6 Low-voltage cabinet with control device
- 7 Access cover to cable compartment
- 8 Earthing switch position indicator
- 9 Earthing switch
- 10 Current transformers
- 11 Metallic shutter

Rated voltage	kV	12	17,5
Rated frequency withstand voltage	kV	28	38
Rated impulse withstand voltage (BIL)	kV	75	95
Rated frequency	Hz	50 / 60	50 / 60
Rated current PIX Double Busbar	Up to A	3150	3150
Rated peak current	kA	82	82
Rated short time current (1s - 3s)	kA	31.5	31.5
Internal arc fault classification	(kA 1S)	31.5	31.5
	IAC	AFLR	
Loss in service continuity category		LSC2B	
Degree of protection	IP	3X or 4X	

PE6007



Operating conditions

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

- Ambient air temperature:
 - less than or equal to 40°C
 - less than or equal to 35°C on average over 24 hours
 - greater than or equal to – 5°C
- Altitude:
 - less than or equal to 1000 m
 - above 1000 m, a derating coefficient is applied (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

PM10357



Specific operating conditions (please consult us)

PIX Double Busbar 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

Standards

PIX Double Busbar meets the following international standards:

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



PIX Double Busbar

Range of functions

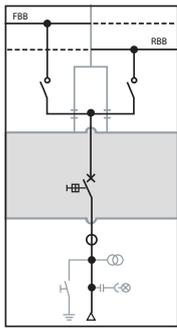
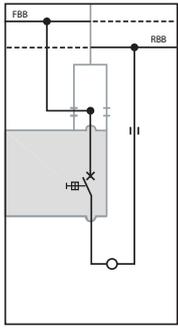
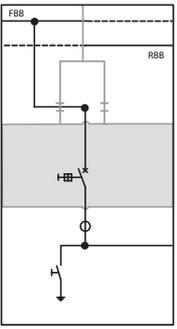
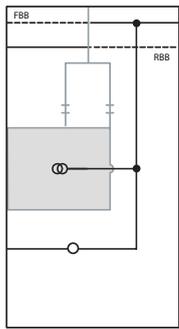


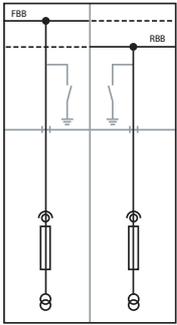
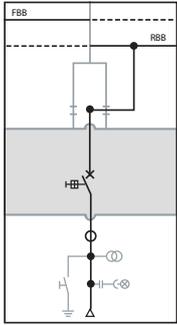
PIX Double Busbar has a comprehensive range of functions to suit all requirements for a wide range of applications.

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 equipments shown below are the main functions.

Additional functions are available upon request to answer specific requirements.

Function	Incomer or Feeder	Busbar coupler (1)	Bus section (2)	Bus riser (2)
Device	Vacuum Circuit Breaker HVX	Vacuum Circuit Breaker HVX	Vacuum Circuit Breaker HVX	Withdrawable metering unit MTX (3)
Single line diagrams				

Function	Busbar metering & earthing	Direct incomer (2)
Device	Withdrawable metering unit MTX	Vacuum Circuit Breaker HVX
Single line diagrams		

FBB = front busbar

RBB= rear busbar

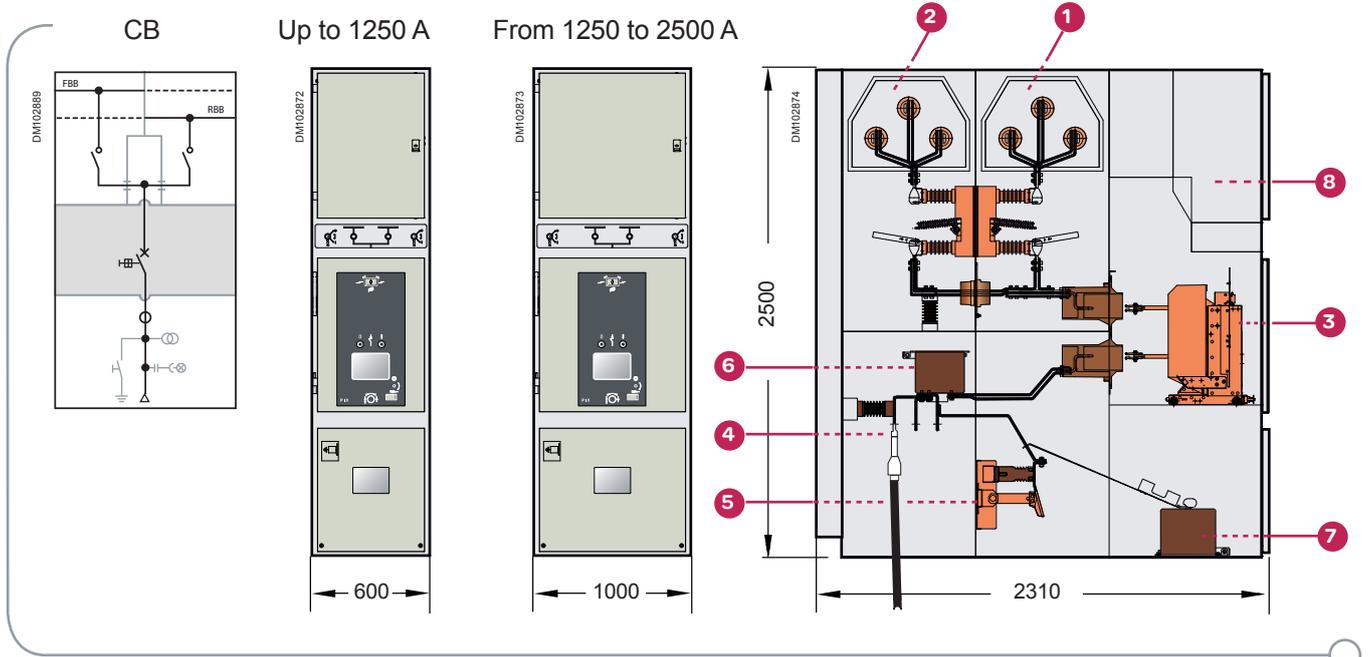
(1) Available with busbar disconnecter

(2) Front or rear busbar

(3) Optional

Function and characteristics

Incomer or Feeder



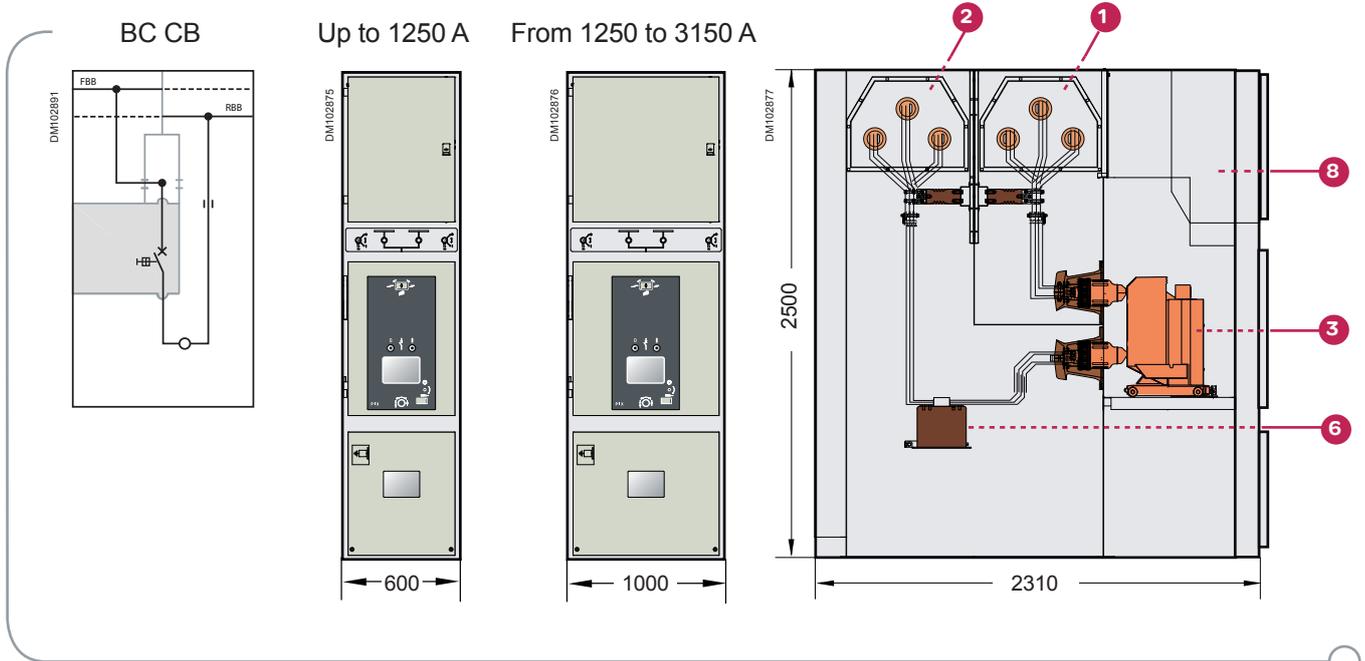
MV devices

- 1 Front Bus Bar compartment
- 2 Rear Bus Bar compartment
- 3 Main switching device
- 4 MV connections by cables accessible from the rear face
- 5 Earthing switch
- 6 Current transformers
- 7 Voltage transformers, with fuses

LV control cabinet

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

			CB 12	CB 17
Rated voltage		kV	12	17,5
Rated frequency		Hz	50 / 60	
Rated peak current		kA	82	
Rated short time current (3s)		kA	31.5	
Busbar current		A	Up to 3150	
Short circuit current		kA	up to 31,5	
Rated current	Width 600 mm	A	up to 1250	
	Width 1000 mm		from 1250 to 2500	
Dimensions	H	mm	2500	
	D		2310	
	W		600 / 1000	
Approximate mass	Width 600 mm	kg	1200	
	Width 1000 mm		1500	



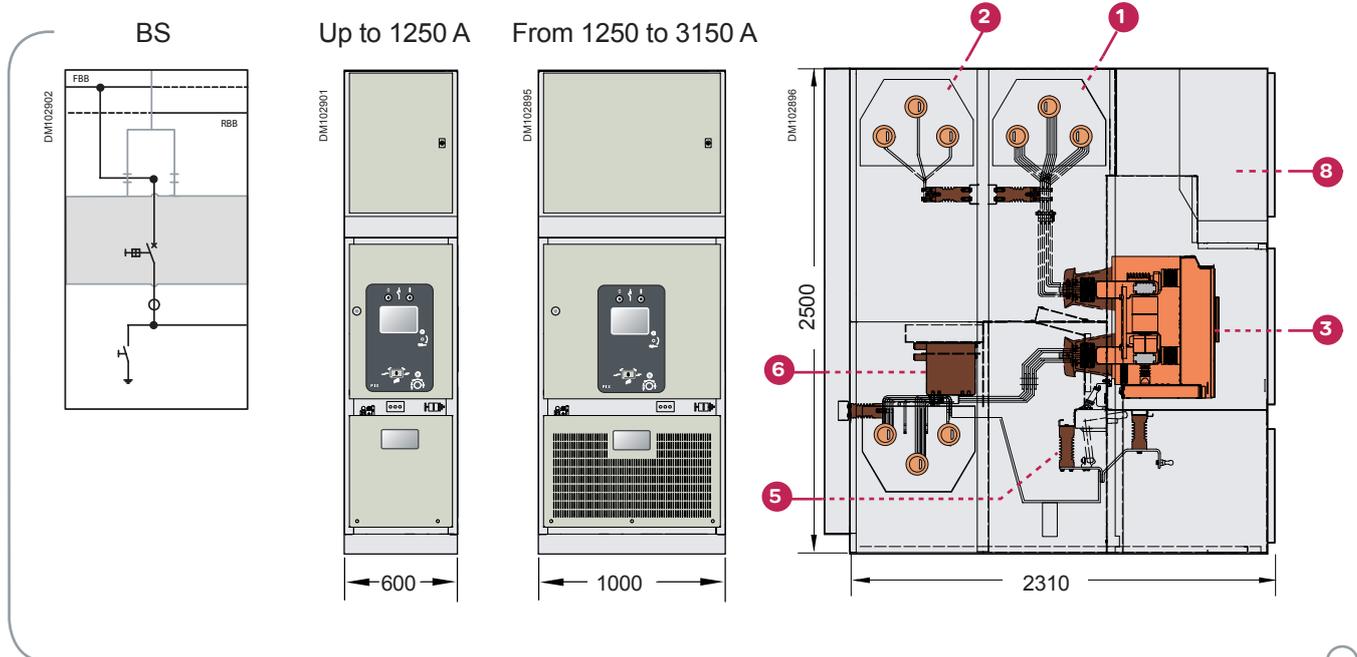
MV devices

- 1 Front Bus Bar compartment
- 2 Rear Bus Bar compartment
- 3 Main switching device
- 6 Current transformers

LV control cabinet

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Rated frequency		Hz	50 / 60	
Rated peak current		kA	82	
Rated short time current (3s)		kA	31.5	
Busbar current		A	Up to 3150	
Short circuit current		kA	up to 31,5	
Rated current	Width 600 mm	A	up to 1250	
	Width 1000 mm		from 1250 to 3150	
Dimensions	H	mm	2500	
	D		2310	
	W		600 / 1000	
Approximate mass	Width 600 mm	kg	1200	
	Width 1000 mm		1500	



The function is available either on front or on rear busbar

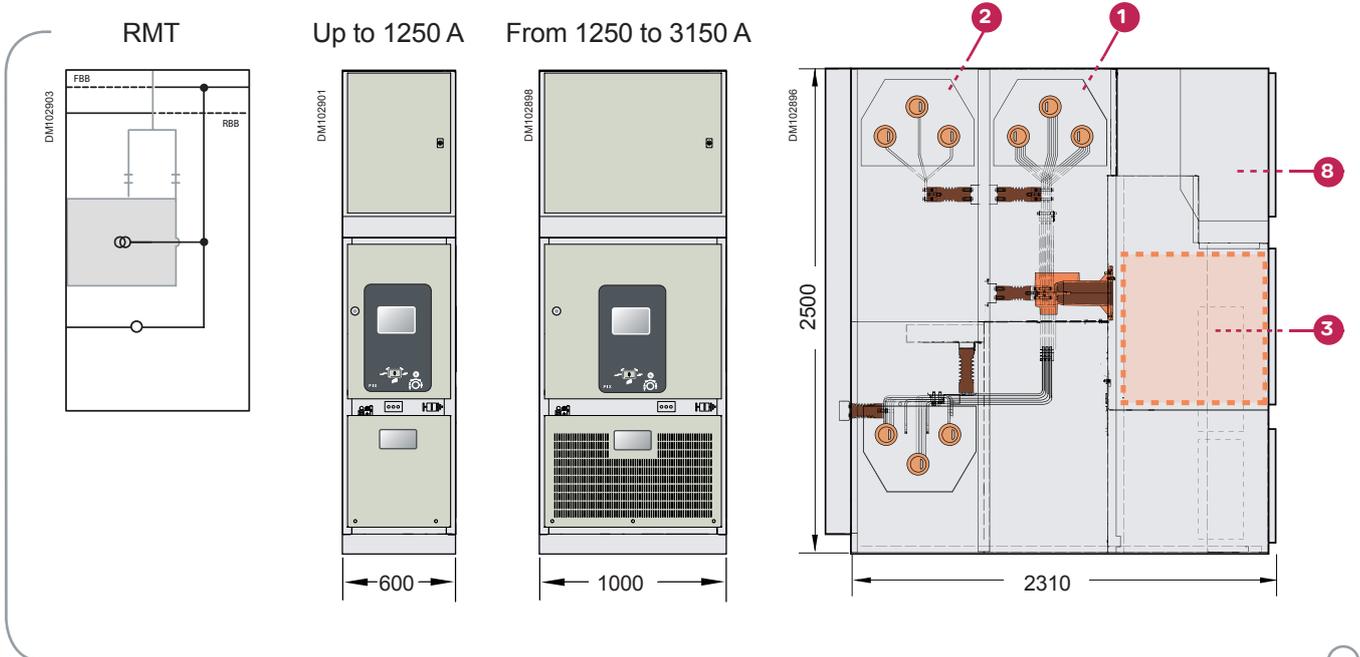
MV devices

- 1 Front Bus Bar compartment
- 2 Rear Bus Bar compartment
- 3 Main switching device
- 5 Earthing switch
- 6 Current transformers

LV control cabinet

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

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Rated voltage		kV	12	17,5
Rated frequency		Hz	50 / 60	
Rated peak current		kA	82	
Rated short time current (3s)		kA	31.5	
Busbar current		A	Up to 3150	
Short circuit current		kA	up to 31,5	
Rated current	Width 600 mm	A	up to 1250	
	Width 1000 mm		from 1250 to 3150	
Dimensions	H	mm	2500	
	D		2310	
	W		600 / 1000	
Approximate mass	Width 600 mm	kg	1200	
	Width 1000 mm		1500	



The function is available either on front or on rear busbar

MV devices

- 1 Front Bus Bar compartment
- 2 Rear Bus Bar compartment
- 3 Withdrawable metering unit (option)

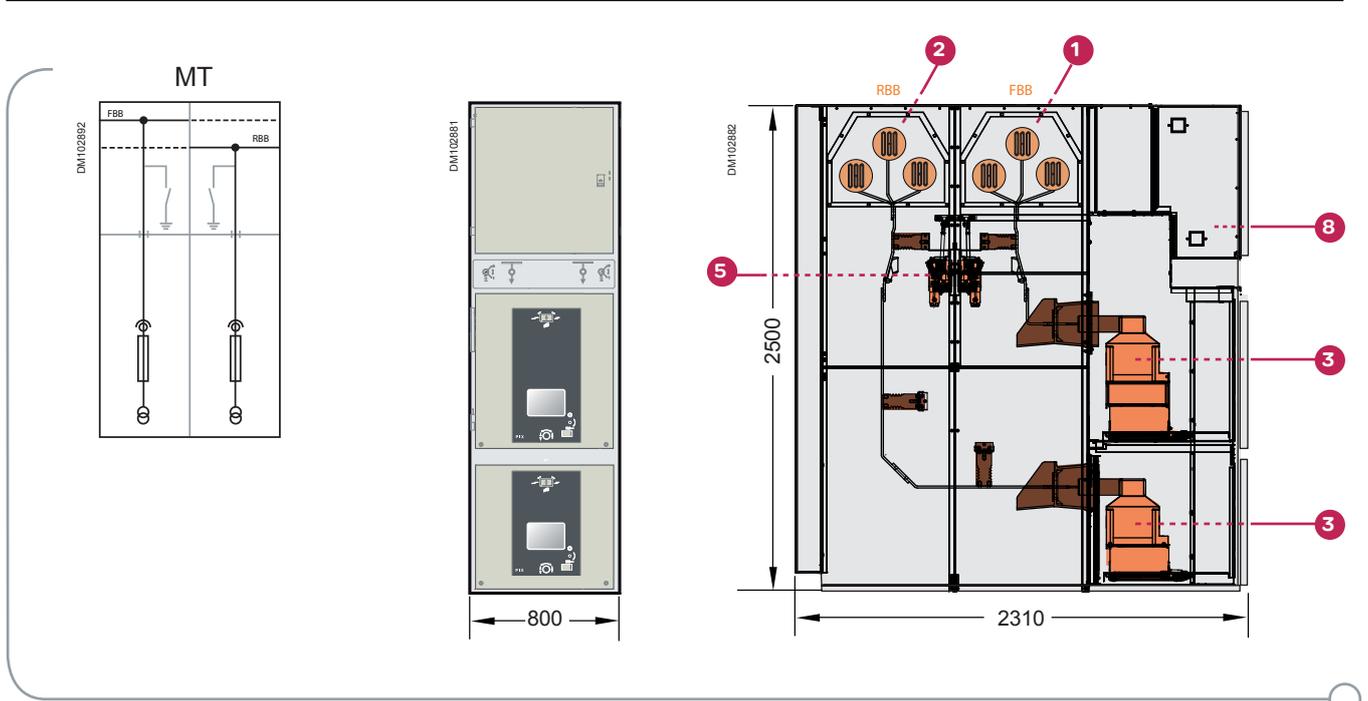
LV control cabinet

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

		RMT 12	RMT 17
Rated voltage	kV	12	17,5
Rated frequency	Hz	50 / 60	
Rated peak current	kA	82	
Rated short time current (3s)	kA	31.5	
Busbar current	A	Up to 3150	
Rated current	Width 600 mm	up to 1250	
	Width 1000 mm	from 1250 to 3150	
Dimensions	H	2500	
	D	2310	
	W	600 / 1000	
Approximate mass	Width 600 mm	1200	
	Width 1000 mm	1500	

Functions and characteristics

Busbar metering & earthing



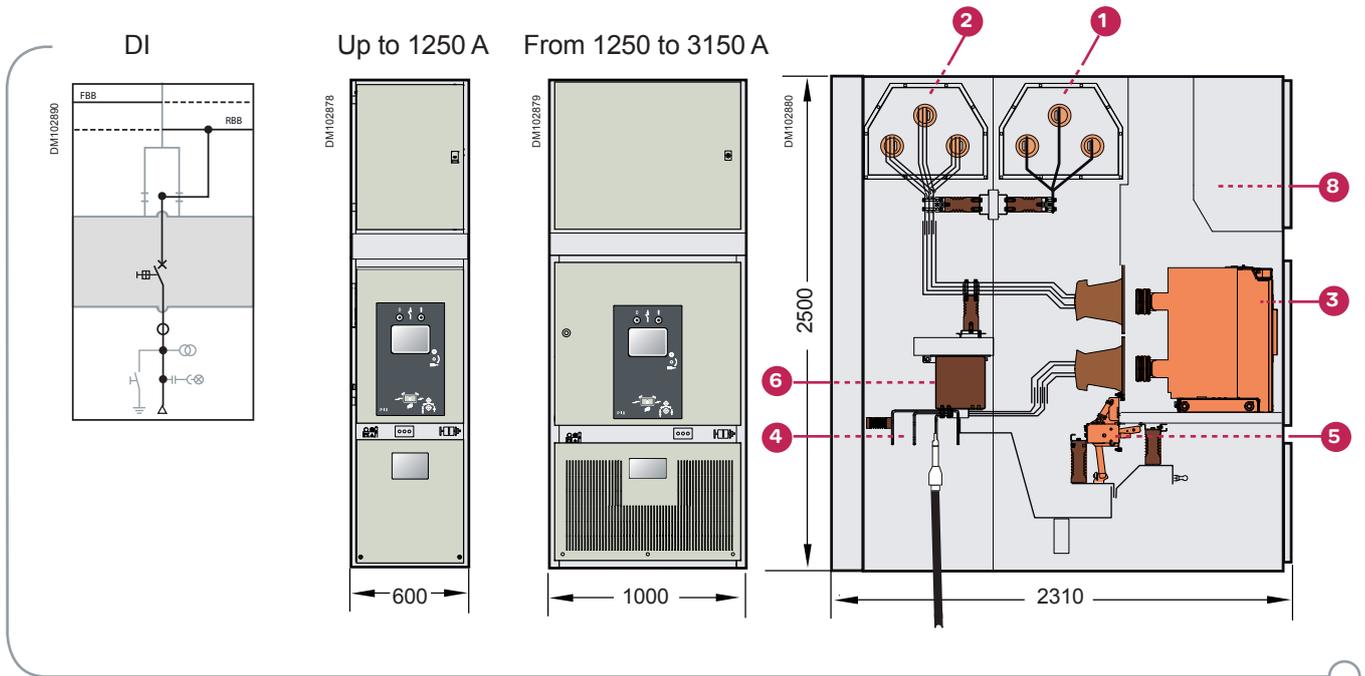
MV devices

- 1 Front Bus Bar compartment
- 2 Rear Bus Bar compartment
- 3 Withdrawable metering unit
- 5 Earthing switches

LV control cabinet

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

			MT 12	MT 17
Rated voltage		kV	12	17,5
Dimensions	H	mm	2500	
	D		2310	
	W		800	
Approximate mass	Width 800 mm	kg	1200	



The function is available either on front or on rear busbar

MV devices

- 1 Front Bus Bar compartment
- 2 Rear Bus Bar compartment
- 3 Main switching device
- 4 MV connections by cables accessible from the rear face
- 5 Earthing switch
- 6 Current transformers

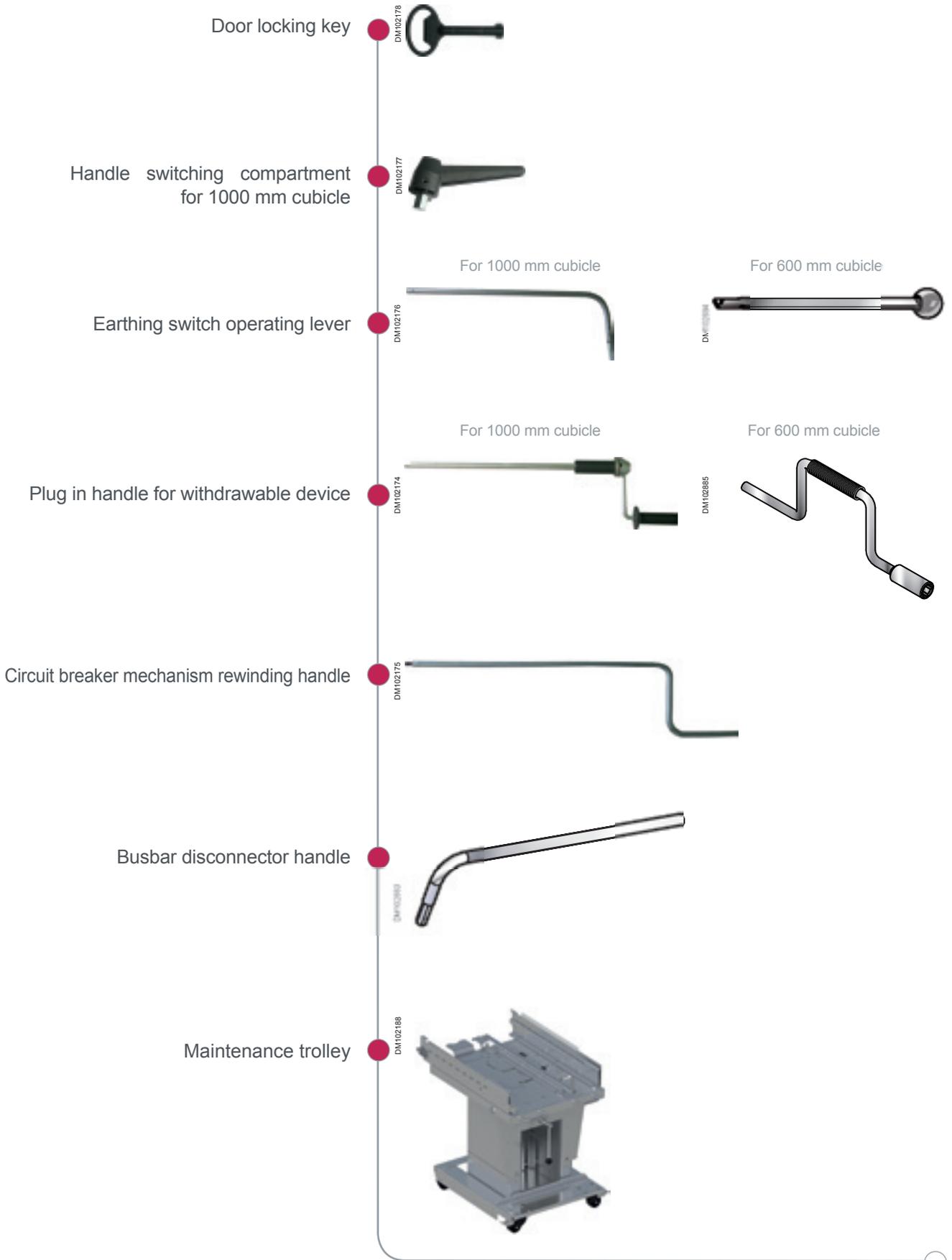
LV control cabinet

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Rated voltage		kV	12	17,5
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Busbar current		A	Up to 3150	
Short circuit current		kA	up to 31,5	
Rated current	Width 600 mm	A	up to 1250	
	Width 1000 mm		from 1250 to 3150	
Dimensions	H	mm	2500	
	D		2310	
	W		600 / 1000	
Approximate mass	Width 600 mm	kg	1200	
	Width 1000 mm		1500	

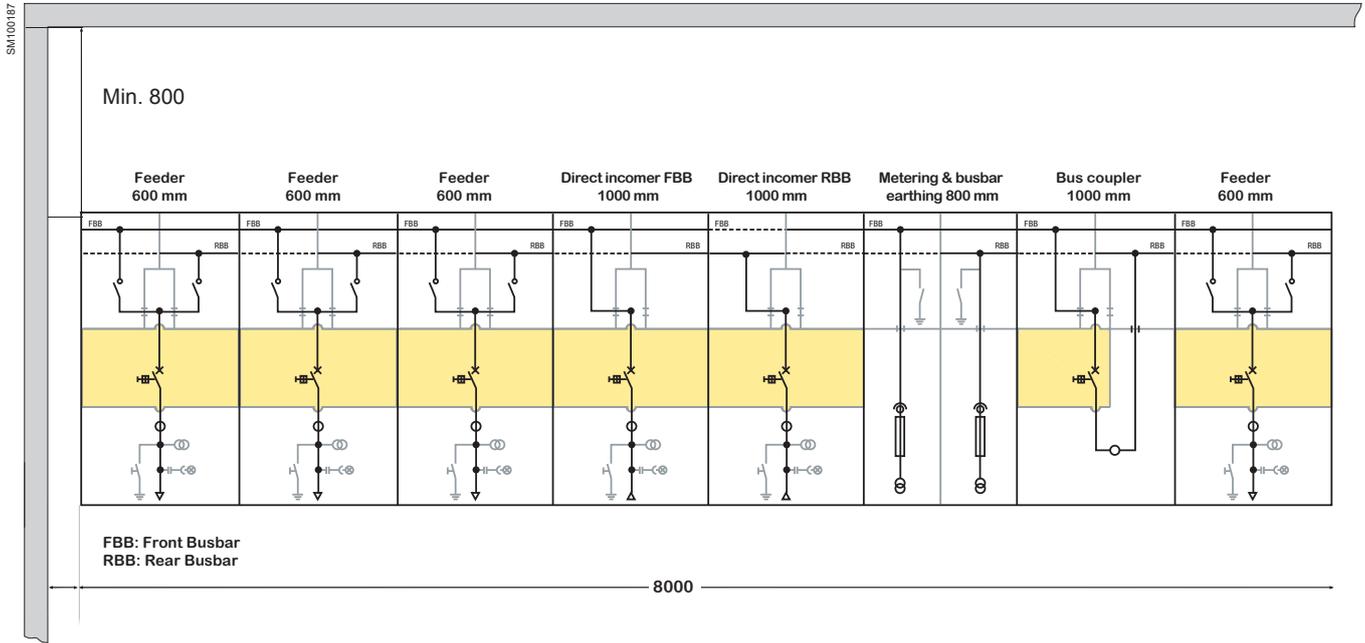
Installation

Accessories and extraction withdrawable parts

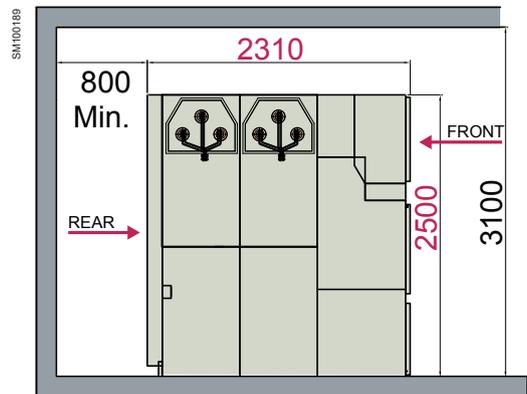
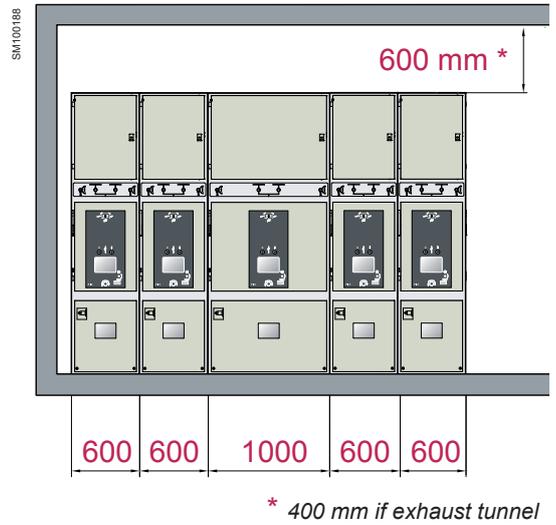
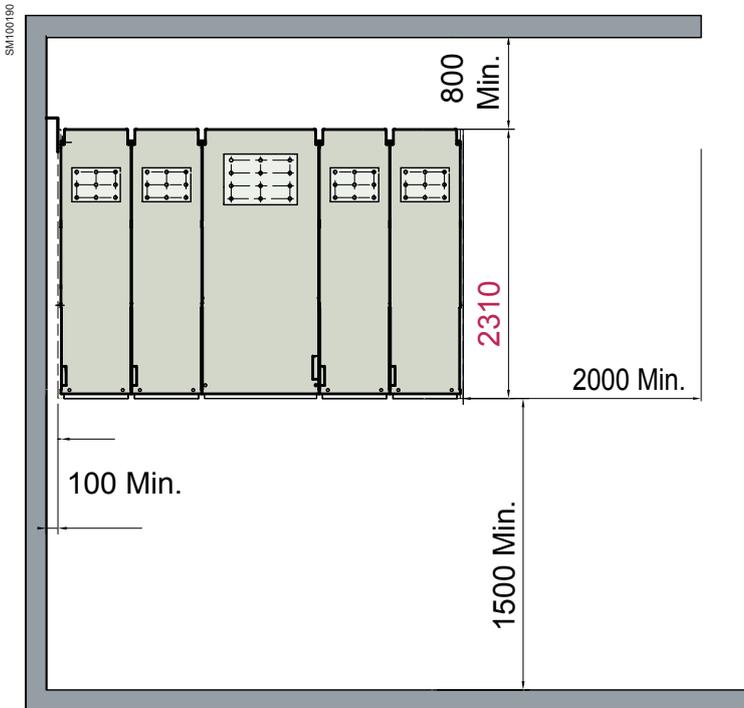


Installation

Implementation example of a line-up switchboard

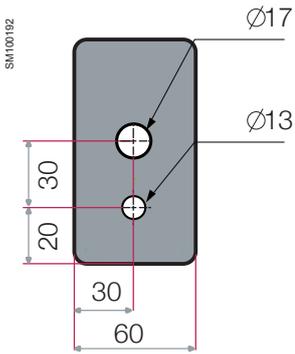


Min. 100

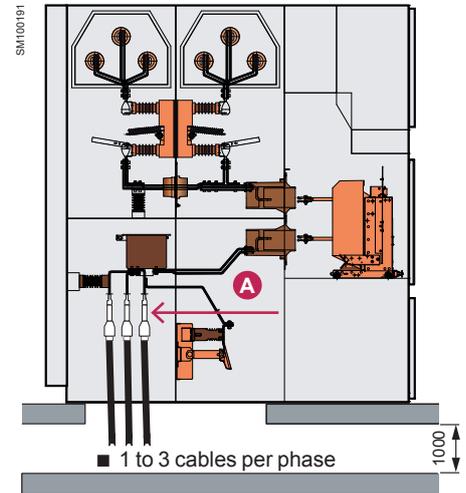
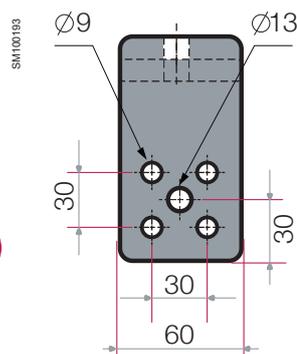


PIX Double Busbar - width 600 mm

■ View A

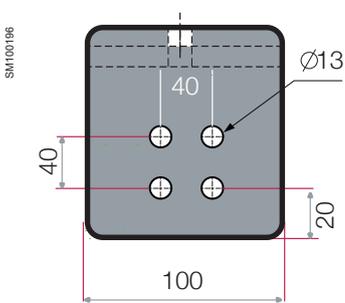


OR

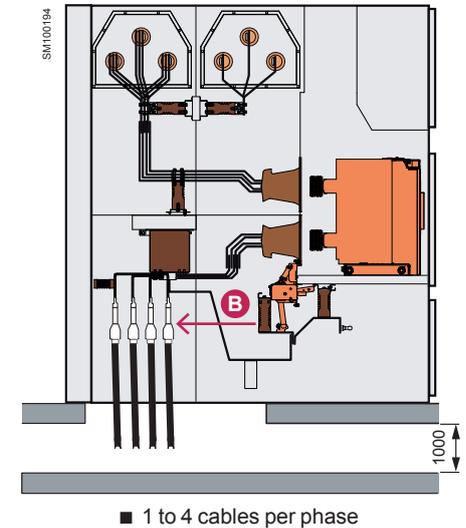
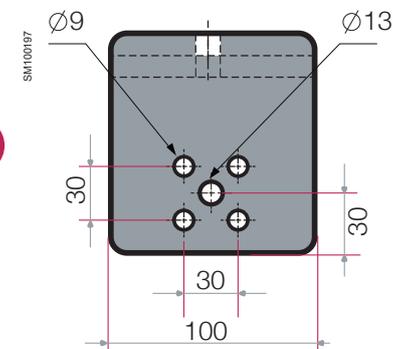


PIX Double Busbar - width 1000 mm

■ View B



OR



**Standard cable connection:
maximum size and number per phase**

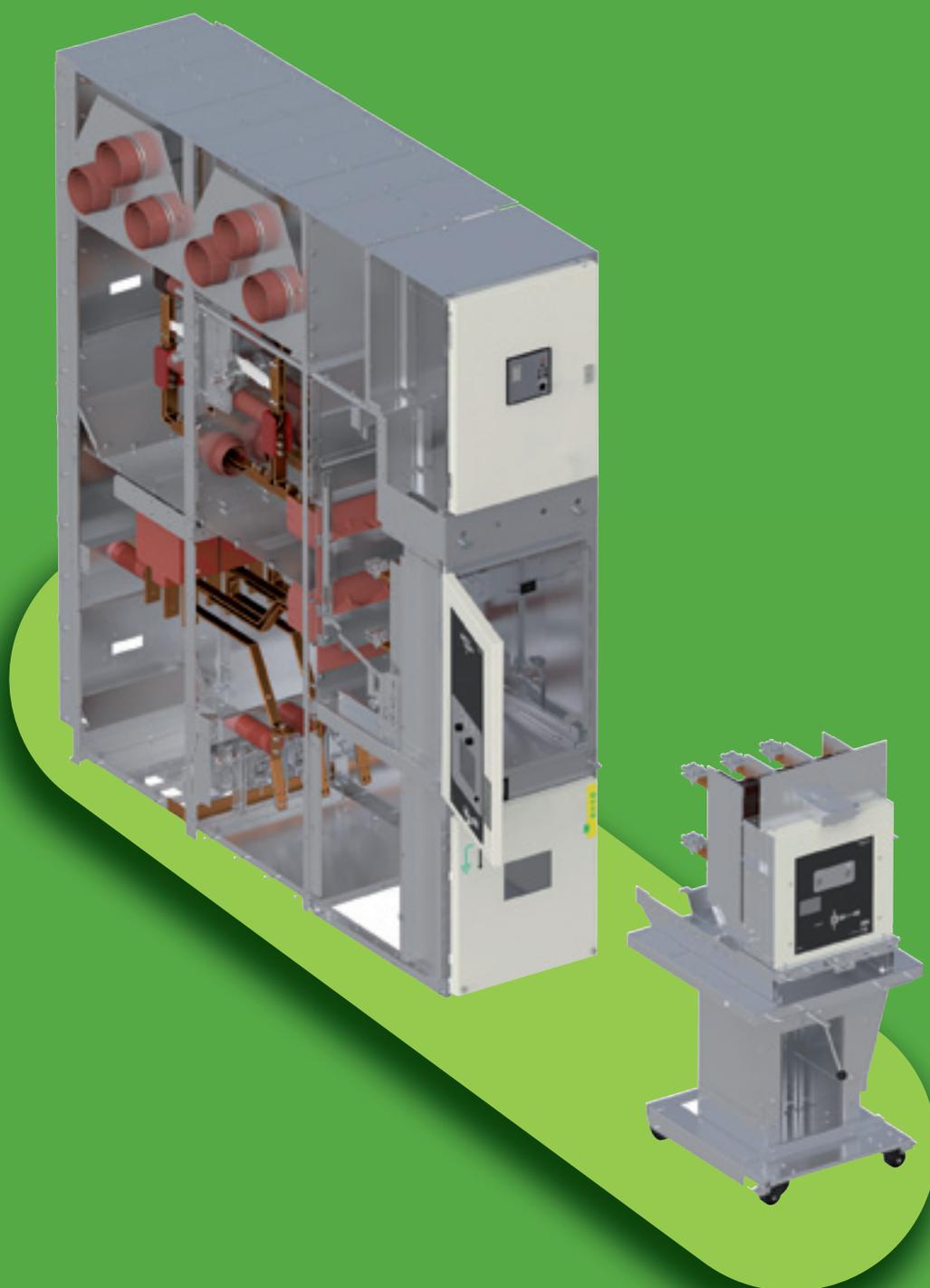
12 / 17.5 kV

		Cable max. (no. / size) (1)	
Incomers	feeders	600 mm	max. 3 x 630 mm ²
Direct Incomers		1000 mm	max. 4 x 630 mm ²
			4 x 1000 mm ²

(1) Cable size is the cross sectional area in mm² based on a single core cable.

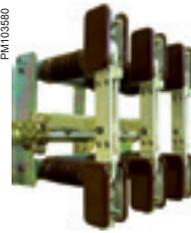
PIX Double Busbar

Switchgear / Apparatus and Cubicle equipment



Busbar disconnecter

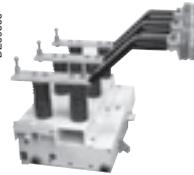
PM103580



Busbar disconnecter TRI
 ■ No load operation only
 ■ Up to 2500A rated current

Injection / Earthing truck

DE599565



It enables the earthing of busbar or cables. It can also be used to make voltage injection, for instance to test cables.
 It is installed instead of the circuit breaker and has the same interlock capabilities.

Disconnecter truck

DE599566



The disconnecter truck provides a direct conductive link between busbar and cable compartment.
 It is installed instead of the circuit breaker and has the same interlock capabilities.

Metering device

PEE0627



Withdrawable metering unit enables to measure busbar voltage
 ■ MTX compact drawout VT module

Circuit breaker

DM102893



A circuit breaker is a safety device enabling the switching and protection of electrical distribution networks. Installed in the PIX Double Busbar cubicle, it protects all components situated downstream during a short-circuit.
 ■ Breaking in vacuum
 □ HVX



HVX up to 1250 A



HVX above 1250 A

Description of the device

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 17.5 kV. HVX brings a valuable solution to your project. Thanks to its improved contact design, our interrupters provide unrivalled performance for their reduced size.

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

Application

HVX is designed to suit all types of applications (utilities, power generation, O&G, industry, etc.) and to perform all switching conditions of transformers, generators, capacitor banks and motors.

Flexibility

HVX is available in a range of standard, fixed or withdrawable configurations, with plug-in (finger or tulip type) or bolted connections.

HVX can be integrated in our medium voltage switchboard PIX or can be offered with a pre-engineered power module which incorporates a chassis with metal shutters, earthing switch, mechanical interlocks, multi-functional bushings and various electrical options to facilitate switchboard integration.

Standard

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

HVX has also been certified to ANSI C37.013 for generator circuit breaker applications up to 50 kA (31.5 kA maximum for PIX Double busbar).

Electrical characteristics according to IEC 62271-100

For the cubicles		PIX 12	PIX 17
Circuit breaker designation		HVX 12	HVX 17
Rated voltage U_r	kV	12	17.5
Rated breaking capacity	Short circuit current	kA rms up to 31.5	
	Cable charging current	25	31.5
	Line charging current	10	
	Single capacitor bank	400	
	No load transformer	10	
Rated making capacity	kA peak	82	
Rated operating time	Opening	ms 35 - 53	
	Breaking	ms 55 - 62	
	Arcing	ms 2 - 15	
	Closing	ms 45 - 63	
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	30 000	
	Mechanical (C/O) for mechanism	10 000	
	Electrical (C/O at I_r up to 3150 A)	10 000	

Equipment			Type of cubicle					
			CB	BC CB	BS	BR	MT	DI
Switchgear								
Circuit-breaker			■	■	■			■
Contactors								
Fuse switch								
Disconnectors truck			■	■	□			■
Earthing truck			□	□				□
Metering truck						□	■	
Racking position indication contact for the withdrawable part	2 NO + 2 NC		■	■	■	□	■	■
Padlocking of isolating shutters for withdrawable parts			■	■	■	□	■	■
Locking of withdrawable part/cable compartment			□	□	□	□	■	□
Disabling of circuit-breaker operating mechanism								
Voltage presence indicator or Voltage detection system			■	■	■			■
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)
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	■	■	■	□		■
Connections								
Connection with cable terminal height > 600 mm			■					■
Connection from top bar								
Connection by cable from the top								
Connection by cable from the bottom			■					■
Cubicle								
Protection index (5)	Enclosure	IP3X	■	■	■	■	■	■
		IP4X	□	□	□	□	□	□
		IPX1						
		IPX2						
Anti-arcing protection (2)	Compartments (4)	IP2XC	■	■	■	■	■	■
		25 kA - 1 s	□	□	□	□	□	□
		31.5 kA - 1 s	□	□	□	□	□	□
Thermal diagnosis system (5)			□	□	□	□	□	□
Lightning arrester			□	□	□			□
Busbars								
1250 A / 2500 A / 3150 A (5)		Exposed	■	■	■	■	■	■
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 exhaust tunnel or deflector.

(3) Connection of 1 or 2 cables per phase.

(4) Compartment protection.

(5) Consult us.

PIX Double Busbar

Protection, Monitoring and Control



Protection relays					
Sepam series 10	MiCOM Px10	Sepam series 20	Sepam series 40	MiCOM Px20	Sepam series 60
					
Functions					
Provides protection of network for each application: Substations (incomer or feeder type) / Transformers / Motors / Generators / Busbars / Capacitors					
Each relay series offers all of the functions required for:					
<ul style="list-style-type: none"> ■ Effective protection of life and property ■ Accurate measurements and detailed diagnosis ■ Integral equipment control ■ Local or remote indications and operation 					
Self power / Auxiliary supply					
Auxiliary supply	• Auxiliary supply • Self or Dual supply	Auxiliary supply	Auxiliary supply	Auxiliary supply	Auxiliary supply
Protection					
Current (1 or 5A)	Current (1 or 5A)	• Current (1 or 5A) • Voltage	• Current (1 or 5A) • Voltage	• Current (1 or 5A) • Voltage	• Current (1 or 5A or LPCT) • Voltage
Phase & Earth basic	Phase & Earth basic	Phase & Earth basic	- Phase & Earth basic - Directional	- Phase & Earth basic - Directional	- Phase & Earth basic - Directional - Synchro-check
Display					
Standard UMI	Standard UMI	• Standard UMI • Remote UM	• Standard UMI • Remote UM	Standard UMI	• Standard UMI • Remote UM • Mimic based UMI
Other characteristics					
				Withdrawable hardware	Removable S/W cartridge
Input / Output (up to)					
4 / 7	6 / 6	10 / 8	10 / 8	7 / 8	28 / 16
I/O terminals					
Screw type	Screw type	• Screw type • Ring lug	• Screw type • Ring lug	Ring lug	• Screw type • Ring lug
Temperature sensor (up to)					
		8	8 to 16	10 (motor)	8 to 16
Communication protocol					
• Modbus RTU • IEC 60870-5-103	• Modbus RTU • IEC 60870-5-103	• Modbus RTU • IEC 60870-5-103 • DNP3 • Modbus TCP/IP • IEC 61850 No GOOSE	• Modbus RTU • IEC 60870-5-103 • DNP3 • Modbus TCP/IP • IEC 61850 No GOOSE • RSTP*	• Modbus RTU • IEC 60870-5-103 • DNP3	• Modbus RTU • IEC 60870-5-103 • DNP3 • Modbus TCP/IP • IEC 61850 Standard GOOSE • RSTP*
Logic equations					
			Comprehensive logic equations	Basic logic equations	Comprehensive logic equations
Safety characteristics					
					IEC 61508-SIL2
IEC and specific country standards (UL, CSA, GOST...)	IEC and specific country standards (GOST...)	IEC and specific country standards (UL, CSA, GOST...)	IEC and specific country standards (UL, CSA, GOST...)	IEC and specific country standards (GOST...)	IEC and specific country standards (UL, CSA, GOST...)

* Ethernet high availability communication

Sepam series 80	MiCOM Px30	MiCOM Px40
 PE900512	 PE90437	 PE90436
Functions		
Self power / Auxiliary supply		
Auxiliary supply	Auxiliary supply	Auxiliary supply
Protection		
<ul style="list-style-type: none"> • Current (1 or 5A or LPCT) • Voltage <ul style="list-style-type: none"> - Phase & Earth basic - Directional - Synchro-check - Differential 	<ul style="list-style-type: none"> • Current (1 or 5A) • Voltage <ul style="list-style-type: none"> - Phase & Earth basic - Directional - Synchro-check - Differential - Line differential - Distance 	<ul style="list-style-type: none"> • Current (1 or 5A) • Voltage <ul style="list-style-type: none"> - Phase & Earth basic - Directional - Synchro-check - Differential - Line differential - Distance - Busbar differential
Display		
<ul style="list-style-type: none"> • Standard UMI • Remote UM • Mimic based UMI 	<ul style="list-style-type: none"> • Standard UMI • Remote UM • Mimic based UMI 	<ul style="list-style-type: none"> • Standard UMI
Other characteristics		
Removable S/W cartridge		
Input / Output (up to)		
42 / 23	50 / 26	32 / 32
I/O terminals		
<ul style="list-style-type: none"> • Screw type • Ring lug 	<ul style="list-style-type: none"> • Screw type • Ring lug 	Ring lug
Temperature sensor (up to)		
8 to 16	1/9/10	10
Communication protocol		
<ul style="list-style-type: none"> • Modbus RTU • IEC 60870-5-103 • DNP3 • Modbus TCP/IP • IEC 61850 • Customised GOOSE • RSTP* 	<ul style="list-style-type: none"> • Modbus RTU • IEC 60870-5-103 • DNP3 • IEC 61850 with GOOSE • RSTP / SHP / DHP* 	<ul style="list-style-type: none"> • Modbus RTU • IEC 60870-5-103 • DNP3 • IEC 61850 with GOOSE • RSTP / SHP / DHP*
Logic equations		
Control logic by ladder diagram	Comprehensive logic equations	Comprehensive logic equations
Safety characteristics		
IEC 61508 - SIL2		
IEC and specific country standards (UL, CSA, GOST...)	IEC and specific country standards (GOST...)	IEC and specific country standards (GOST...)



Benefits

Sepam

- Hardware modularity and common hardware modules
- Large range of auxiliary power
- ROHS compliant and conformal coated components

MiCOM

- Complete and comprehensive product offer
- Full IEC 61850 solution with goose
- All-in-the-box solution

Protection relays

Sepam protection system



Sepam: protection digital relays

Sepam is a range of digital monitoring protection and control units. Sepam is at the centre of the protection, monitoring and control system for the MCset functional units: all of the necessary protection, metering, control, monitoring and signalling functions are performed by **Sepam**.

The **Sepam** range is defined to provide an optimal solution for each application, and includes, for example:

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

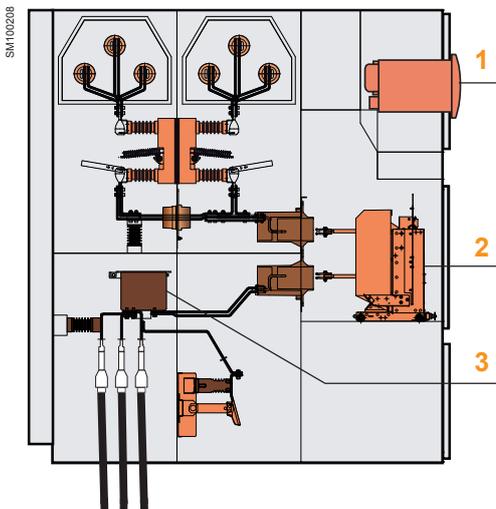
The **Sepam** range consists of the **Sepam series 20, series 40, series 60 and series 80**, a range of modular protection relays to adapt precisely to your needs.



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

- 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, i.e. to provide control of the breaking device (contactor and circuit breaker) of the withdrawable part
- Various auxiliaries: secondary circuit test units, etc.

(*) Please check the sensor to use in the Sepam catalogue.



- 1 - Protection relay metering equipment.
- 2 - Switchgear (circuit breaker and contactor).
- 3 - Instrument transformers.

Protection chain

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

A high performance, economical solution

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

Easy to order and install

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

The power of a multi-functional digital unit

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

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

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

Sepam advantages

Reliability

- Over 30 years of experience in multi-function digital protection relays
- Over 600,000 Sepam units in service in more than 90 countries

Quality

- Design quality is based on dependability studies and the strict definition of environmental constraints: temperature, pollution, EMC, dielectric strength, etc.
- All Sepam series 20, 40, 60 and 80 boards and electronic components are industrially conformally coated. This manufacturing allows Sepam to be used in the most severe industrial environments, including off-shore oil rigs and chemical factories (IEC 60068-2-60 and EIA 364-65A IIIA)
- Quality manufacturing based on procurement agreements with suppliers and inspection throughout all of the manufacturing phases

Simplicity of use

- Local operation facilitated by the ergonomic User Machine Interface informing the operator fully and clearly in his own language
- Ease-of-setup thanks to the flexibility and user-friendliness of the parameters setup software

The Sepam range of protection relays is designed for the operation of machines and electrical distribution networks of industrial installations and utility substations at all voltage levels - To cover all needs, from the simplest to the most complete.

Sepam range includes 3 families:

- Sepam series 20, for usual applications.
- Sepam series 40, series 60, for demanding applications.
- Sepam series 80, for custom applications.

Sepam complies with IEC 61850 (series 20, 40, 60, 80).

Sepam multifunction protection relays

A range of solutions adapted to your application

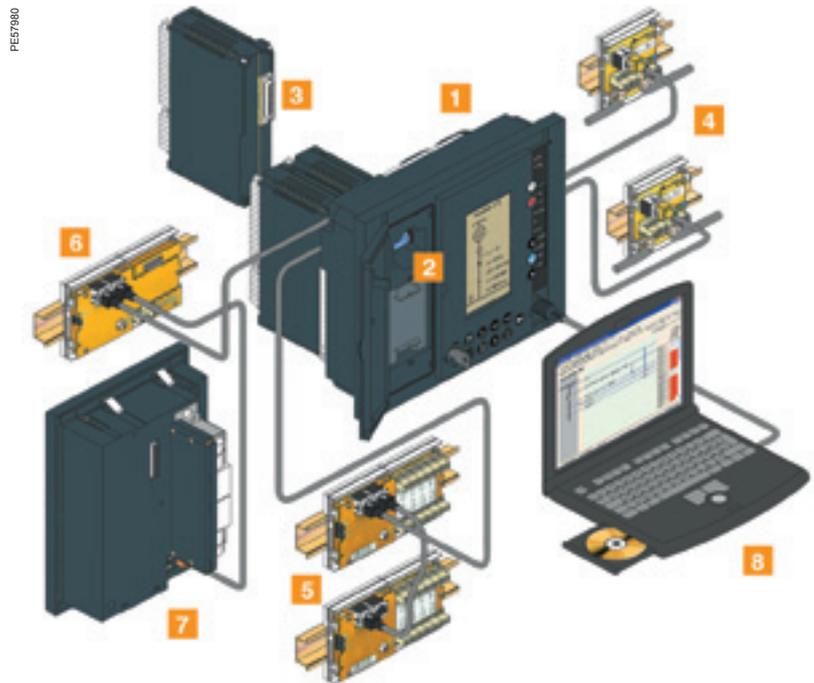
- Substation protection (incomers, feeders, busbars)
- Transformer protection
- Motor and generator protection

All of the necessary functions for your application

- Effective protection of people and property
- Accurate measurements and detailed diagnosis
- Integral equipment control
- Local or remote indication and operation

Flexibility and upgrading capability

To adapt to as many situations as possible and to allow for future installation upgrades, optional modules may be added to Sepam at any time for new functions.



Sepam 100 additional units

Sepam 100 units round off the Sepam range and can be installed either separately or combined with Sepam series 20, series 40, series 60 and series 80 units.

Sepam 100 has several variants:

- Sepam 100 MI has local breaking device control and signalling modules (many different line diagram types are available)
- Sepam 100 LA contains self-powering protection (back-up protection without auxiliary power supply)

PE60116



Sepam 100 MI

PE57126



Sepam 100 LA

Sepam series 80 modular architecture

- 1 - Base unit, with two types of User Machine Interfaces (UMI):
 - Integrated mimic-based UMI
 - Integrated or remote advanced UMI
- 2 - Parameters and protection settings saved on a removable memory cartridge
- 3 - 42 logic inputs and 23 relay outputs, including 5 outputs on the base unit, plus 3 optional modules, each providing 14 inputs and 6 outputs
- 4 - 2 independent Modbus communication ports:
 - Connection of each port to 1 or 2 S-LAN and/or E-LAN networks
 - Modbus, Modbus TCP/IP, IEC60870-5-103, DNP3 and IEC 61850 communication protocols
 - GOOSE messages and TCP/IP redundancy
 - RS485 (2 or 4 wire) or fibre-optic network
- 5 - Temperature data from 16 sensors: Pt100, Ni100, or Ni120
- 6 - 1 analogue output: 0-1 mA, 0-10 mA, 4-20 mA or 0-20 mA
- 7 - Synchro-check module
- 8 - Software tools:
 - Sepam parameter and protection setting and control function customisation
 - Programming of specific functions (Logipam)
 - Recovery and display of disturbance recording data
 - Local or remote operation via a communication network

MiCOM protection provides the user with a choice of cost-optimised solutions for specific protection requirements within the distribution network. The MiCOM relay series offers comprehensive protective function solutions for all power supply systems, as well as for the various functional and hardware project stages..

MiCOM complies with IEC 61850

MiCOM protection relays

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

- Grid protection equipment, and
- Combined protection and control systems
- 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

MiCOM offers varying levels of functionality and hardware

- **Series 10** is designed for universal overcurrent protection for the primary or back-up protection on LV or MV systems
- **Series 20** fulfills the basic requirements of industrial, utility and building applications, providing simplicity and ease of use in a wide range of installations
- **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

PM102888



GemControl is a modular unit for control, monitoring, measurement, processing and data transmission. To know the switchboard status at all times and to act with full knowledge of the facts, GemControl maximises smart switchgear management.

GemControl advantages

■ **Safe operation**

Robust standard PLC software (IEC 61131-3). Direct motor control of all devices without intermediate relays.

■ **Scalable concept for simple or complex applications**

All possibilities are covered, from the stand-alone replacement of conventional electrical push-buttons, position indicators, local/remote key switches and metering instruments in low voltage cabinets to smart interfacing between switchgear panels and substation control systems (SCADA).

■ **Incomparable flexibility**

In all phases of design, parameter setting, operation and upgrading of the installation. Expandable for future needs.

■ **Reliability**

Type tested according to IEC 255-6 or EN 60255-6. Transferable back-up memory (GemStick).

GemControl equipped Switchgear ensures the highest availability of your electrical network. By closely monitoring the health and status of actual conditions in real time, GemControl will flag any unusual or detrimental conditions, helping you to plan effectively and efficiently.

The robust, Innovative, intelligent modules are linked together to provide, control, monitoring, measurement and metering of all parameters. The monitored data can be used locally and individually, or linked into a complete Smart Grid automation solution.



Front panel version 1



Front panel version 2



Extension modules



Base unit

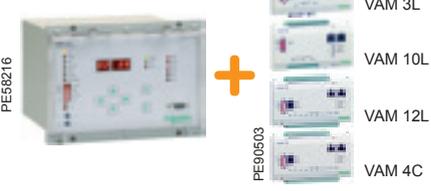


GemControl

The world's first universal Switchgear Controller for all MV applications, designed for Smart Grid ready applications.

- Optimised Switchgear and network performance.
- Extended life, minimal maintenance required.
- Modular, tailored to any application.
- Complementary to a free choice of protection devices.
- Low Cost of Ownership (reduced CAPEX and OPEX).
- Direct control and switchgear monitoring (no interposing devices).

Arc fault detectors

Vamp 120	Vamp 121	Vamp 221 (+I/O units)*
 <p>PE60501</p>	 <p>PE60502</p>	 <p>PE68216</p> <p>VAM 3L VAM 10L VAM 12L VAM 4C</p>

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 minimises material damage caused by arc faults

System features

<ul style="list-style-type: none"> • Typical operation on light only principle - Input for current criteria for I> and L> operation - Integrated 19 - 256V AC/DC aux. supply • Optimised for wind power and other small applications • Up to 4 arc or smoke sensors • Selective trip for 2 zones and possibility for generator set emergency trip (separate contact) • Operation time 7 ms (including the output relay) • Non-volatile trip status • NO and NC trip outputs (Zone 1) - Self-supervision - Straightforward installation - Cost efficient solution 	<ul style="list-style-type: none"> • Operation on light only • Up to 10 arc or smoke sensors • Single trip contact • Straightforward installation • Operation time 9 ms (including the output relay) • Cost efficient solution • Self-supervision • Binary input for blocking or resetting the unit (programmable) • Possibility for double arc channel activation trip criteria • BIO light transfer possibility to other Vamp device 	<ul style="list-style-type: none"> • Current and light tripping criteria (possibility of tripping by light only) • Operating time 7 ms or less (electromechanical contact) • Accurate location of arc fault utilising point sensors • Four selective protection zones per central unit • Self-supervision of the entire system • Easy interconnect using VX001 cables • Phase current measuring • Earth fault current measuring • Personal protector option • Panel or rail mount I/O units • Circuit breaker fail protection (CBFP)
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Sensors

<p>Point sensor - surface</p> <ul style="list-style-type: none"> - Arc detection from two compartments simultaneously - Self-monitored - Cable length adjustable from 6 m to 20 m down 	<p>Point sensor - surface</p> <ul style="list-style-type: none"> - Arc detection from two compartments simultaneously - Self-monitored - Cable length adjustable from 6 m to 20 m down 	<p>Point sensor - surface</p> <ul style="list-style-type: none"> - Arc detection from two compartments simultaneously - Self-monitored - Cable length adjustable from 6 m to 20 m down
<p>Point sensor - pipe</p> <ul style="list-style-type: none"> - Self-monitored - Cable length adjustable from 6 m to 20 m down 	<p>Point sensor - pipe</p> <ul style="list-style-type: none"> - Self-monitored - Cable length adjustable from 6 m to 20 m down 	<p>Point sensor - pipe</p> <ul style="list-style-type: none"> - Self-monitored - Cable length adjustable from 6 m to 20 m down
	<p>Portable sensor</p> <ul style="list-style-type: none"> - Snap-in connection to I/O unit - Enhanced work safety 	<p>Portable sensor</p> <ul style="list-style-type: none"> - Snap-in connection to I/O unit - Enhanced work safety
		<p>Loop sensor (fibre)</p> <ul style="list-style-type: none"> - Monitors various compartments - Small bending radius for easy installation

IEC standards

* I/O 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.



Benefits

- Personnel safety.
- Reduces production losses.
- Extended switchgear life cycle.
- Reduced insurance costs.
- Low investment costs and fast installation.
- Reliable operation.

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

Arc flash protection maximises personnel safety and minimises material damage to the installation in the most hazardous power system fault situations.

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

Vamp advantages

- Personnel Safety

A fast and reliable arc protection unit may save human lives in the event of an arc fault occurring in the switchgear during work in or near an installation.

- Reduces production losses

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

- Extended switchgear life cycle

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

- Reduced insurance costs

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

- Low investment costs and fast installation

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

- Reliable operation

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

PE68216



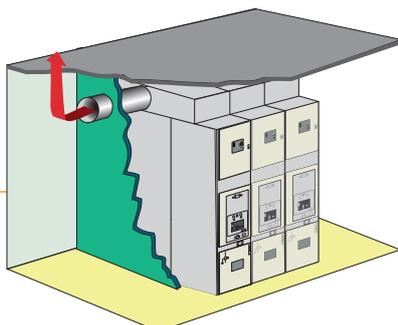
Vamp 221

PE68215



Input/Output units

DM10287



PIX switchboard with gas exhaust

Gas exhaust*

Our Air Insulated Switchgear is designed to eliminate the effects of small internal arc currents for a short duration, due to:

- Metal flaps positioned on the top of the enclosure which, in the case of an internal fault, limit overpressure in the compartments.
- Nonflammable materials used for the cubicle.

* The gas exhaust is an option to protect the switchgear room against pollution in case of an internal arc

Schneider Electric AIS switchgears Internal arc compliance

Internal arc version

Our Air Insulated Switchgear is designed to withstand and protect operators in the case of failure due to an internal arc.

Our Air Insulated Switchgear have been successfully type tested.

Our Air Insulated Switchgear **provides several options to install an internal arc switchboard.**

- 4-sided internal arc protection

In the case of a switchboard installed in the middle of a room, internal arc protection on 4 sides is necessary in order to protect an operator who goes behind the cubicle.

- Internal arcing detector (option)

Our Air Insulated Switchgear has 2 systems that can detect internal arcing and switch off the power supply to limit the fault duration.

- Electromagnetic detector

This system employs a positive security electromechanical tripping circuit, positioned on the cubicle's flaps.

This set transmits the information to the Sepam to give the opening order to the circuit breaker located upstream of the fault.

- Vamp arc flash protection

The arc protection unit detects an arc flash in an installation and trips the feeding breaker. Arc flash protection improves personnel safety and minimises material damage to the installation in the most hazardous power system fault situations.

Current transformers

For PIX Double Busbar

Rated voltage up to 17.5 kV
For other ratings please consult us.

Conventional DIN 42600 type Current Transformers

Conventional Current Transformers are used to provide power to metering, measuring or control devices. They measure the value of primary current from 10 A to 2500 A.

Schneider Electric has drawn up a list of Current Transformers which are appropriate for use with digital protection devices in order to make it easier to determine accuracy characteristics.



AD12 or AD14 800 A



AD13 1250 A



AD15 2500 A

For AD12 or AD14 at 800 A

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

I _{1n} (A)	50-100	75-150	100-200	150-300	200-400	250-500	600	750
I _{th} (kA)	40	40	31.5-40	40	40	40	50	50
t (s)	1	1	1	1	1	1	1	1
Measurement* cl.0.5			5-10 VA	10-20 VA	7.5-15 VA	10-20 VA	20 VA	20 VA
Protection*	5P20	2.5-5 VA	2.5-5 VA	2.5-5 VA	5-10 VA	5-10 VA	7.5 VA	7.5 VA

For AD13 at 1250 A

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

I _{1n} (A)	1000	1250
I _{th} (kA)	50	50
t (s)	1	1
Measurement* cl.0.5	30 VA	30 VA
Protection*	5P20 10 VA	10 VA

For AD15 at 2500 A

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

I _{1n} (A)	1500	2000	2500
I _{th} (kA)	50	50	50
t (s)	1	1	1
Measurement* cl.0.5	30 VA	30 VA	30 VA
Protection*	5P20 15 VA	15 VA	15 VA

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

Voltage transformers

For PIX Double Busbar

Rated voltage up to 17.5 kV
For other ratings please consult us.

These supply power to:

- Measuring, metering and monitoring devices
- Relays or protective devices

The energised part is entirely encapsulated in an epoxy resin, which provides both electrical insulation and excellent mechanical strength.

They include the following models:

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



VDF11 or VDF12

Voltage Transformers type phase-earth

Transformer VDF11 or VDF12

- Phase-earth
- Frequency 50-60 Hz

Primary voltage (kV)	$3/\sqrt{3}$	$3.3/\sqrt{3}$	$5.5/\sqrt{3}$	$6/\sqrt{3}$	$6.6/\sqrt{3}$	$10/\sqrt{3}$	$11/\sqrt{3}$
1st secondary voltage (V)	$100/\sqrt{3}$	$110/\sqrt{3}$	$110/\sqrt{3}$	$100/\sqrt{3}$	$110/\sqrt{3}$	$100/\sqrt{3}$	$110/\sqrt{3}$
2nd secondary voltage (V)	100/3	110/3	110/3	100/3	110/3	100/3	110/3
1st secondary accuracy class (VA)	30-50 VA cl.0.5						
2nd secondary accuracy class (VA)	50 VA 3P						



VDC12

Voltage Transformers type phase-phase

Transformer VDC12

- Phase-phase
- Frequency 50-60 Hz

Primary voltage (kV)	3.3	5.5	6.6	11
Secondary voltage (V)	110	110	110	110
Accuracy class (VA)	50 VA cl.0.5			

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