Medium Voltage Switchgear - PIX Roll on Floor

Air Insulated Switchgear
Withdrawable Circuit Breaker Vacuum Technology

Civil Engineering Guide

01/2019
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All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

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Safety Information

Important Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

⚠️ The addition of this symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

⚠️ This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠️ DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠️ WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠️ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

⚠️ NOTICE

NOTICE is used to address practices not related to physical injury.

PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.
About the Document

At a Glance

Document Scope

This Civil Engineering guide describes air-insulated medium voltage switchgear units of the PIX Roll on Floor Circuit Breaker series.

The operations described in this guide may only be performed by the qualified personnel with proven experience regarding:

- The PIX Roll on Floor circuit breaker series
- All relevant safety provisions

This Civil Engineering guide is the integral part of the product and must be stored such that it is always readily accessible and can be used by persons who work on the switchgear. If the switchgear is relocated to another site, this guide must be passed on to the new operator along with the unit.

This guide does not describe every imaginable individual case or every customer-specific version of the product. Contact Schneider Electric for more information that is not included in the guide.

Validity Note

This guide is valid for PIX Roll on Floor circuit breaker. The design provides easy rack-in/rack-out operation without the need for a separate trolley. It is an extension of the standard PIX range and delivers performances up to 17.5 kV/31.5 kA/2500 A. It is equipped with a Vacuum Circuit Breaker and has other functional trolleys like the metering device.

For product compliance and environmental information (RoHS, REACH, PEP, EOLI and so on.), go to www.schneider-electric.com/green-premium.

The technical characteristics of the devices described in this document also appear online. To access this information online:

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Go to the Schneider Electric home page <a href="http://www.schneider-electric.com">www.schneider-electric.com</a>.</td>
</tr>
<tr>
<td>2</td>
<td>In the Search box, type the name of the product range (PIX Roll on Floor), select the webpage.</td>
</tr>
<tr>
<td>3</td>
<td>If you know the generic reference of the product, type the generic reference of the product in the Search box. Select the corresponding page from the result. Here you could see the Datasheet related to product reference.</td>
</tr>
<tr>
<td>4</td>
<td>If more than one product reference appears in the search results, click the reference that interests you.</td>
</tr>
<tr>
<td>5</td>
<td>You may need to scroll down to see the complete datasheet.</td>
</tr>
</tbody>
</table>

The characteristics that are presented in this guide should be the same as those characteristics that appear online. In line with our policy of constant improvement, we may revise content over time to improve clarity and accuracy. If you see a difference between the manual and online information, use the online information as your reference.

Product Related Information

Air-insulated medium-voltage switchgear units of the PIX Roll on Floor circuit breaker series are designed exclusively for switching and distributing electrical power. They may only be used in the scope of the specified standards and the switchgear-specific technical data. Any other utilization constitutes improper use and may result in dangers and damage.
# Chapter 1
## General

### Glossary

#### Acronyms

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<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>FU</td>
<td>Functional Unit (cubicle + mobile part)</td>
</tr>
<tr>
<td>IC</td>
<td>Incomer Cubicle</td>
</tr>
<tr>
<td>FD</td>
<td>Feeder Cubicle/Vacuum Contactor Cubicle</td>
</tr>
<tr>
<td>BC</td>
<td>Bus Coupler Cubicle</td>
</tr>
<tr>
<td>BR</td>
<td>Bus Riser Cubicle</td>
</tr>
<tr>
<td>BM</td>
<td>Bus Metering Cubicle</td>
</tr>
<tr>
<td>BE</td>
<td>Bus Earthing Cubicle</td>
</tr>
<tr>
<td>VT</td>
<td>Voltage Transformer</td>
</tr>
<tr>
<td>CT</td>
<td>Current Transformer or Current Sensor</td>
</tr>
<tr>
<td>VP</td>
<td>Voltage Presence Indicator System</td>
</tr>
<tr>
<td>LV</td>
<td>Low Voltage</td>
</tr>
<tr>
<td>MV</td>
<td>Voltage Class, Including levels 7.2 – 12 kV and 17.5 kV</td>
</tr>
<tr>
<td>ES</td>
<td>Earthing Switch</td>
</tr>
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### Mobile part

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>Easypact EXE</td>
<td>Vacuum Circuit Breaker</td>
</tr>
<tr>
<td>MD</td>
<td>Metering Device</td>
</tr>
<tr>
<td>CVX-C</td>
<td>Vacuum Contactor with Fuse</td>
</tr>
</tbody>
</table>
Introduction

Before performing work on the panel, it is essential that you comply with the following instructions:

**DANGER**

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Before removing covers and before performing assembly or maintenance work, make sure that you isolate the system from the high voltage and the supply voltage and that you ground it.
- Comply with the five safety rules:
  - Isolate from the power supply
  - Make sure that unintentional restart (re-closing) is prevented
  - Verify zero voltage
  - Earth and short-circuit
  - Cover or cordon off adjacent live components

Failure to follow these instructions will result in death or serious injury.

**WARNING**

RISK OF INJURY DUE TO MOVABLE PARTS IN MECHANICAL DRIVES

Before performing mounting and maintenance work:

- Comply with the five safety rules:
  - Isolate from the supply voltage
  - Release the circuit-breaker’s energy storing device by OFF-ON-OFF operation
  - Switch make-proof earthing switches ON
  - Earth and short-circuit
  - Do not remove the mechanisms during maintenance work

Failure to follow these instructions can result in death, serious injury, or equipment damage.

**WARNING**

RISK OF INJURY DUE TO SHARP-EDGED SHEET METAL AND METAL PARTS

During installation and maintenance work:

- Comply with the five safety rules:
  - Always wear the approved protective clothing in accordance with the valid accident prevention and work regulations
  - Always cover sharp edges

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Applicable standards and regulations:

- Metal-enclosed AC switchgear for rated voltages > 1 kV up to including 52 kV: IEC 62271-200
- The locally applicable accident prevention, operating and work instructions must be complied
- Assembly and maintenance: IEC 61936-1
- Operation of electrical equipment: EN 50110-1

*NOTE:* The national standards applicable in the country where the equipment is to be installed must be compiled.

Other standards or regulations have to be checked and accessed locally.
Behaviour in case of incidents or accidents:

For the case of an internal fault, the switchgear PIX Roll on Floor is equipped with pressure relief ports, which prevent the panels and the switchgear from bursting.

This Civil engineering guide does not include information regarding the safety of buildings in case of internal faults (pressure load of the switchgear room and necessary pressure relief ports). Pressure calculations for switchgear rooms inclusive recommendations regarding pressure relief ports can be provided on request against a fee. For further details, please contact the manufacturer.

In case of fire or of internal faults, toxic and caustic decomposition products may be produced. Comply with the locally applicable accident and safety provisions.

Make sure that first-aid measures are taken in case of injury to persons.
Chapter 3
Dimensions and Weights

Dimensions and Weights of the Cubicles without Internal Arc Accessories

IC, FD, BC, BR, BM, BE Cubicles with 1 CT per Phase

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>IC1/FD1</th>
<th>IC2/FD2</th>
<th>BC1-BR1</th>
<th>BC2-BR2</th>
<th>BM1/BE1</th>
<th>BM2/BE2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width W (mm)</td>
<td>600</td>
<td>800</td>
<td>600 x 2</td>
<td>800 x 2</td>
<td>600</td>
<td>800</td>
</tr>
<tr>
<td>Height** H (mm)</td>
<td>2300</td>
<td>2300</td>
<td>2300</td>
<td>2300</td>
<td>2300</td>
<td>2300</td>
</tr>
<tr>
<td>Depth D (mm)</td>
<td>1800</td>
<td>1650</td>
<td>1650</td>
<td>1650</td>
<td>1650</td>
<td>1650</td>
</tr>
<tr>
<td></td>
<td>650</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight* (kg)</td>
<td>1000</td>
<td>650 x 2</td>
<td>850 x 2</td>
<td>650</td>
<td>800</td>
<td></td>
</tr>
<tr>
<td>Weight of VT compartment (kg)</td>
<td>120 (for IC1 only))</td>
<td>130 (for IC2 only)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

*Maximum fully equipped weight.
** This dimension is considering 735 mm height of LV chamber and no internal arc accessories.
## Dimensions and Weights

### IC and FD Cubicles with 2 CT per Phase

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>IC1/FD1</th>
<th>IC2/FD2</th>
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<tbody>
<tr>
<td>Width W (mm)</td>
<td>600</td>
<td>800</td>
</tr>
<tr>
<td>Height** H (mm)</td>
<td>2300</td>
<td>2300</td>
</tr>
<tr>
<td>Depth D (mm)</td>
<td>2150</td>
<td>2650/2150</td>
</tr>
<tr>
<td>Weight* (kg)</td>
<td>840</td>
<td>1050</td>
</tr>
<tr>
<td>Weight of VT compartment (kg)</td>
<td>120 (for IC1 only)</td>
<td>130 (for IC2 only)</td>
</tr>
</tbody>
</table>

*Maximum fully equipped weight.

** This dimension is considering 735 mm height of LV chamber and no internal arc accessories.
Switchboard with Internal Arc Protection Accessories

Recommendations

The following are the recommendations for the switchboard tunnel:
- Ceiling clearance $H$ for installing an exhaust: Minimum ceiling height ($H$) should be 3200 mm.
- Installation above the switchboard: Installation of the devices, such as lamps are not advisable so avoid using the switchboard roof to access this device.
- Never step on the switchboard roof to access this device.

Installation

Installing the switchboard tunnel at the middle of the room mounting (with Internal exhaust arrangement for 1s).
Installing the switchboard tunnel at the middle of the room mounting (external exhaust arrangement for 1s)
Installing the switchboard tunnel at the middle of the room mounting (deflector arrangement for 0.1s)
Installing the switchboard tunnel at the middle of the room mounting (deflector arrangement for 1s)
Chapter 5
Switchboard Spacing

What Is in This Chapter?

This chapter contains the following topics:

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<tr>
<td>Civil Engineering with Cable Trench</td>
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</tr>
<tr>
<td>Spacing around the Switchboard</td>
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</tr>
<tr>
<td>Position of MV Cables</td>
<td>23</td>
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</tbody>
</table>
Civil Engineering with Maintenance Space

FD Cubicles

A  Access to room
B  Main earthing bar
C  Reserved slab space, if necessary, for routing of LV cables
D  Reserved slab space for routing the MV cables
E  This space must remain free for the opening of the gas exhaust outlets in the event of internal arcing. Put nothing in this zone (lights, equipment storage and so on.). It is also the location for the installation of the tunnel.

* This height is considering LV compartment height of 735 mm and total height of 2300 mm.

NOTE:
- The depth of the maintenance space must match the bending radius of the cables used.
- For core drilling, and fire protection between the maintenance space and the cubicles, contact Schneider Electric support team.
Civil Engineering with Cable Trench

FD Cubicles

A Access to room
B Main earthing bar
C Reserved slab space, if necessary, for routing of LV cables
D Reserved slab space, if necessary, for routing of LV cables
E This space must remain free for the opening of the gas exhaust outlets in the event of internal arcing. Put nothing in this zone (lights, equipment storage and so on.). It is also the location for the installation of the tunnel

*This height is considering LV compartment height of 735 mm and total height of 2300 mm.

**NOTE:**
- The depth of the maintenance space must match the bending radius of the cables used.
- For core drilling, and fire protection between the maintenance space and the cubicles, contact Schneider Electric support team.
Spacing around the Switchboard

General

The L dimension depends on the Functional Unit (FU) of the switchboard.

**NOTE:** * for the installation on base frame, consider 3mm gap between each panel for coupling gasket.

A: This dimension must be equal to:
- 1550 mm for operation (extraction and positioning of mobile parts)
- 1850 mm for the extraction of one FU with a depth of 1650 mm without displacing the others
- 2350 mm for the extraction of one FU with a depth of 2150 mm without displacing the others
- 2850 mm for the extraction of one FU with a depth of 2650 mm without displacing the others

B: This dimension must be equal to:
- 900 mm for a 600/800 mm long FU at the end of the switchboard
  **NOTE:** ** For non-accessible side, keep this as 100 mm.

C: This dimension must be equal to 900 mm

D: Access to the room

E: Main earthing bar of the switchboard

F: Closing plates
Position of MV Cables

IC1 Cubicle (1 CT per phase)

Maximum Ø external cables:
- Single-core dia 56 mm
- Three-core dia 89 mm
IC1 Cubicle (2 CT per phase)

Maximum Ø external cables:
- Single-core dia56 mm
- Three-core dia89 mm
IC2 Cubicle (1 CT per phase)

Maximum Ø external cables:
- Single-core dia56 mm
- Three-core dia89 mm

[Diagram of IC2 Cubicle with dimensions and cable routes]
IC2 Cubicle (2 CT per phase)

Maximum Ø external cables:
- Single-core dia 56 mm
- Three-core dia 89 mm
Chapter 6
Floor Finishing and Cubicle Mounting

What Is in This Chapter?

This chapter contains the following topics:

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<th>Topic</th>
<th>Page</th>
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<tbody>
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<tr>
<td>Floor Finishing</td>
<td>30</td>
</tr>
</tbody>
</table>
Assembly

Safety provisions

The switchgear panels may only be installed and assembled by the manufacturer’s staff or by persons who have been certified for this work.

⚠️ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARCH FLASH

- Before removing covers and before performing assembly or maintenance work, make sure that you isolate the system from the high voltage and the supply voltage and that you ground it.
- Comply with the five safety rules:
  - Isolate from the power supply
  - make sure that unintentional restart (re-closing) is prevented
  - verify zero voltage
  - earth and short-circuit
  - cover or cordon off adjacent live components

Failure to follow these instructions will result in death or serious injury.

⚠️ WARNING

RISK OF INJURY DUE TO MOVABLE PARTS IN MECHANICAL DRIVES

Before performing mounting and maintenance work:
- Comply with the five safety rules:
  - Isolate from the supply voltage
  - release the circuit-breaker’s energy storing device by OFF-ON-OFF operation
  - switch make-proof earthing switches ON
  - earth and short-circuit
  - Do not remove the mechanisms during maintenance work

Failure to follow these instructions can result in death, serious injury, or equipment damage.

⚠️ WARNING

RISK OF INJURY DUE TO SHARP-EDGED SHEET METAL AND METAL PARTS

During installation and maintenance work:
- Comply with the five safety rules:
  - Always wear the approved protective clothing in accordance with the valid accident prevention and work regulations
  - Always cover sharp edges

Failure to follow these instructions can result in death, serious injury, or equipment damage.

⚠️ WARNING

RISK OF FALLING

During installation and maintenance work:
- Pay attention to cracks in the floor of the switchgear room
- Do not walk upon the topsides of the switchgear panels
  - When working on the topside of the switchgear panels (e.g. when installing deflectors, fans or pressure relief ducts) temporarily attach firm base plate, so that they are not damaged by walking on it

Failure to follow these instructions can result in death, serious injury, or equipment damage.
Instructions for assembly

PIX Roll on Floor panels are delivered with the earthing switch ON.
The circuit breakers are always shipped in open state ("OFF") with the energy storing device released.

<table>
<thead>
<tr>
<th>NOTICE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EQUIPMENT DAMAGE</strong></td>
</tr>
<tr>
<td>• Condensation, dirt and dust should be avoided during assembly on all accounts, in order to prevent damage to the panels.</td>
</tr>
<tr>
<td>• For assembly, observe the assembly drawings supplied with the equipment. Read them before you commence assembly work. The drawing numbers are specified in this manual in the description of the assembly work in question.</td>
</tr>
</tbody>
</table>

**Failure to follow these instructions can result in equipment damage.**
Floor Finishing and Cubicle Mounting

**Floor Finishing**

**Surface Condition**

The floor’s surface evenness must allow for a 2 meter rule to be placed on it in any direction and on all sides so that there are no deflections greater than 5 mm.

**Floor Strength**

The floor must have a compression withstand ≥33 MPa to roll the extraction tool on it without any damage.

**Cubicle Mounting**

For standard or earthquake resistant civil engineering, refer to *Installation Guide no. PHA6653500.*

**NOTE:** For a civil engineering structure built with a false floor or beams, contact Schneider Electric support team.

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**CAUTION**

**HAZARD OF IMPROPER INSTALLATION**

The ground must be perfectly smooth and free from any surface Irregularities.

Failure to follow these instructions can result in injury or equipment damage.
Chapter 7
Configuration of Incoming MV Cables

Configuration of Incoming MV Cables

General Information
The production of civil engineering and the installation of medium voltage cables must take several factors into account:

- The bending radius of the cables. The possibility of having slack, for pulling and then re Pushing cables. Cable handling, varying in ease according to incoming configurations and free cable length from its point of insertion in the maintenance space.

Some recommendations are given below. Other incoming configurations are possible, if there is greater clearance under the Functional Units (FU).

NOTE: If the cable box is used, adapt the depth of the maintenance space.

If you have any questions regarding the configuration, contact Schneider Electric support team.

Civil Engineering with Maintenance Space

MV Cables incoming from the rear
It is intended for cables up to 240 mm², but not recommended for 630 mm² cables.
MV Cables incoming from the front
It is not recommended for 630 mm² cables.

MV Cables incoming from the side near wall
It is intended for cables up to 240 mm², but not recommended for 630 mm² cables.
MV Cables incoming from the side at a distance from a wall
It is recommended for all cable diameters up to 630 mm².
According to the distance from the wall, the dimension of E must be ≥2 m for 630 mm² cables.

Civil Engineering with a Cable Trench
MV Cables incoming from the rear
It is intended for cables up to 240 mm², but not recommended for 630 mm² cables.
**MV Cables incoming from the front**

It is intended for cables up to 240 mm². Incoming by nozzle is not recommended if the cable trench dimensions are small.

![Diagram of MV Cables incoming from the front](image)

A  Cable box if necessary

**MV Cables incoming from the side near a wall**

It is intended for cables up to 240 mm², but not recommended for 630 mm² cables.

![Diagram of MV Cables incoming from the side near a wall](image)

A  Cable box if necessary
Chapter 8
Civil Works Slab

Reserved Area in Civil Works Slab

Switchboard with IC Cubicle FU and Reserved Space at the FU

A Anchor bolt
B MV cable opening
C LV cable opening

NOTE: * for the installation on base frame, consider 3mm gap between each panel for coupling gasket
Switchboard with IC Cubicle FU and Reserved Space over all Civil Engineering
A Anchor bolt
B MV cable opening
C LV cable opening