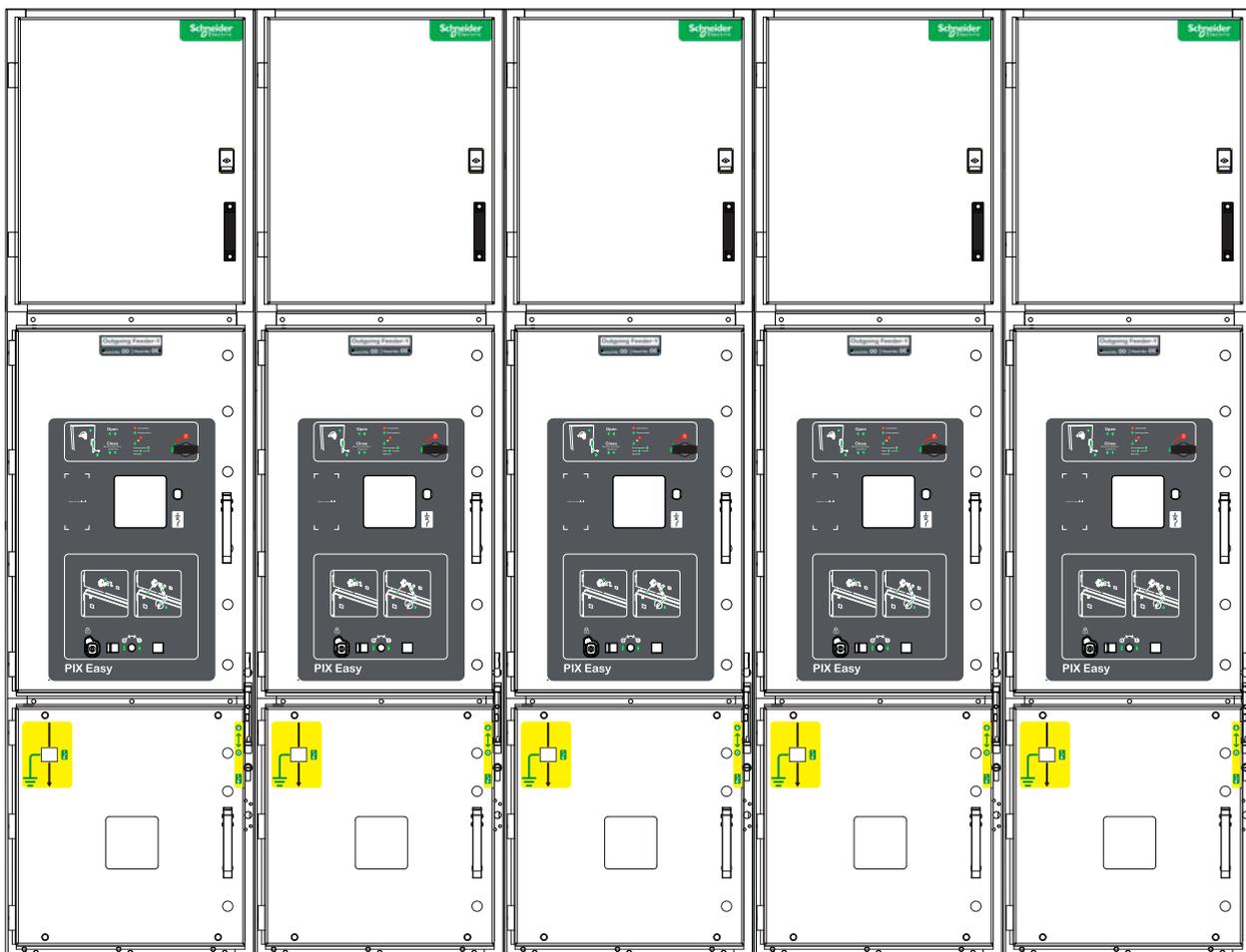


Medium Voltage Switchgear - PIX Easy Middle Rolling

Air Insulated Switchgear
Withdrawable Circuit Breaker Vacuum Technology

Installation Guide

06/2020



The information provided in this documentation contains general descriptions and/or technical characteristics of the performance of the products contained herein. This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications. It is the duty of any such user or integrator to perform the appropriate and complete risk analysis, evaluation and testing of the products with respect to the relevant specific application or use thereof. Neither Schneider Electric nor any of its affiliates or subsidiaries shall be responsible or liable for misuse of the information contained herein. If you have any suggestions for improvements or amendments or have found errors in this publication, please notify us.

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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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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



At a Glance

Document Scope

This Installation guide describes air-insulated medium voltage switchgear units of the PIX Easy Middle Rolling cubicle series.

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

- The PIX Easy Middle Rolling cubicle series
- All relevant safety provisions

This Installation guide is the integral part of the product and should be stored such that it is all times readily accessible and can be used by persons who work on the switchgear. If the switchgear is relocated to another site, this guide should 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 Easy Middle Rolling cubicle. 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 units like the metering device.

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

The information contained in this guide is likely to be updated at any time. Schneider Electric strongly recommends that you have the most recent and up-to-date version available on www.se.com/ww/en/download.

The technical characteristics of the devices described in this guide also appear online. To access the information online, go to the Schneider Electric home page at www.se.com.

Product Related Information

Air-insulated medium voltage switchgear units of the PIX Easy Middle Rolling cubicle 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

FU	Functional Unit (cubicle + mobile part)
IC	Incomer Cubicle
FD	Feeder Cubicle
BC	Bus Coupler Cubicle
BR	Bus Riser Cubicle
BM	Bus Metering Cubicle
BE	Bus Earthing Cubicle
VT	Voltage Transformer
CT	Current Transformer or Current Sensor
VPIS	Voltage Presence Indicator System
LV	Low Voltage
MV	Voltage Class, Including levels 7.2 – 12 kV and 17.5 kV
ES	Earthing Switch

Mobile part	
Easypact EXE	Vacuum Circuit Breaker
MD	Metering Device

Chapter 2 Safety Provisions

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
<ul style="list-style-type: none">• 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:<ul style="list-style-type: none">○ 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
HAZARD OF MOVABLE PARTS IN MECHANICAL DRIVES
Before performing mounting and maintenance work:
<ul style="list-style-type: none">• Comply with the five safety rules:<ul style="list-style-type: none">○ Isolate from the supply voltage○ release the circuit-breaker's energy storing device by OFF-ON-OFF operation○ switch make-proof earthing switches to ON position○ 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
HAZARD OF SHARP-EDGED SHEET METAL AND METAL PARTS
During installation and maintenance work:
<ul style="list-style-type: none">• Comply with the following safety rules:<ul style="list-style-type: none">○ 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: 2011
Common Specification: IEC 62271-1: 2017
- The locally applicable accident avoidance, operating and work instructions should be complied
- Assembly and maintenance: IEC 61936-1: 2010
- Operation of electrical equipment: EN 50110-1: 2013
NOTE: The national standards applicable in the country where the equipment is to be installed should be complied.

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 Easy Middle Rolling is equipped with pressure relief ports, which helps avoiding the panels and the switchgear from bursting.

This Installation 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). The pressure calculations for switchgear rooms inclusive of recommendations regarding pressure relief ports can be provided on request against a fee. For further details, 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.

Ensure that the 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

Dimensions	IC1/FD1	IC2/FD2	BC1-BR1	BC2-BR2	BM1/BE1
Rated normal current (A)	$I \leq 1250A$	$1250 < I \leq 2500$	$I \leq 1250A$	$1250 < I \leq 2500$	--
Width W (mm)	600	800	600x2	800x2	600
Height** H (mm)	2300	2300	2300	2300	2300
Depth D (mm)	1660	1660	1660	1660	1660
Weight* (kg)	800	1000	650x2	850x2	650

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

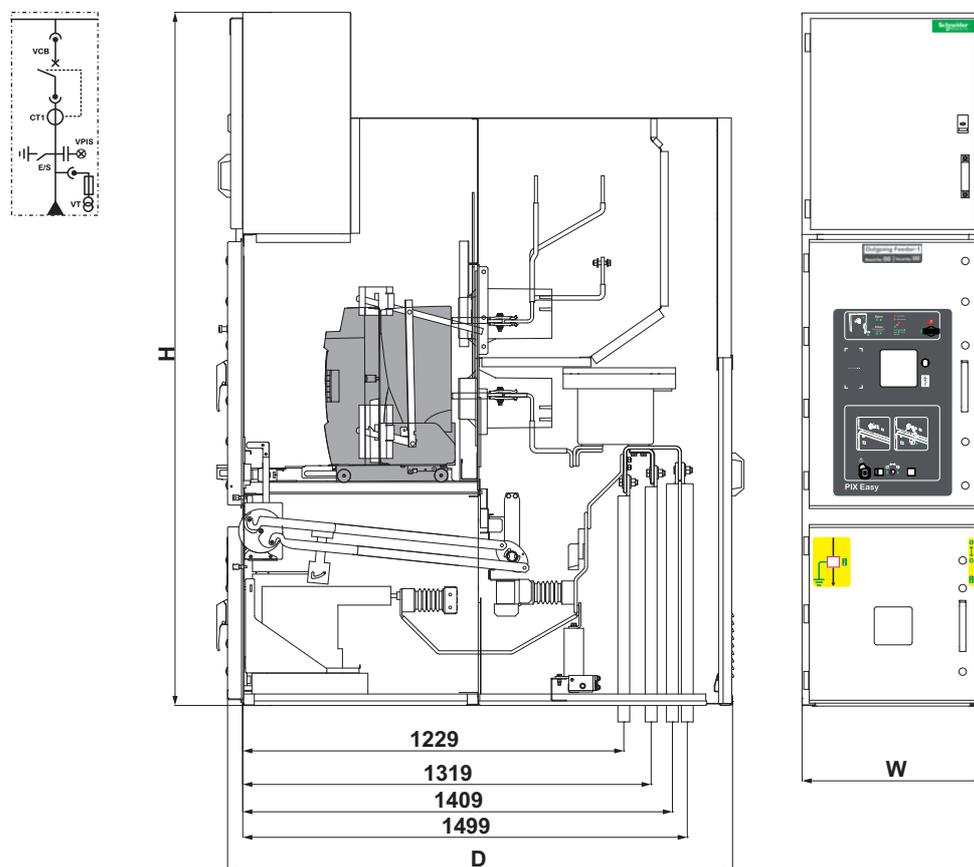


Figure 01
Front and sectional side view of IC1

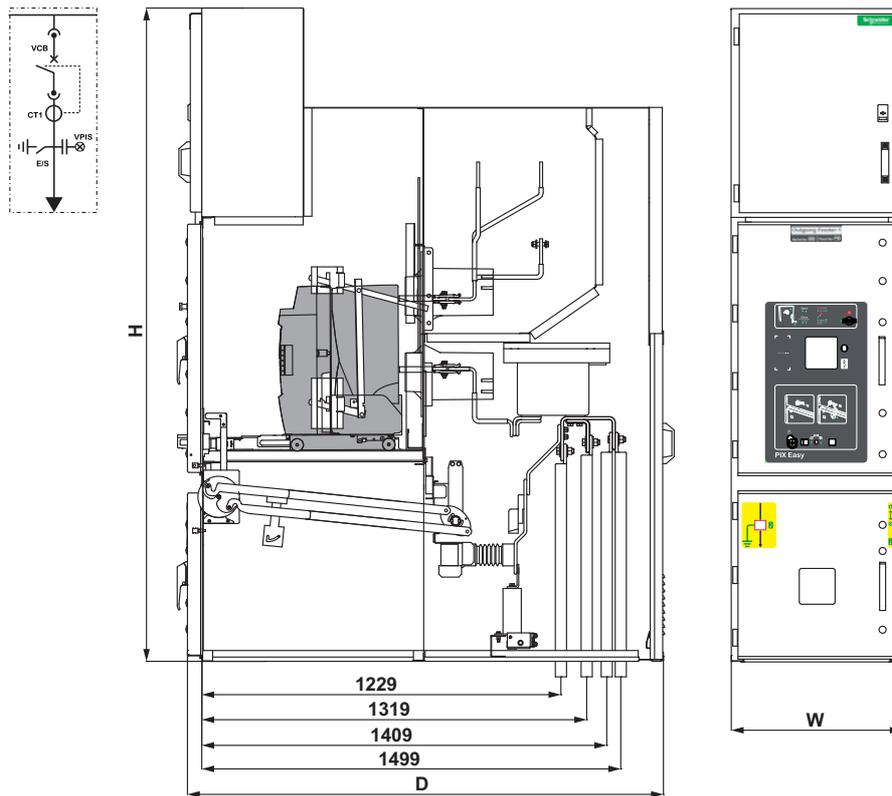


Figure 02
Front and sectional side view of FD1

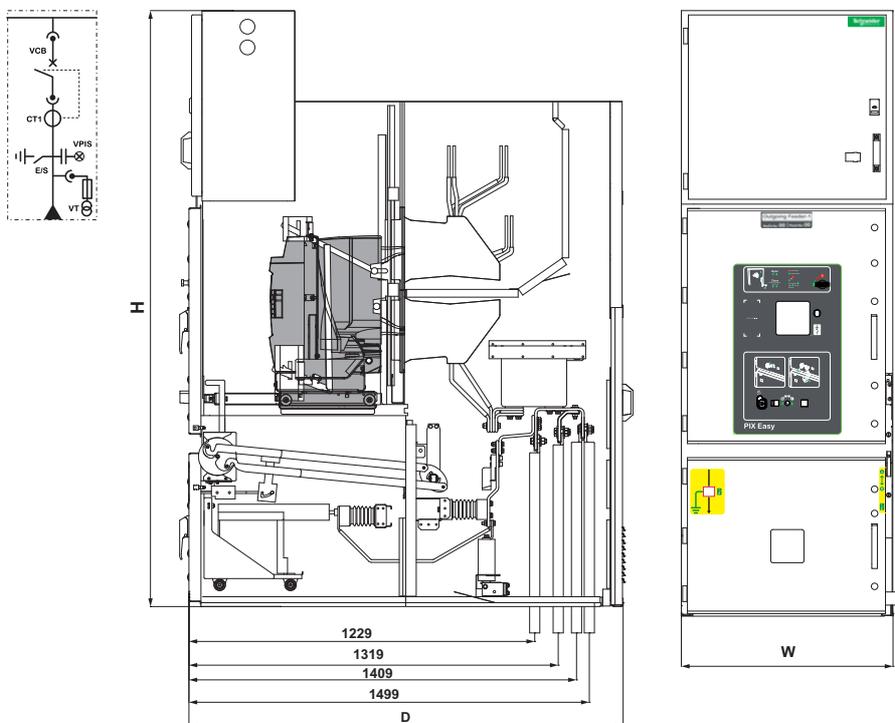


Figure 03
Front and sectional side view of IC2

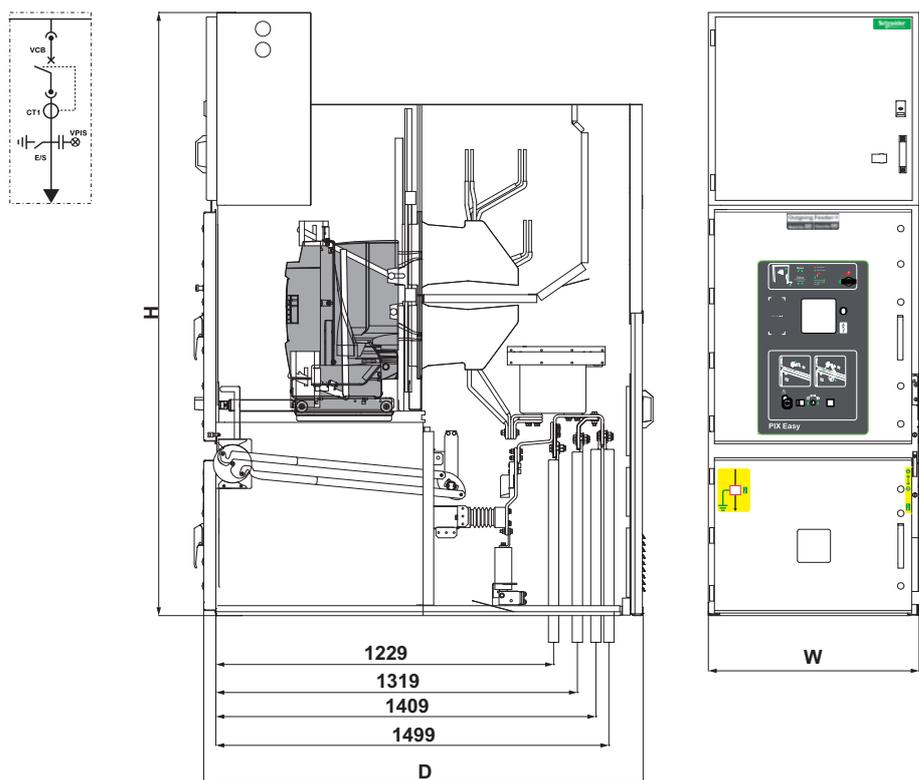


Figure 04
Front and sectional side view of FD2

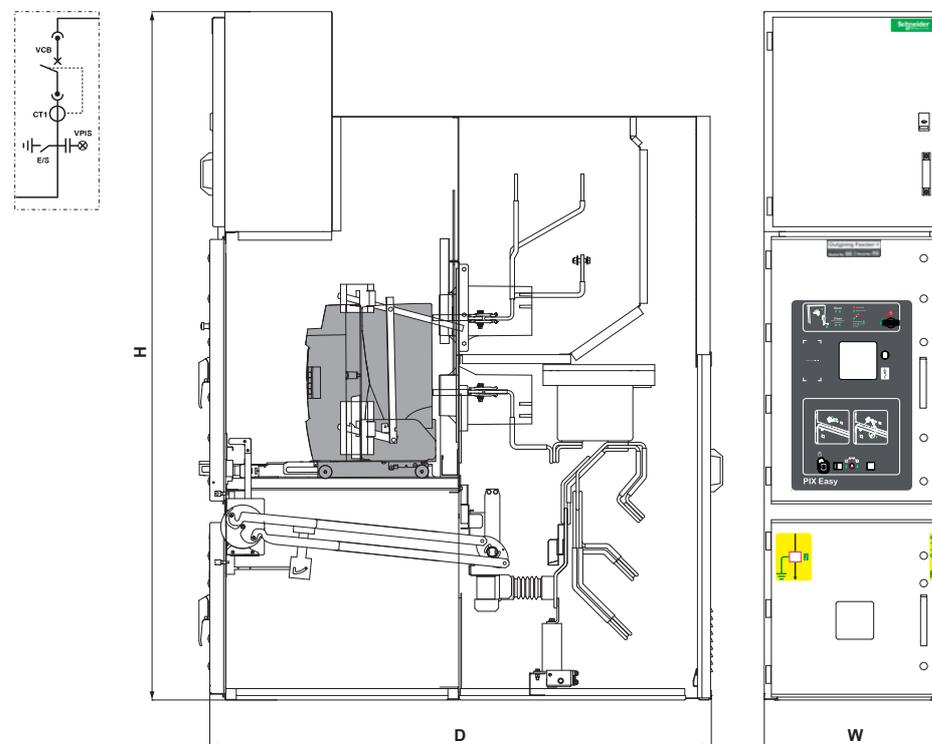


Figure 05
Front and sectional side view of BC1

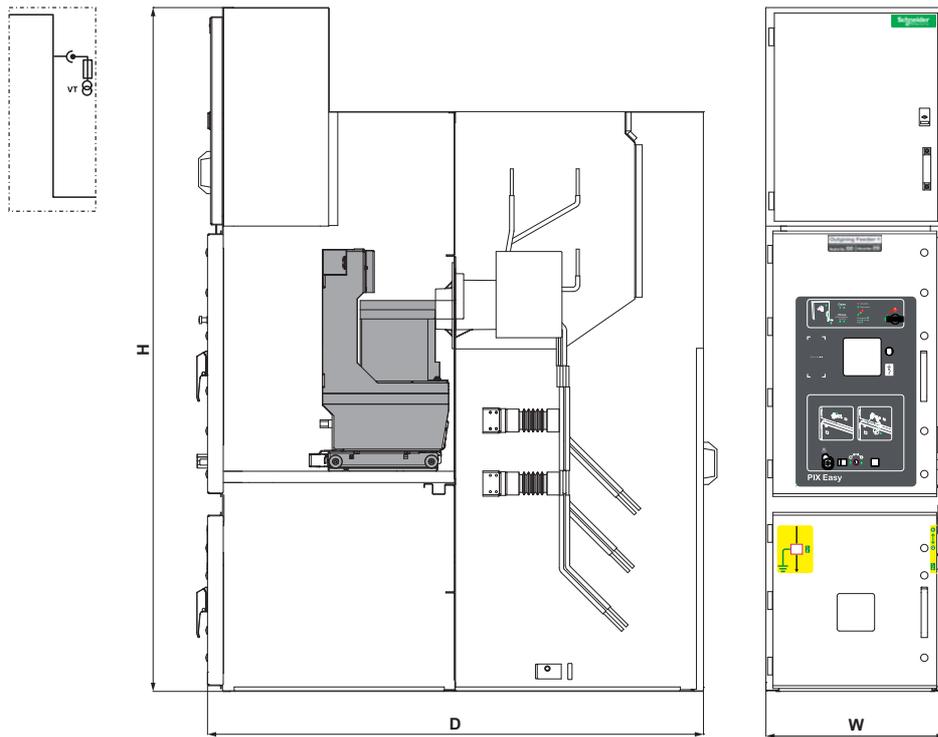


Figure 06
Front and sectional side view of BR1

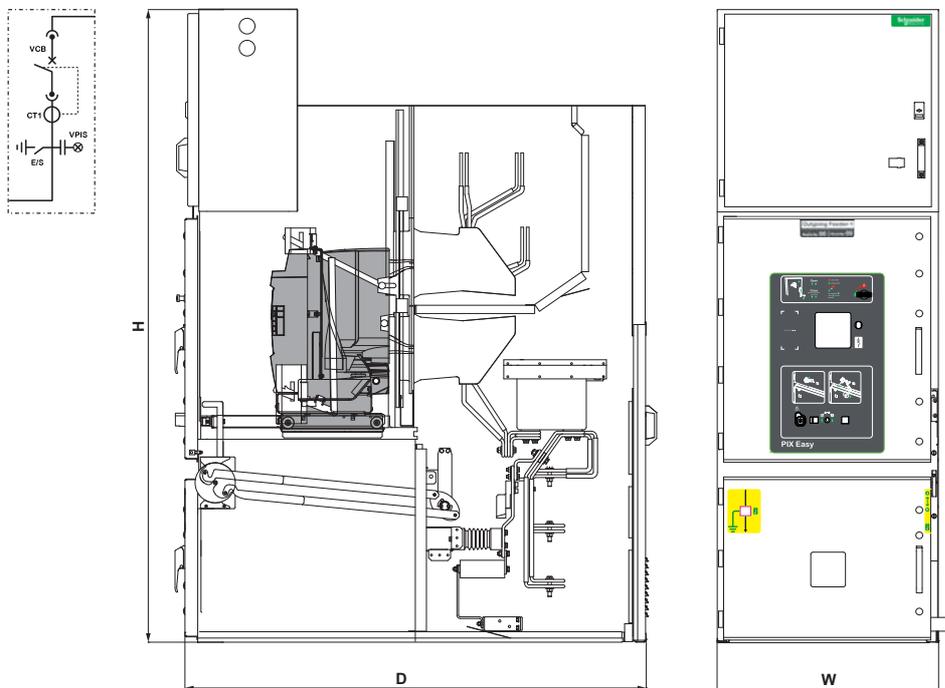


Figure 07
Front and sectional side view of BC2

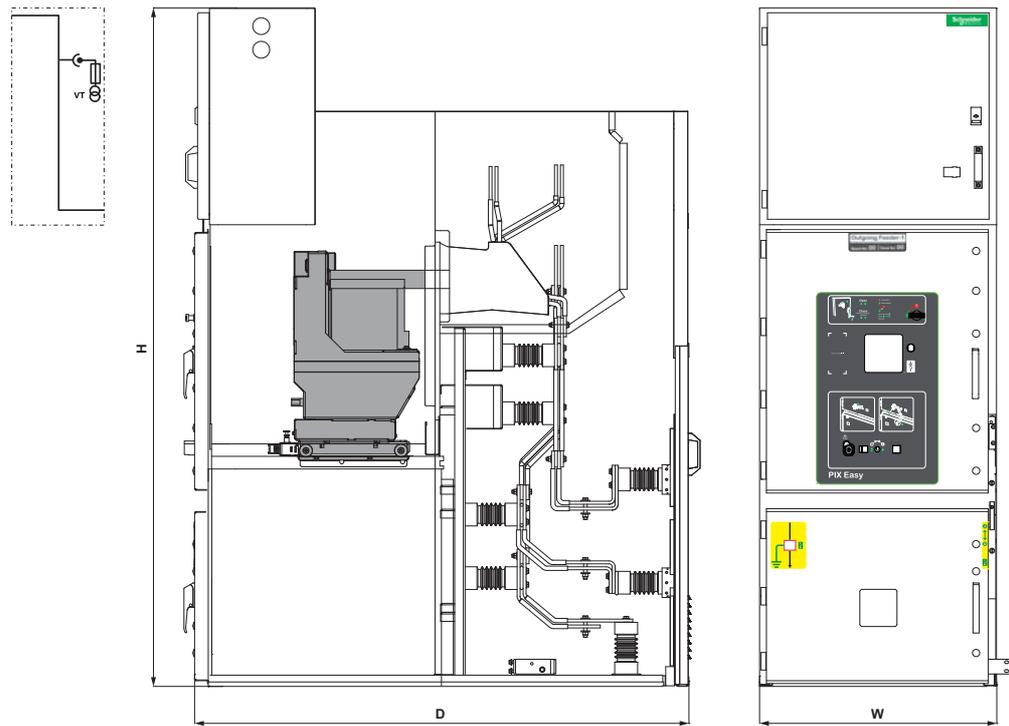


Figure 08
Front and sectional side view of BR2

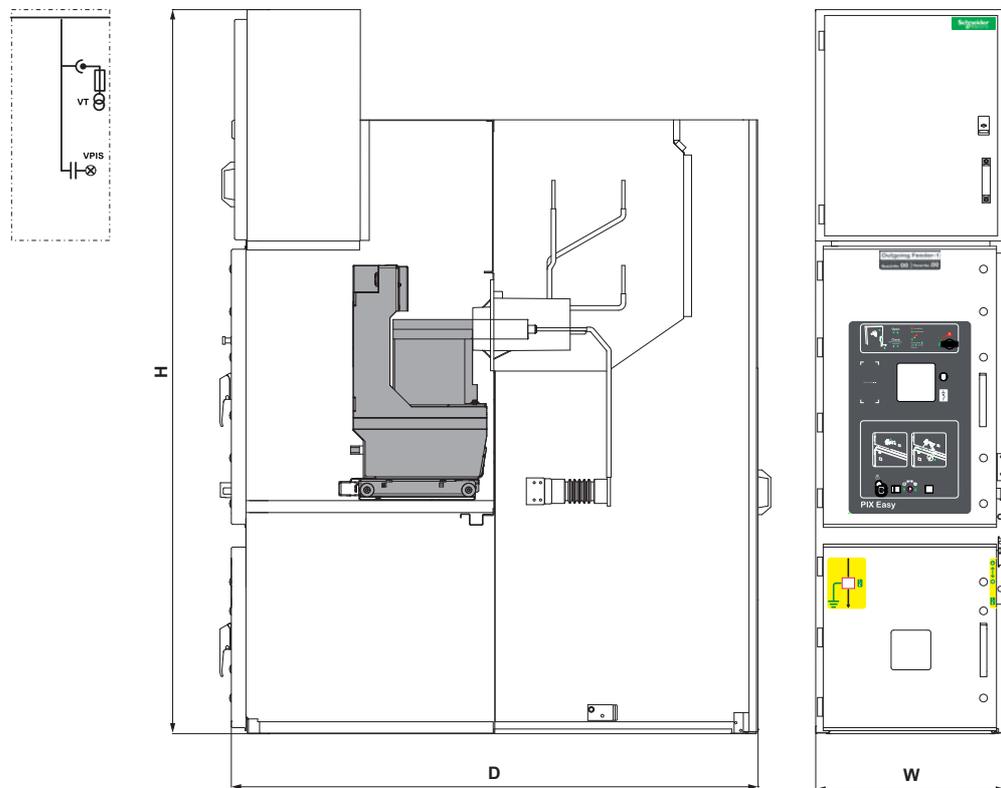


Figure 09
Front and sectional side view of BM1

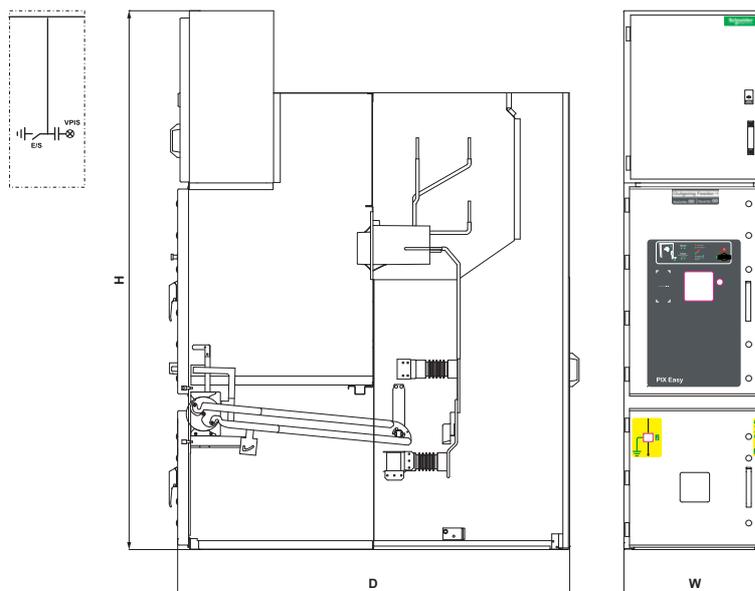


Figure 10
Front and sectional side view of BE1

IC and FD Cubicles with 2 CT per Phase

Dimensions	IC1/FD1	IC2/FD2
Rated normal current (A)	$I \leq 1250A$	$1250 < I \leq 2500$
Width W (mm)	600	800
Height** H (mm)	2300	2300
Depth D (mm)	2160	2160
Weight* (kg)	840	1050

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

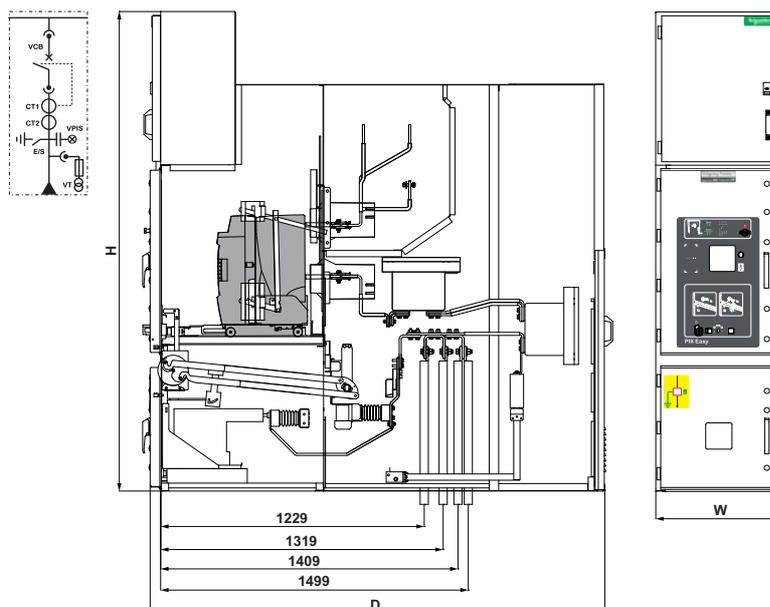


Figure 11
Front and sectional side view of IC1

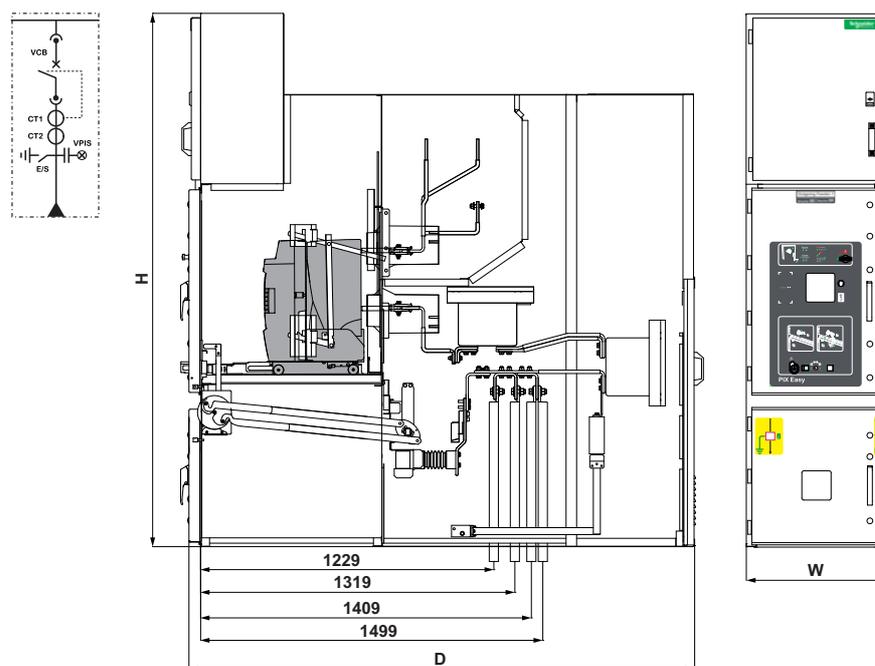


Figure 12
Front and sectional side view of FD1

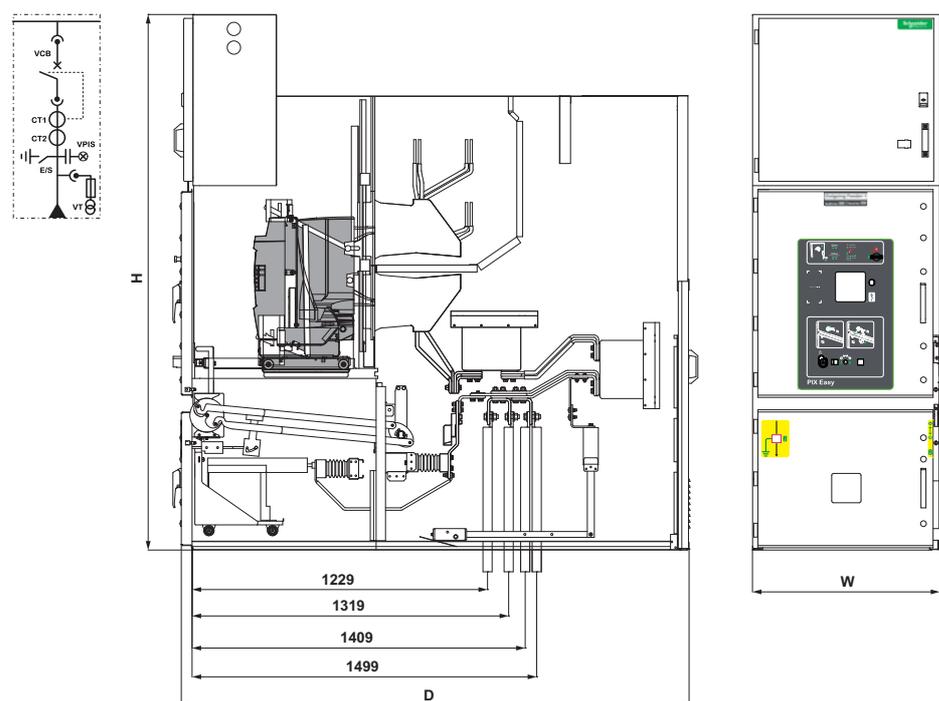


Figure 13
Front and sectional side view of IC2

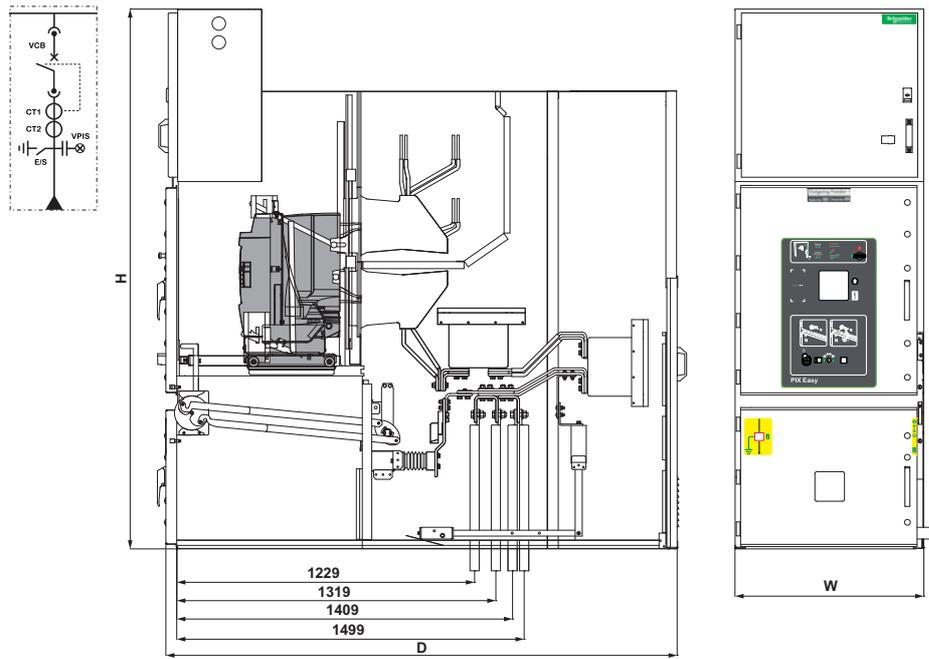


Figure 14
Front and sectional side view of FD2

Chapter 4 Design and Description

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Intended Use	22
Applicable Standards	23
Ambient and Operating Conditions	24
Disposal at the End of Service Life	25

Intended Use

The Air-insulated medium voltage switchgear units of the PIX Easy Middle Rolling series are designed exclusively for switching and distributing electrical power.

  **DANGER**

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Use only this switchgear in the scope of the specified standards and specific technical data.

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

Applicable Standards

The switchgear units of the PIX Easy Middle Rolling series are:

- metal-enclosed; loss of service continuity category according to IEC 62271-200: 2011 LSC 2B-PM
- type-tested
- tested for internal faults (qualification IAC AFLR)
- dimensioned for indoor installation.

The PIX Easy Middle Rolling switchgear units meet the following standards and regulations:

Designation	IEC Standard
Switchgear	IEC 62271-200: 2011 IEC 62271-1: 2017
Internal arc classification (IAC)	IEC 62271-200: 2011
Circuit breaker	IEC 62271-100: 2017
Earthing switch	IEC 62271-102: 2018
Current transformer	IEC 61869-2: 2012
Voltage transformer	IEC 61869-3: 2011
Voltage presence indicating systems (VPIS)	IEC 62271-206: 2011
Protection against accidental contact, foreign bodies and water	IEC 62271-200: 2011 IEC 60529: 2013
High-voltage fuse link	IEC 60644: 2009 IEC 60282-1: 2009

Degrees of protection against accidental contact and foreign objects:

Degrees of protection against accidental contact and foreign objects according to IEC 62271-200: 2011 and IEC 60529: 2013	
Switchgear enclosure	IP4X
Inner Compartments	IP2X

Ambient and Operating Conditions

The PIX Easy Middle Rolling is an indoor switchgear and it may only be operated under normal conditions in accordance with IEC 62271-1: 2017.

Operating the switchgear under conditions deviating from these is only admissible upon consultation with the written approval of the manufacturer.

Ambient conditions in accordance with IEC 62271-1: 2017	
Temperature class	-5°C Indoors
Ambient temperature minimum/maximum in according with IEC ...	-5°C/+40°C
Average value over 24 hours	≤35°C
Mean relative air humidity: 24 hours/1 month	≤95%/≤90%
Installation altitude above sea level	≤1000 m

Disposal at the End of Service Life

A material and recycling data sheet can be provided on request for the disposal of switchgear units of the PIX Easy Middle Rolling series at the end of their service life.

The disposal is performed as a service by the service center of the manufacturer and this service is subject to a fee.

Chapter 5 Assembly

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Safety Provisions	28
Switchgear Resistance	28
Instructions for Assembly	30
Switchgear Room Requirements	31

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 ARC FLASH

- Before removing covers and performing assembly or maintenance work, make sure to isolate the system from the high voltage and the supply voltage and to ground it.
- Comply with the five safety rules:
 - Isolate the system from the power supply
 - Make sure that unintentional restart (reclosing) is avoided
 - 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

HAZARD OF MOVABLE PARTS IN MECHANICAL DRIVES

Before performing mounting and maintenance work:

- Comply with the five safety rules:
 - Isolate the system from the supply voltage
 - Release the energy storing device of the circuit breaker 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

HAZARD OF 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

HAZARD OF TOPPLING

During handling the moving devices, pay attention to uneven floor surfaces (for example, cracks, projections and so on) of the switchgear room.

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

WARNING

HAZARD OF FALLING

- Do not walk upon the topsides of the switchgear panels.
- While working on the topside of the switchgear panels (for example, during the installation of deflectors, fans, or pressure relief ducts) use appropriate temporary platform ensuring no damage to the product.

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

Switchgear Resistance

Follow these safety rules for the resistance of the switchgear to ageing in an MV substation.

NOTICE

HAZARD OF NON COMPLIANCE TO INSTALLATION INSTRUCTIONS

- Ensure that draughts and/or thermal shocks are avoided in all panel compartments in order to avoid the creation of dew points (sources of partial discharges).
- The equipment must be installed in conformity with the relevant IEC standard.

Failure to follow these instructions can result in equipment damage.

NOTICE

HAZARD OF NON COMPLIANCE TO INSTALLATION INSTRUCTIONS

Grid size must be suited to the power dissipated in the substation. These grids must be placed exclusively in the vicinity of the transformer, in order to avoid air circulation on the low voltage switchboard.

Failure to follow these instructions can result in equipment damage.

Instructions for Assembly

The PIX Easy Middle Rolling panels are delivered with the earthing switch in the OFF position.

NOTICE

HAZARD OF NON COMPLIANCE TO ASSEMBLY INSTRUCTIONS

- Condensation, dirt, and dust should be avoided during assembly on all accounts, in order to prevent damage to the panels.
- For assembly, observe the assembly drawings that are supplied with the equipment or shared online during drawing approval. Read assembly drawings before you start the assembly work.
- Unless otherwise specified by the cable manufacturer, comply with the specified tightening torques in the contact areas.

Failure to follow these instructions can result in equipment damage.

Switchgear Room Requirements

Before installing the switchgear panels, ensure that the switchgear room is checked according to the *Civil Engineering Guide*.

- Observe the minimum distance between the switchgear and the wall of the building.
- Check the base frame (if used) for dimensions and positional tolerances.
- Check the position of floor openings for high voltage and low voltage cables.

Before the switchgear is positioned at its installation site, ensure that the all specifications are met as defined in the *Civil Engineering Guide*.

<i>NOTICE</i>
HAZARD OF INAPPROPRIATE INSTALLATION <ul style="list-style-type: none">● Make sure that the load-bearing capacity of the fastening areas can correspond to the weight of the switchgear (perform a stress analysis of the building).● Observe switchgear-specific space assignment plan as per <i>Civil Engineering Guide</i>. Failure to follow these instructions can result in equipment damage.

Chapter 6 Installation Instructions

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Unpacking of Cubicles and Loose Materials	34
Transport of Panels on Site	36
Placing Panels in a Switchboard	38
Coupling of Cubicles	39
Access to Cable Connection Compartment	40
Main Earth Bar	41
MV Cable Installation	45
Placing External Cables in the Switchgear Panel	51
LV Cable Installation	52

Unpacking of Cubicles and Loose Materials

NOTICE

HAZARD OF INAPPROPRIATE PACKING

To avoid damage to the components of the front panel functional unit, leave the protection foam in place until the switchboard is in the operation phase.

Failure to follow these instructions can result in equipment damage.

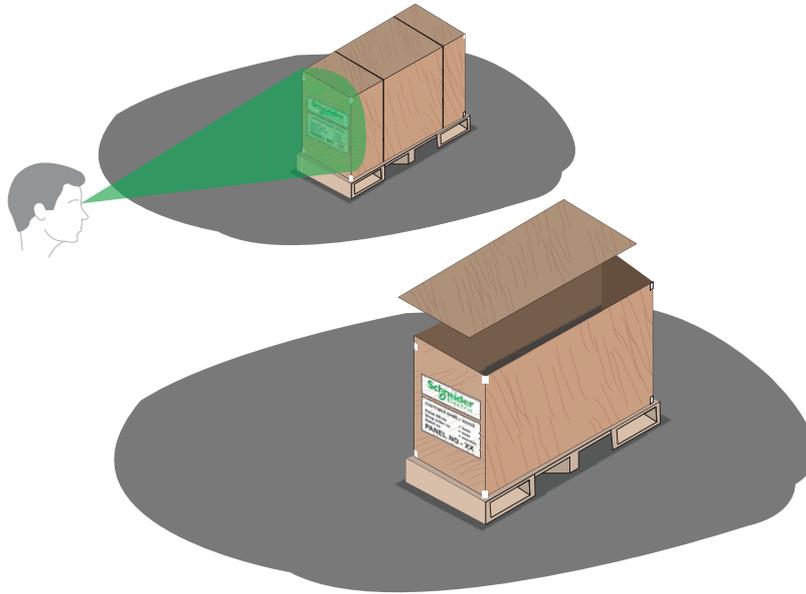


Figure 15
Cubicle and loose material box

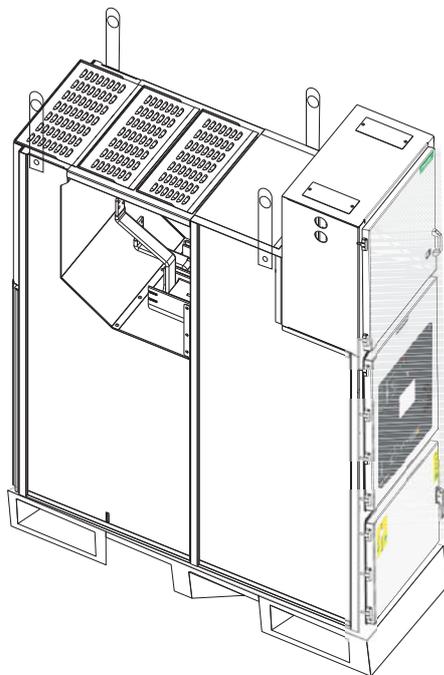


Figure 16
Unpacked cubicle

The preparation of the cubicles should be carried out on the premises at the installation location.

Follow the below steps to unpack the cubicle and loose materials:

Cubicle

- Check transportation indicator status before unpacking the cubicles and report Schneider Electric in case of any damage.
- Remove all the sides of packing material except the bottom wooden pallet.
- Keep the front panel protection foam/plastic in place to avoid scratch/damage.

Loose Material Box

- Remove the top cover of the loose material box to access required parts/hardwares.

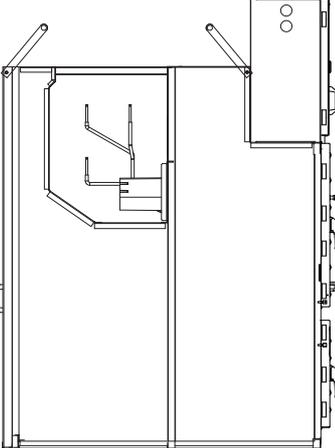
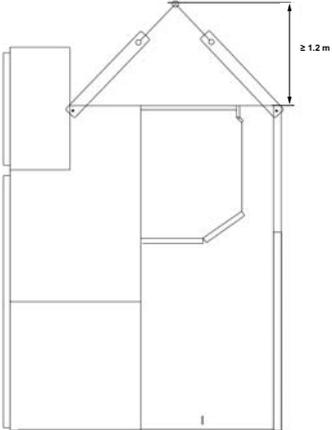
Transport of Panels on Site

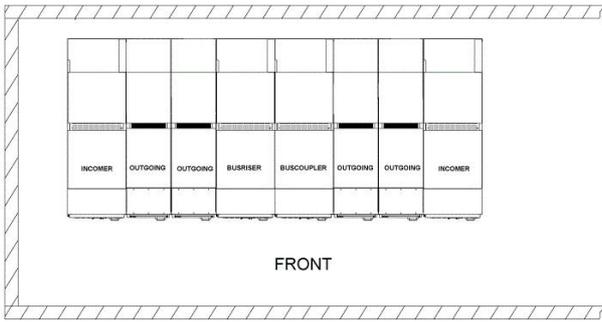
⚠ WARNING
<p>HAZARD OF FALLING OR TILTING LOADS</p> <ul style="list-style-type: none"> • Make sure that the ropes or chains are strong enough to bear the weight of the panel. Comply with the relevant provisions for hoisting the equipment. • On lowering the panels, make sure that the supporting platform is sufficiently stable and even. <p>Failure to follow these instructions can result in death, serious injury, or equipment damage.</p>

⚠ WARNING
<p>HAZARD OF FALLING</p> <p>Watch out for floor openings in the switchgear room.</p> <p>Failure to follow these instructions can result in death, serious injury, or equipment damage.</p>

Switchgear Panel Transport with Overhead Crane

To transport the switchgear panel with overhead crane:

Step	Action
1	<p>Attach the four crane ropes/chains (observing minimum carrying capacity and length).</p>  <p style="text-align: center;">Figure 17</p>
2	<p>Lift the panel carefully.</p>  <p style="text-align: center;">Figure 18</p>

Step	Action
3	<p>Deposit the panel carefully on the floor at the intended site of installation.</p>  <p>Figure 19</p>

Switchgear Panel Transport with Rollers/Pipes

To transport the switchgear panel with rollers/pipes:

- Shift the switchgear panel from the base wooden pallet over the rollers carefully.
- Move slowly and place the panel carefully on the floor at the intended site of installation.

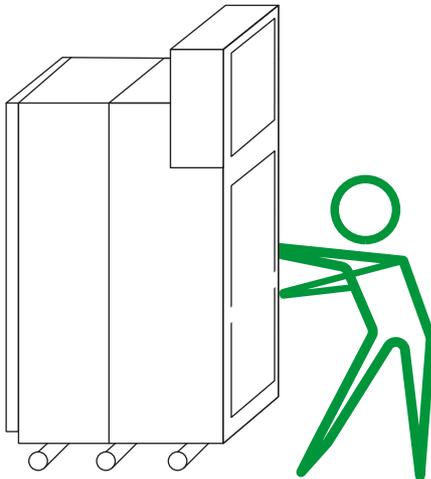


Figure 20
Cubicle transportation with rollers/pipes

NOTE: Place the switchboard cubicles according to the front panel drawings and the single-line diagram. Start by placing the cubicle located in the middle of the switchboard (except in the case of an extension of the existing switchboard), then place the cubicles on either side of it, according to the instructions given in the Civil Engineering Guide.

 CAUTION
<p>HAZARD OF FALLING DOWN</p> <ul style="list-style-type: none"> • Ensure circuit breaker is in SERVICE position. • Secure correct positioning of cubicle as per single-line diagram. <p>Failure to follow these instructions can result in injury or equipment damage.</p>

Placing Panels in a Switchboard

Assembling, Adjusting, and Fastening

Place the switchboard panels according to front panel drawings and the single-line diagram.

Start by placing the panel located in the middle of the switchboard (except in the case of an extension of the existing switchboard), then position the cubicles on either side of it, according to the instructions given in the Civil Engineering Guide.

Fastening the Panel to the Floor and Coupling

To isolate the circuit breaker from the panel and to keep it outside:

- Rack-out till TEST position using the racking handle provided in the loose material box.
- Open MV compartment (breaker) door as explained in door mimic, disconnect the LV connector plug from the circuit breaker and keep it in the parking area.
- Take the transport trolley and position it for taking out the circuit breaker.
- Unlock the racking truck and take the circuit breaker outside.

Grouting Panel on the Floor

Fasten the panel located at the middle as per the civil engineering screw and bolts (Figure 21).

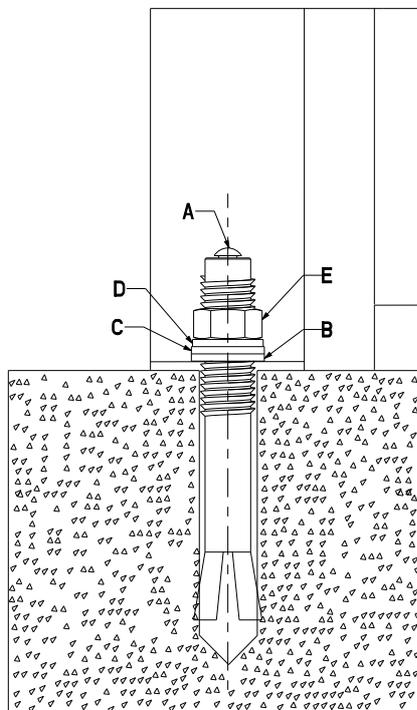


Figure 21

Cubicle grouting on the floor

⚠ CAUTION

HAZARD OF UNPROTECTED OUTPUT

- Cubicle 'X' should not impede cubicle 'X+1' and vice versa with respect to the overall dimensions.
- Depending on the load, if a cubicle is found to be raised after the next one is installed, there is risk of vibration.

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

Coupling of Cubicles

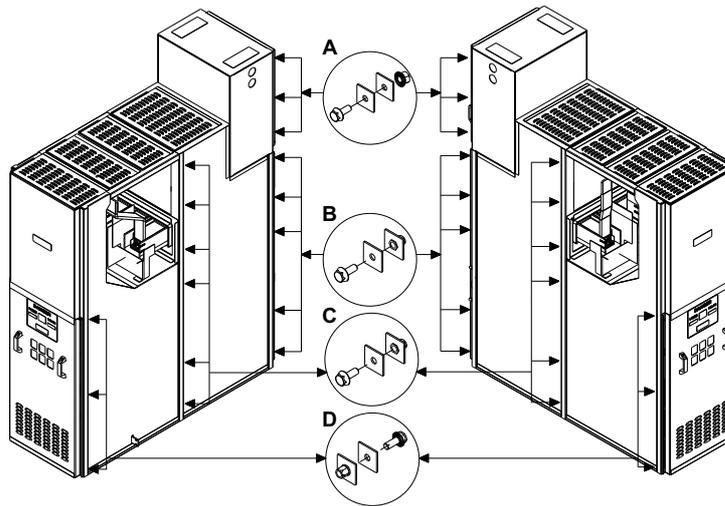
Assembling of Cubicles

⚠ CAUTION

HAZARD OF UNPROTECTED OUTPUT

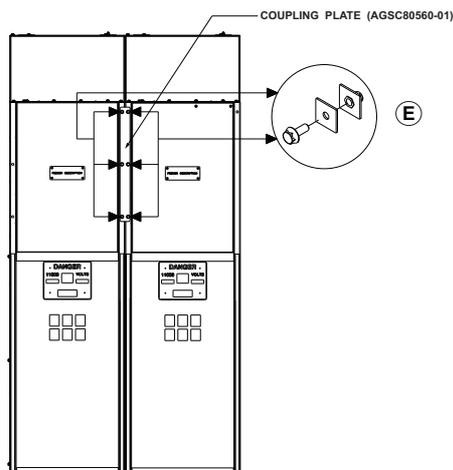
The lifting rings and its associated screw should be removed.

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



- A** Coupling hardware details:
M8x25 Hex serrated screw 3 numbers and M8 steel Serrated nut 3 numbers
- B** Coupling hardware details:
M8x25 Hex serrated screw 5 numbers and M8 steel riveted nut 5 numbers (Already engaged in product)
- C** Coupling hardware details:
M8x25 Hex serrated screw 6 numbers and riveted nut M8 steel 6 numbers (Already engaged in product)
- D** Coupling hardware details:
M8x25 Hex serrated screw 3 numbers and riveted nut M8 steel 3 numbers (Already engaged in product)

Figure 22
Cubicle coupling



- E** Coupling hardware details:
M8x25 Hex serrated screw 6 numbers and riveted nut M8 steel 6 numbers (Already engaged in product)

Figure 23
Cubicle coupling

Access to Cable Connection Compartment

Removing Cable Compartment Cover

⚡ ⚠ DANGER

HAZARD OF ELECTRIC SHOCK OR EXPLOSION ARC FLASH

Open the cable connection compartment only if the earthing switch is ON.

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

Follow the steps to remove cable compartment cover:

Step	Action
1	Remove the securing screws of the cable compartment cover (see item 1 in Figure 24).
2	Remove the cable compartment cover - Lift and remove (see item 2 in Figure 24).

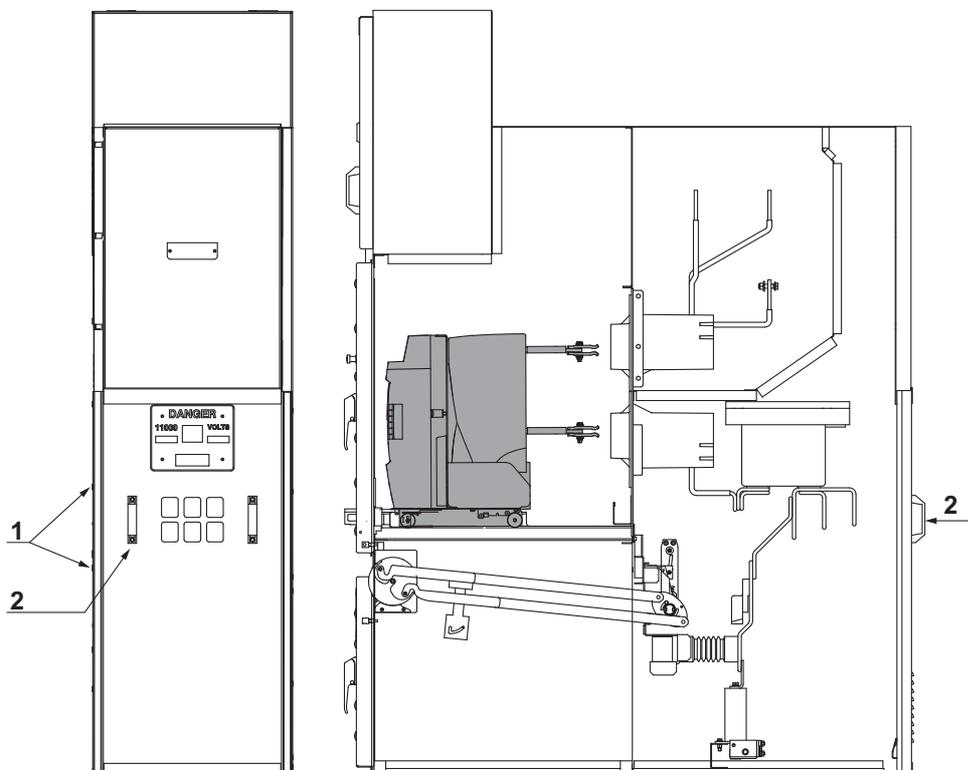


Figure 24

Cable compartment cover access

Mounting Cable Compartment Cover

After completing assembly work, place cable compartment cover on the panel and fasten it again using the securing screws. Tighten all rear cover screw with a torque of 21 Nm.

Main Earth Bar

Main Earth Connection for End Panels

From the switchboard to the building's earth.

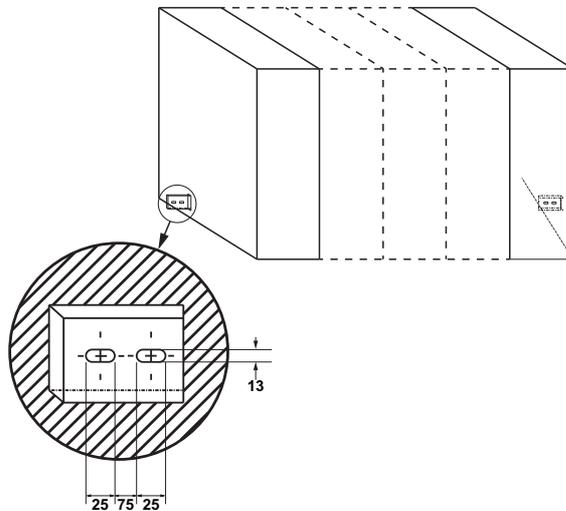


Figure 25

End cubicle main earth connection

Follow the steps to connect the earth bar to the building's earth:

1. Connect the earth bar to the building's earth at the end of the switchboard.
2. On the switchboard right and left, place the specific link with the oblong hole inside the cubicle.
3. Tighten with a torque of 17 Nm.

Main Earth Connection in the Middle Panels

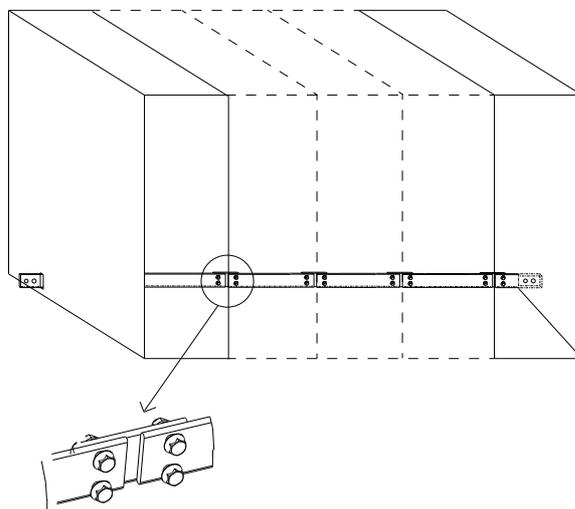


Figure 26

Middle cubicle main earth connection

Follow the steps to the earth connection for cubicles:

1. Find the location for earth connection at the base of the cubicle.
2. Install the link by sliding it from subsequent cubicle.
3. Place the bolt and tighten it. Use the same screw that is provided in the cubicle. Tighten with a torque of 17 Nm.

⚠ WARNING

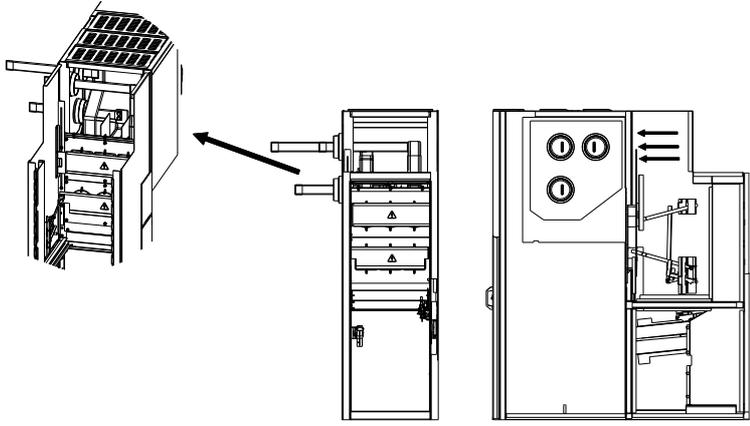
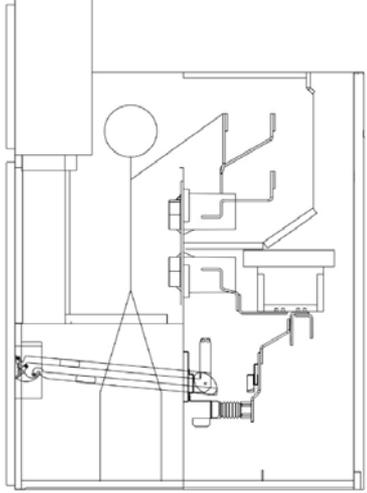
HAZARD OF NON-COMPLIANT CONNECTIONS

- Make sure earth bar connections are done between the cubicles during each cubicle installation or after switchboard assembly.
- Make sure main earth bar connections of cubicle to building's earth is done once end cubicles are fixed.

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

Main Busbar Installation

Follow these steps during the busbar installation of each cubicle:

Step	Action
1	<p>The busbars and required spacers are shipped in loose material box. The busbar area is accessible through top partition of the circuit breaker compartment (Figure 27).</p>  <p style="text-align: center;">Figure 27</p>
2	<p>To clean the busbar and upper riser surface, apply the contact grease type.</p>  <p style="text-align: center;">Figure 28</p>
3	Place the busbar between the two previously assembled cubicles.
4	Tighten the fixation screws from the head side.

Repeat these operations each time a switchboard cubicle is placed.

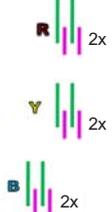
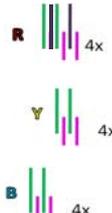
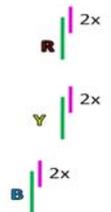
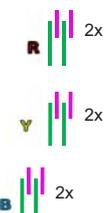
Busbar Section			
800 A	1250 A	2000 A	2500 A
1x60x10	1x80x10	2x80x10	2x100x10

Principle of Assembling Busbars

— Upper Risers
— Main Busbar
— Packers
 Numerical beside indicates number of fixing hardware

Cubicle type and rated current		Main busbar rated current		
		800 A/1250 A	2000 A	2500 A
Feeder	800 A/1250 A			
	2000 A	Not Applicable		
	2500 A	Not Applicable	Not Applicable	
Bus PT	600 mm			
	800 mm	Not Applicable		

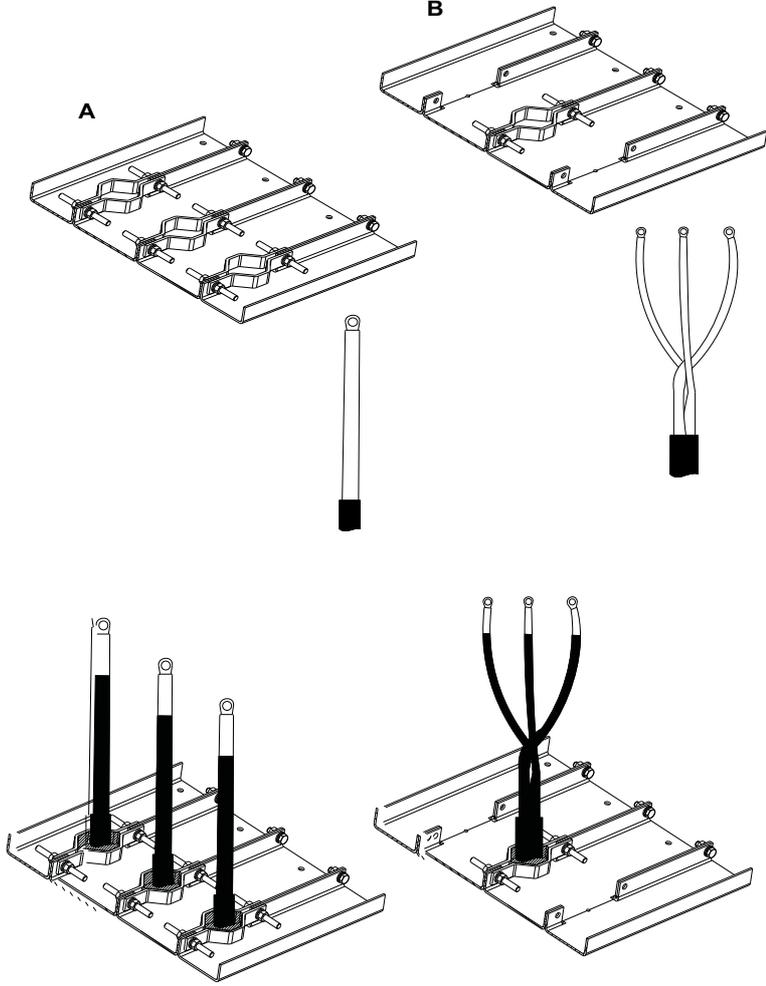
 Upper Risers
 Main Busbar
 Packers
 Numerical beside indicates number of fixing hardwarees

Cubicle type and rated current		Main busbar rated current		
		800 A/1250 A	2000 A	2500 A
Bus coupler	800 A/1250 A		Not Applicable	Not Applicable
	2000 A	Not Applicable		Not Applicable
	2500 A	Not Applicable	Not Applicable	
Bus riser	1250 A		Not Applicable	Not Applicable
	2000 A	Not Applicable		Not Applicable
	2500 A	Not Applicable	Not Applicable	

MV Cable Installation

General Information

The different types of cables are described in the below table:

Step	Action
1	<p data-bbox="464 360 997 412">A: 3 nos single-pole cables per phase (typical size Ø56) B: 1 no three-pole cable per phase (typical side Ø89)</p>  <p data-bbox="464 1491 663 1543">Figure 29 MV cable installation</p>
2	<p data-bbox="464 1581 655 1603">Connect the cables.</p> <ul data-bbox="464 1608 1326 1659" style="list-style-type: none"> <li data-bbox="464 1608 1193 1630">● Cut the cable glands according to the number and diameter of the cables. <li data-bbox="464 1635 1326 1659">● Install them around the cables. Refer to manufacturer instructions for cable termination.

⚡ ⚠ DANGER

HAZARD OF ELECTRIC SHOCK OR EXPLOSION ARC FLASH

- Qualified personnel has to perform cable terminations and cable installation.
- Workers should be aware and understand the hazards involved in working with the medium voltage circuits.

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

⚠ WARNING
HAZARD OF ELECTRIC SHOCK OR EXPLOSION ARC FLASH
Fundamental Installation requirements has to be adhered.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

⚠ CAUTION
HAZARD OF UNPROTECTED OUTPUTS
<ul style="list-style-type: none"> • Ensure that the cable dielectric insulation does not come in contact with any grounded metal parts or other phases. • The grounded metallic support should be in contact with the external protective cable sheath.
Failure to follow these instructions can result in injury or equipment damage.

Preparation of Cable Compartment

Follow the steps to prepare the cable compartment:

Step	Action
1	Remove plain gland plate and drill as per the cable requirement.
2	Cable glands to be used suitable to cable and size of cable.

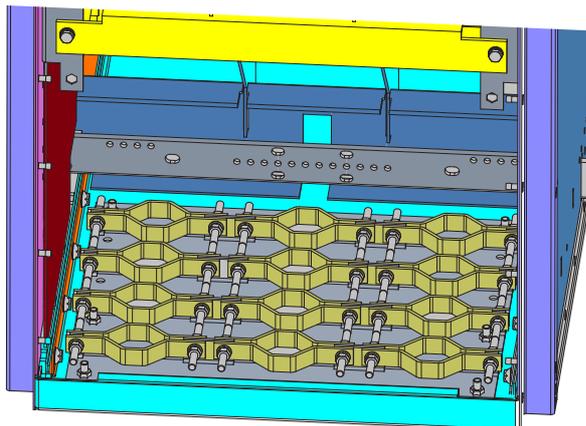


Figure 30
MV cable installation

⚠ WARNING
HAZARD OF INAPPROPRIATE CABLE LUGS
Do not use aluminum cable lugs for the cable connection. There is the risk due to contact corrosion in case of inadmissible matching of materials.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

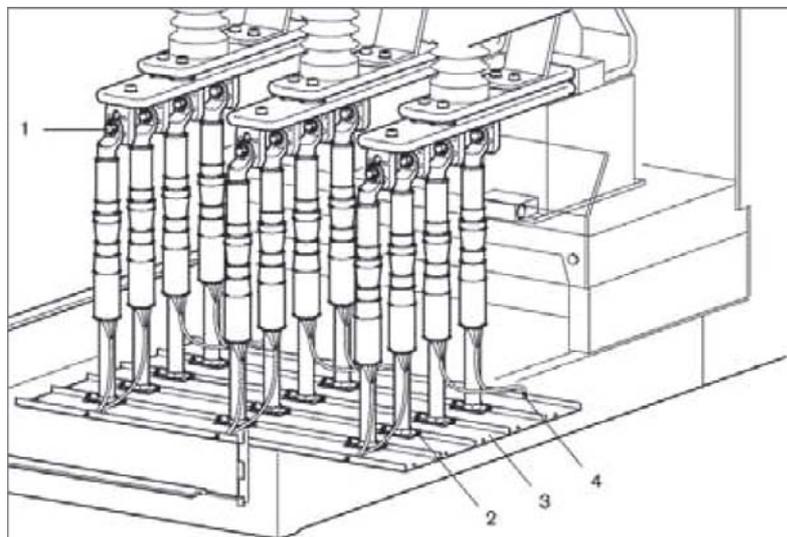
Connecting the Cables

NOTE:

- Unless otherwise specified by the cable manufacturer, comply with the specified tightening torques and pre-coat contact areas.
- Observe the phase grouping of the switchgear panel.

Follow the steps to connect the cables:

Step	Action
1	Fasten the individual cables to the appropriate connection surfaces passing through cable gland mounted on gland plate (see item 1 of the following Figure).
2	Tighten the cable through clamps.
3	Connect the ground wires to the panel rack (see item 2 of the following Figure).



- 1 Cable connection on the panel
- 2 Cable holding with the compressible type gland
- 3 Compressible glands mounted on the plane gland plate
- 4 Connection of the ground wires to the panel

Figure 31
MV cable installation

Clamping Assembly for the Cables

<i>NOTICE</i>
<p>HAZARD OF INAPPROPRIATE CLAMPING</p> <p>Make sure that the sealing of cable floor is proper after installing the cables to avoid vermin and moisture entry.</p> <p>Failure to follow these instructions can result in equipment damage.</p>

Clamping assembly for single core cables

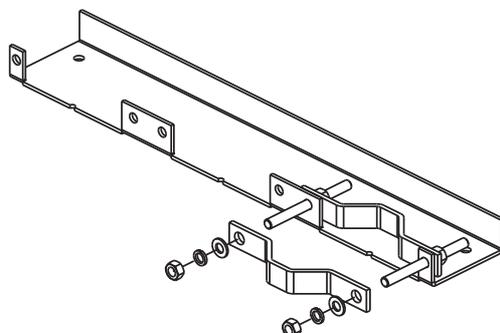


Figure 32
Cable clamp - single core

Clamping assembly for three core cables

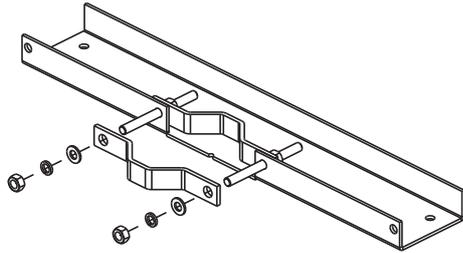
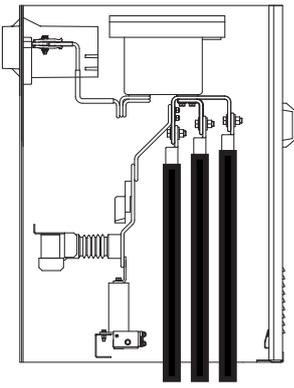
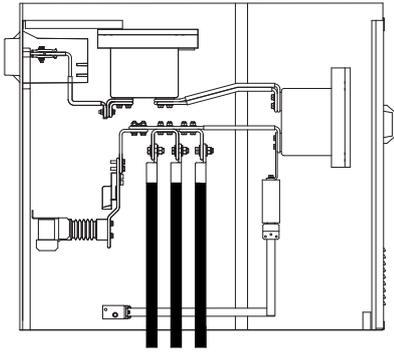
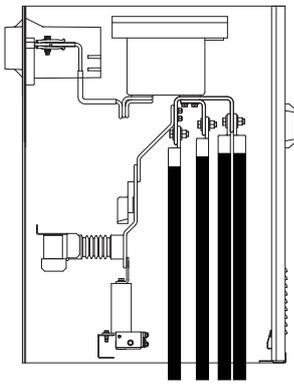
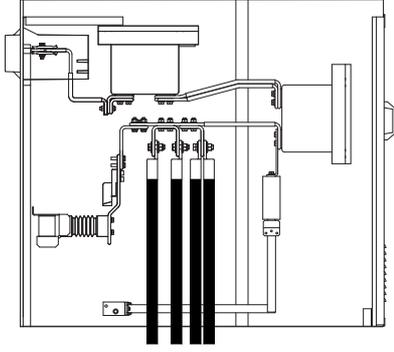
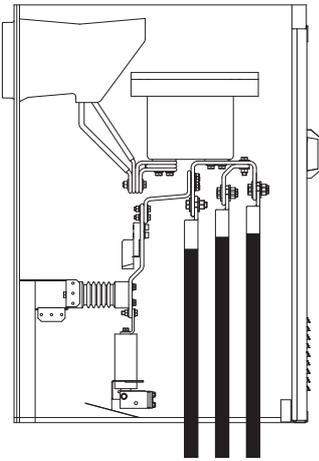
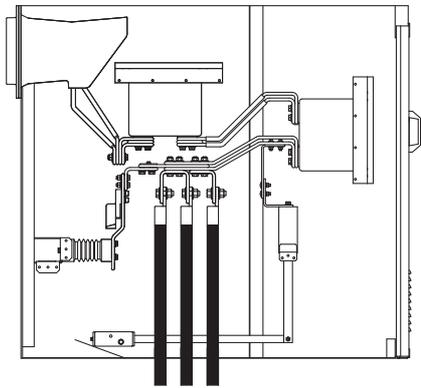
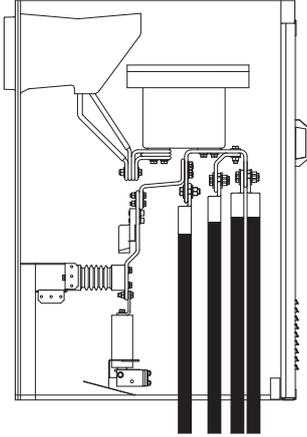
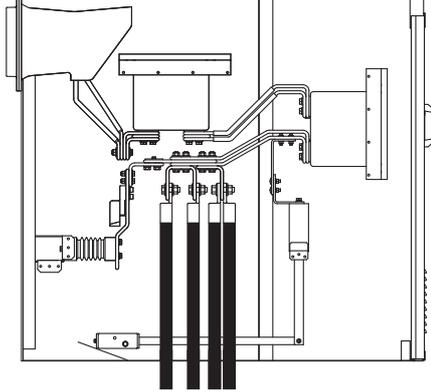


Figure 33
Cable clamp - three core

Cable Termination Orientation

Current Rating ≤1250 A : No. of Cable Run/Phase		
	1CT/Phase	2CT/Phase
1 Run		
	<p>Figure 34 Cable termination - 800 A 1CT 1Run</p>	<p>Figure 35 Cable termination - 800 A 2CT 1Run</p>
2 Run		
	<p>Figure 36 Cable termination - 800/1250 A 1CT 2Run</p>	<p>Figure 37 Cable termination - 800/1250 A 2CT 2Run</p>

Current Rating ≤1250 A : No. of Cable Run/Phase		
	1CT/Phase	2CT/Phase
3 Run		
	<p>Figure 38 Cable termination - 800/1250 A 1CT 3Run</p>	<p>Figure 39 Cable termination - 800/1250 A 2CT 3Run</p>
4 Run		
	<p>Figure 40 Cable termination - 800/1250 A 1CT 4Run</p>	<p>Figure 41 Cable termination - 800/1250 A 2CT 4Run</p>
Current Rating 2000 A and 2500 A : No. of Cable Run/Phase		
	1CT/Phase	2CT/Phase
3 Run		
	<p>Figure 42 Cable termination - 2000/2500 A 1CT 3Run</p>	<p>Figure 43 Cable termination - 2000/2500 A 2CT 3Run</p>

Current Rating 2000 A and 2500 A : No. of Cable Run/Phase		
	1CT/Phase	2CT/Phase
4 Run		
	<p>Figure 44 Cable termination - 2000/2500 A 1CT 4Run</p>	<p>Figure 45 Cable termination - 2000/2500 A 2CT 4Run</p>

Cable Termination Height

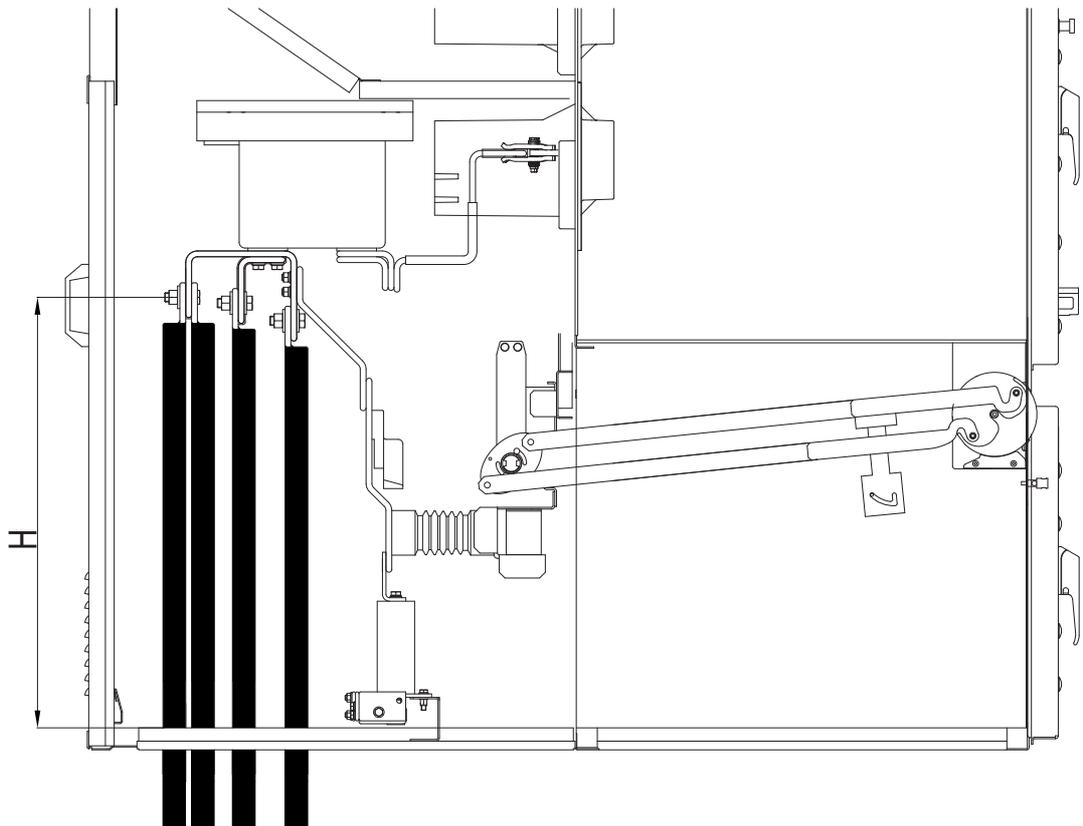


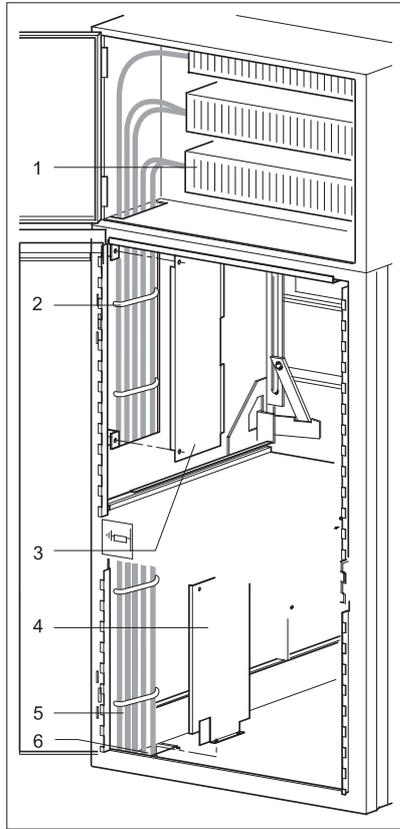
Figure 46
Cable termination height

H (mm)	≤1250 A		2000 A and 2500 A	
	1CT	2CT	1CT	2CT
	733.5	662	631.5	565.5

Placing External Cables in the Switchgear Panel

Overview

Customized low voltage cables for control and measuring purposes can be placed for each panel on the left inside of the panels to the low voltage cabinet (see the following Figure).



- 1 Connection to terminal strip in the low voltage cabinet
- 2 Cable clamp
- 3,4 Cable duct covers
- 5 Bus riser in cable duct
- 6 Cutout in the panel floor

Figure 47

LV cables

Follow the steps to place the external cables in the switchgear panel:

Step	Action
1	Remove the metal cable duct covers on the left side of the panel (see items 3 and 4 in the above Figure).
2	Route external cables (see item 5 in the above Figure) from the cable basement through the cutout in the panel floor (see item 6). Route them in the cable duct to the low voltage cabinet. Fasten cables to the panel using cable clamps (see item 2).
3	Connect external cables to the terminal strip in the low voltage cabinet according to the circuit diagram (see item 1 in the above Figure).
4	Reposition cable compartment covers.

NOTE: If the cables are to be routed into the low voltage cabinet from above, the cable fastening and protection equipment should be provided by the customer.

LV Cable Installation

To install the LV cables, follow the below steps:

1. Remove the roof sheet on each cubicle. Remove the cubicle cable troughs.
2. Place the power supply lead cable inside the trough. Connect the wiring from the power supply lead cable for each cubicle through the cable glands. Place back the trough.
3. Connect the wiring to the terminal blocks. Reassemble the roof sheets.

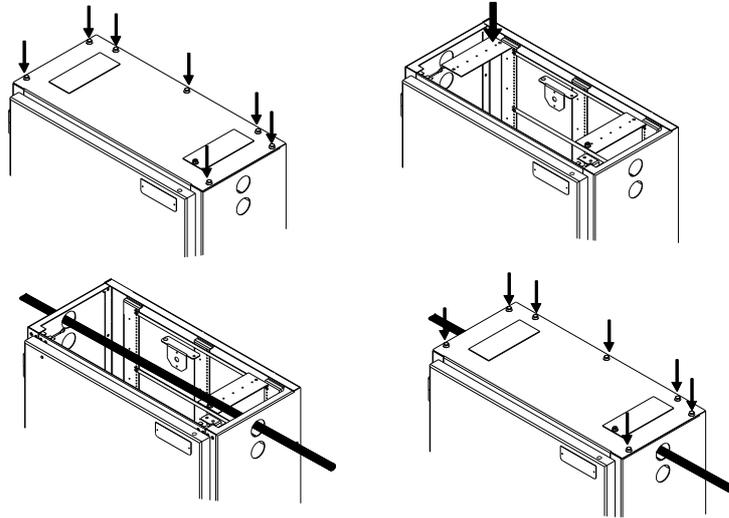


Figure 48

LV cables

Incoming Cables through the Top for Each Cubicle

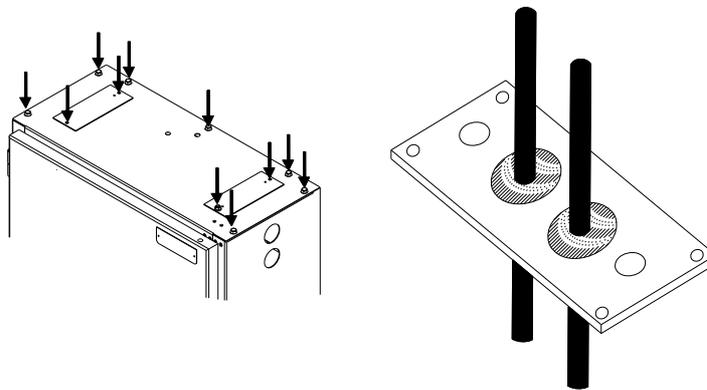


Figure 49

LV cables

Adding the cable through the top for each cubicle:

- Remove the small cable sheet on the roof and the roof sheet.
- Cut the cable sheet according to the required cables size so as the cable can pass through it. Install the cable glands on the cable sheet and the cables.

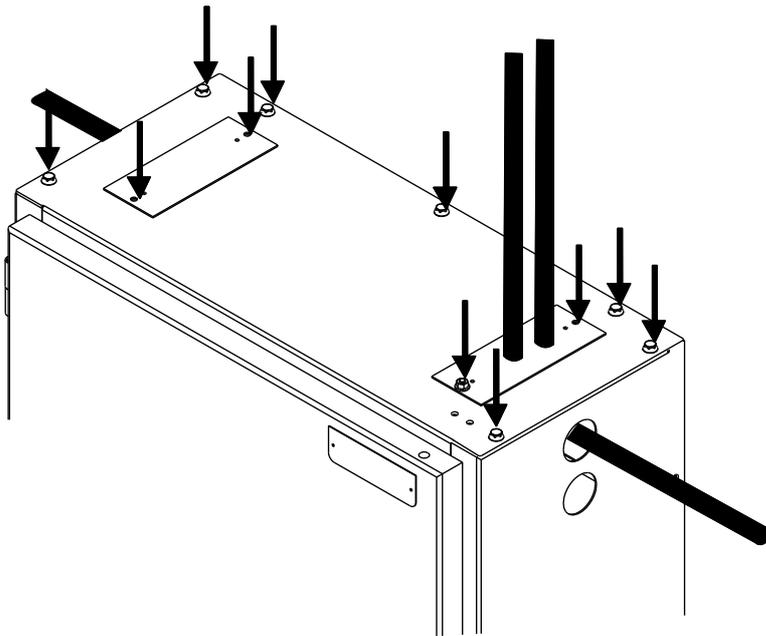


Figure 50

LV cables

Install the cable sheet on the roof. Connect the wires to the terminal blocks. Install the roof sheet.

Incoming Cables from the Floor for Each Cubicle

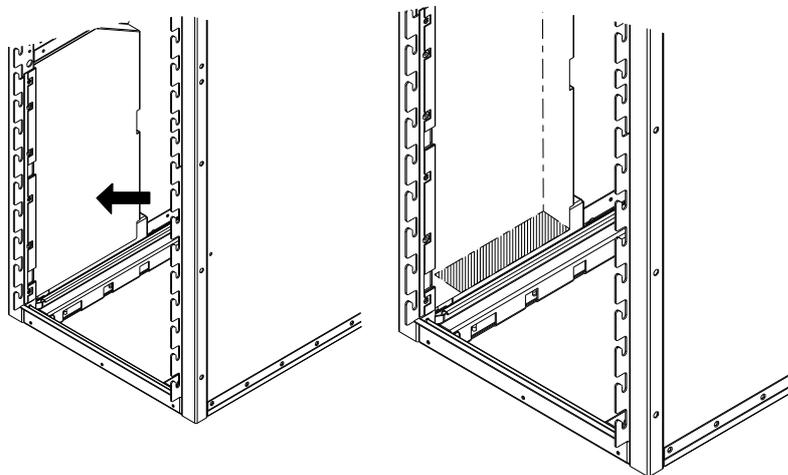
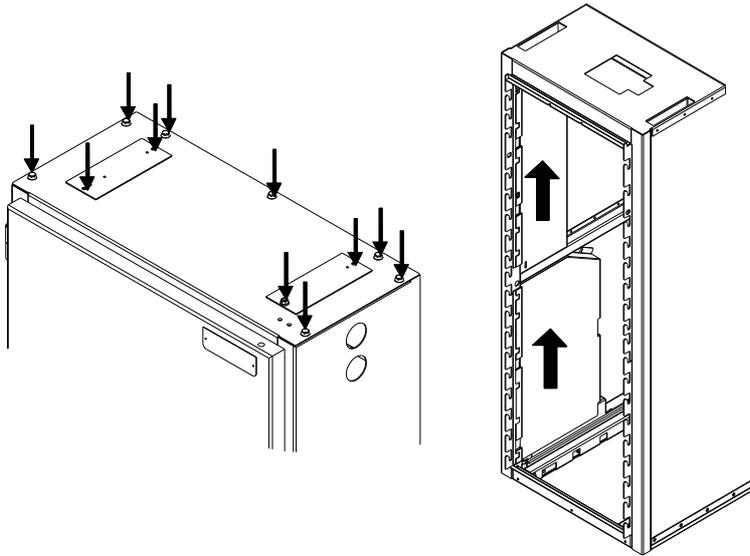


Figure 51

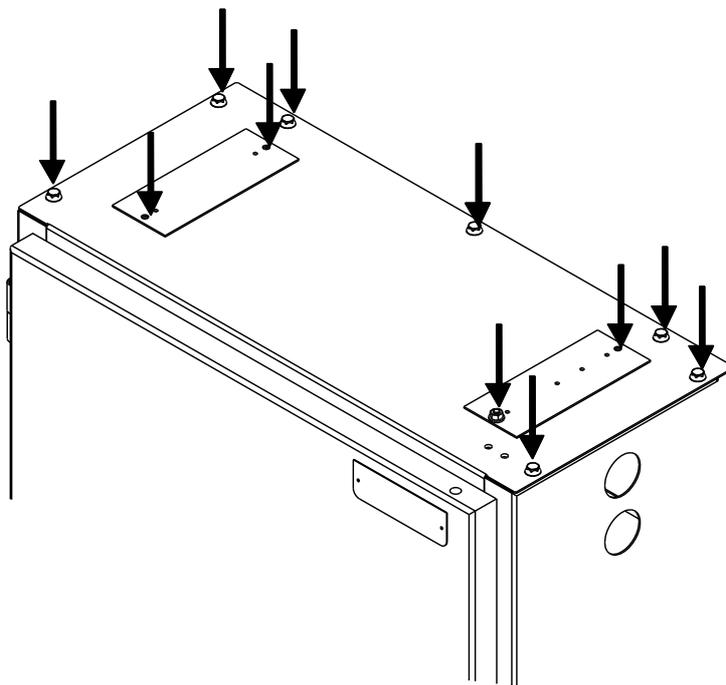
LV cables

Remove the cable trough. Cut according to the number and the diameter of the cables (maximum 5 diameters and 20 mm) at the base of the cable trough.

**Figure 52**

LV cables

Remove the roof sheet and eventually the top cable sheet. Pull the wiring and cable up to the cubicle top through the troughs. Install the cable trough. Connect the wires on the terminal blocks. Reassemble the roof sheet and the cable sheet.

**Figure 53**

LV cables

Chapter 7 Gas Absorber Assembly

IAC Internal Exhaust 1s (IP4X)

Gas handling options are necessary for personal protection to a defined level, in the event of an internal arc in accordance with IEC 62271-200: 2011.

IAC (Internal Arc Classification): AFLR

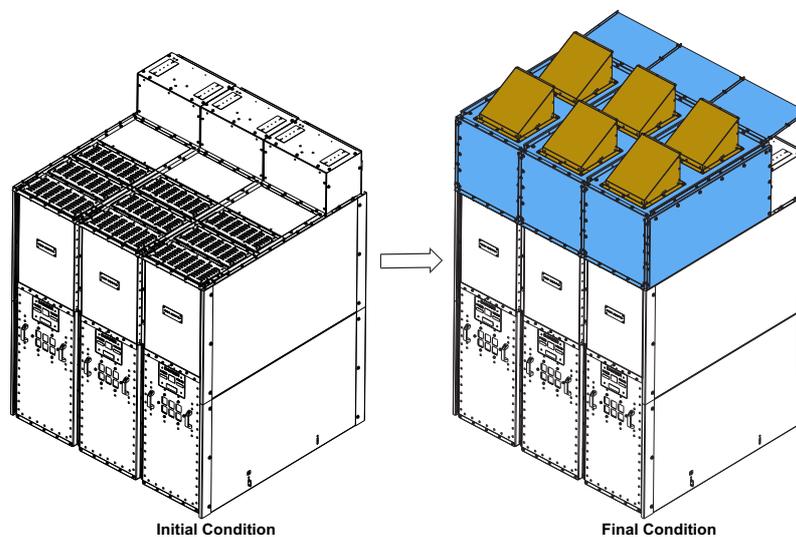
Accessibility Type:- A: Restricted to authorized personnel only.

F: Front side Accessibility.

L: Lateral side Accessibility.

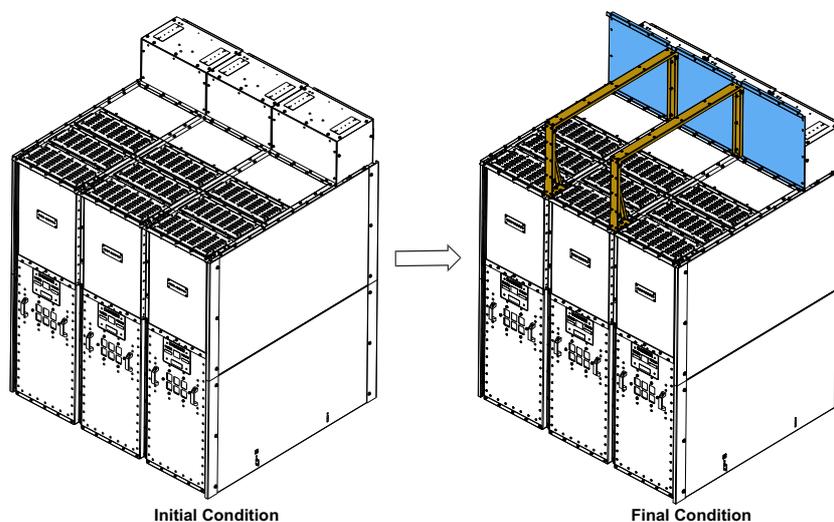
R: Rear side Accessibility.

NOTE: Necessary components and hardwares are supplied in loose material box.



The Gas Duct Assembly procedure is divided in the following steps:

Step 1: Assembly of front walls and connecting frame

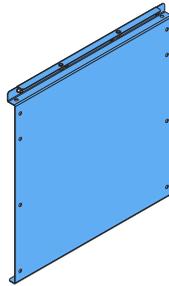


Hardwares and Parts

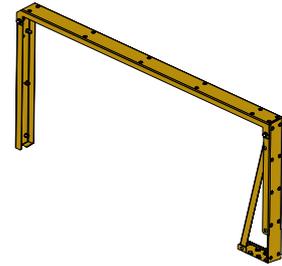
(A) Hex serrated screw M8x25 mm



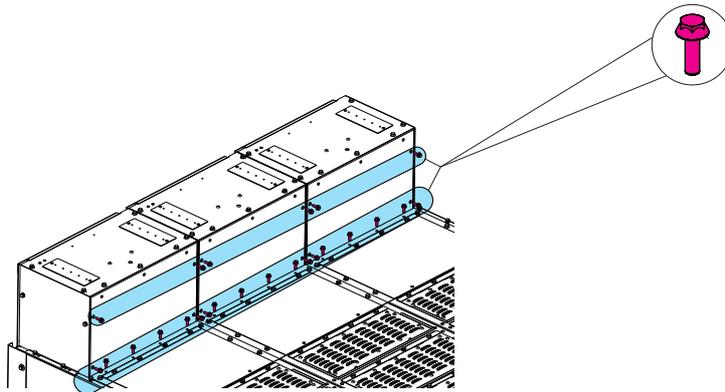
(B) Front wall



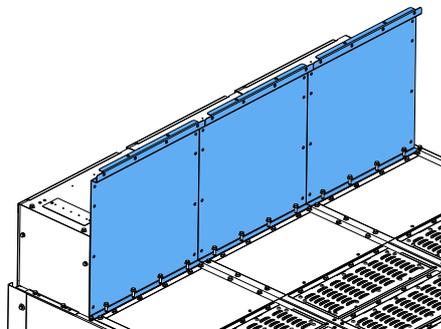
(C) Connecting frame assembly



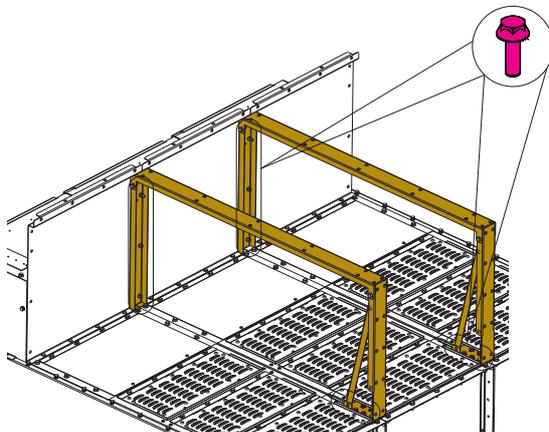
(1) Disassemble the hardware A from the back of LV compartment.

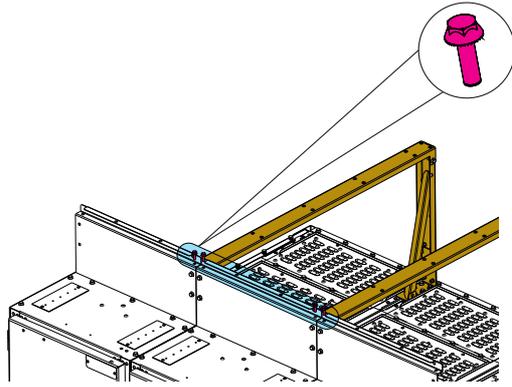


(2) Assemble the front wall B with the hardware A throughout the switchboard as shown.

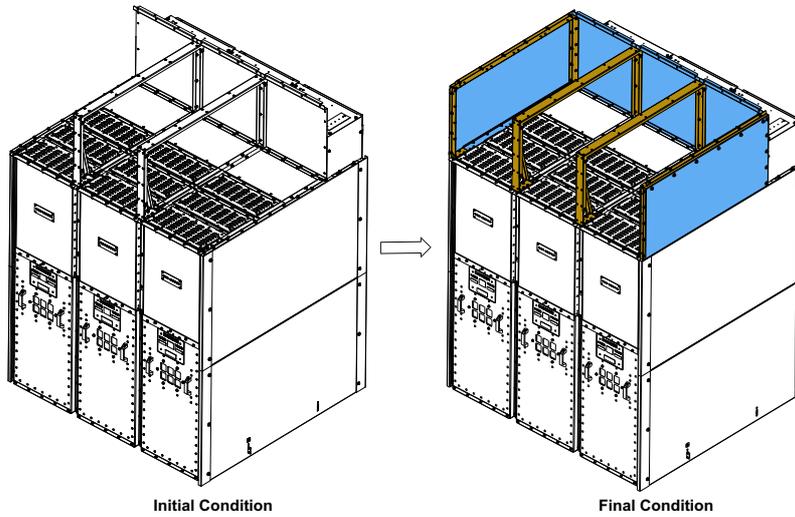


(3) Assemble the connecting frame C along with the front wall and LV Chamber.





Step 2: Assembly of side walls

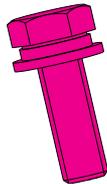


Hardwares and Parts

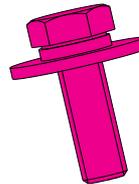
(A) Hex Serrated Screw
M8x25 mm



(B) Hex screw M8x25
mmmm, M8 spring lock
washer and plain washer
normal



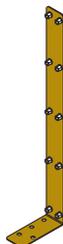
(C) Hex screw M8x25 mm,
M8 spring lock washer and
plain washer large



(D) End cover



(E) L plate



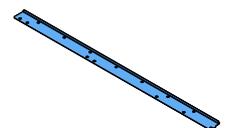
(F) End cover support



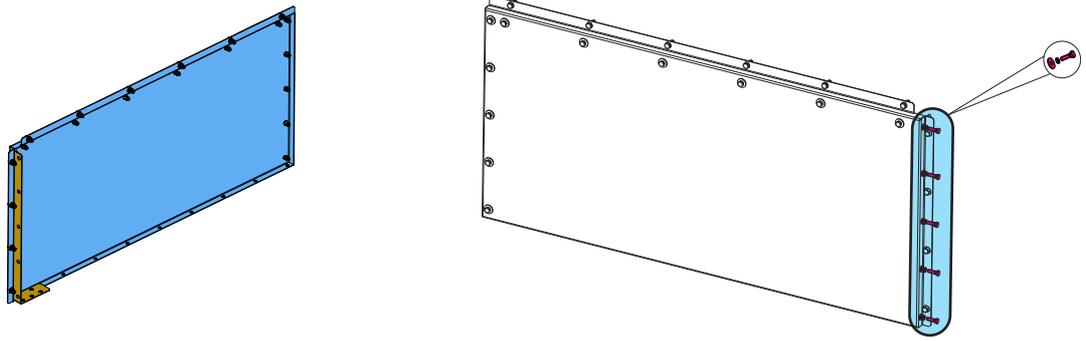
(G) End cover top support



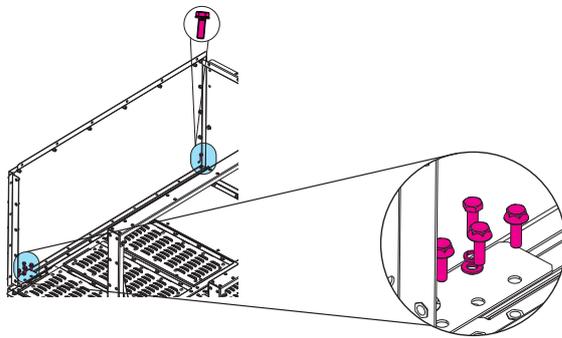
(H) End cover bottom
support



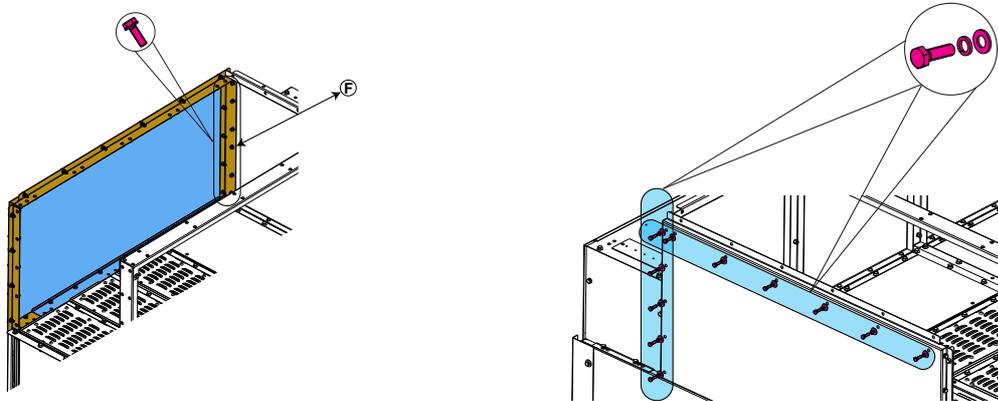
(1) Create the subassembly of two parts D and E as shown below with hardware set B.



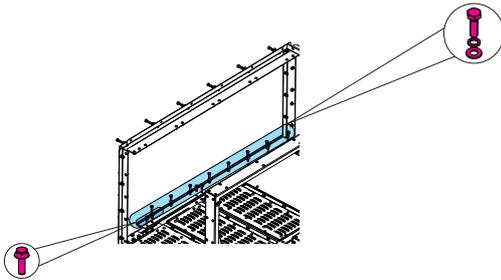
(2) Assemble the above mentioned subassembly with the panel and panel end wall using hardware set A and B.



(3) Assemble the part F with the side wall as shown below using the hardwares A and C.

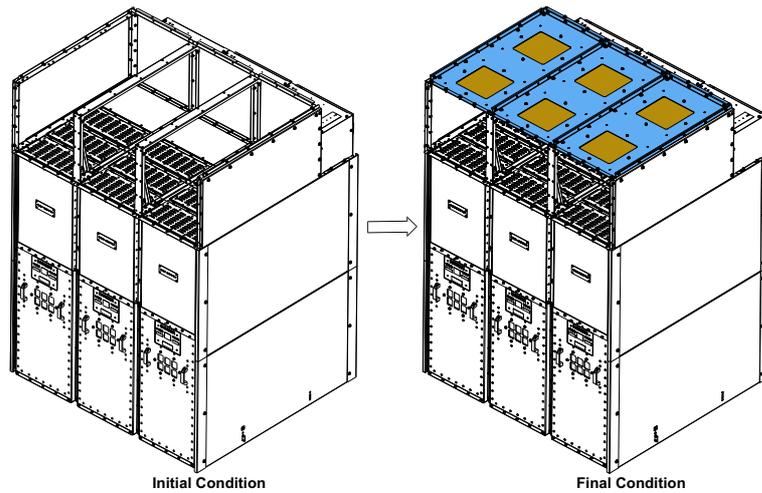


(4) Assemble the remaining parts G and H with the side wall as shown below using hardware A, B, and C.



Repeat the same process for the end cover of the other end.

Step 3: Assemble the top cover subassembly with the main panel



Hardwares and Parts

(A) Hex serrated screw
M8x25 mm and
serrated nut



(B) Hex screw M8x25 mm,
M8 spring lock and plain
washer



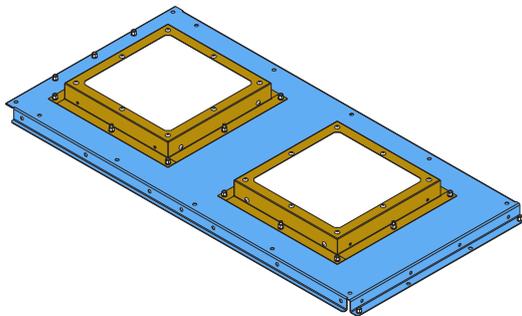
(C) Hex screw M8x25 mm,
M8 spring lock and plain
washer large



(D) Hex screw M8x25 mm,
spring lock, plain washer
large and nut

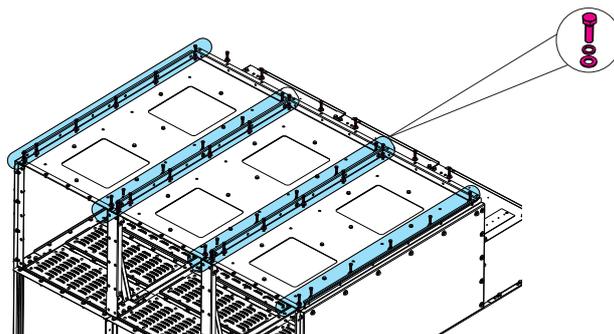


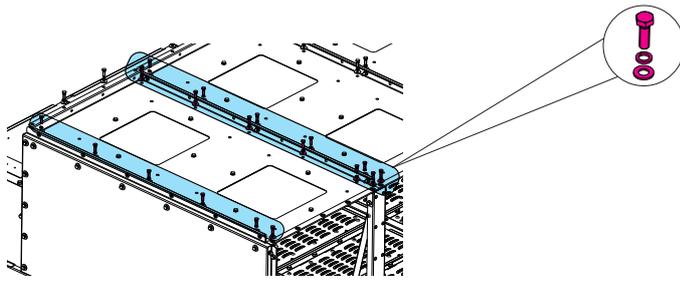
(E) Top cover subassembly



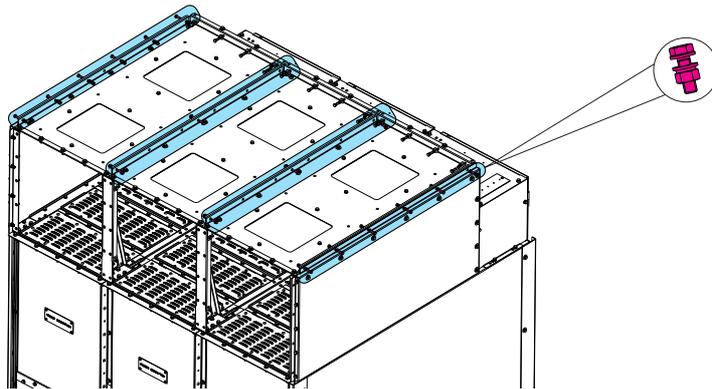
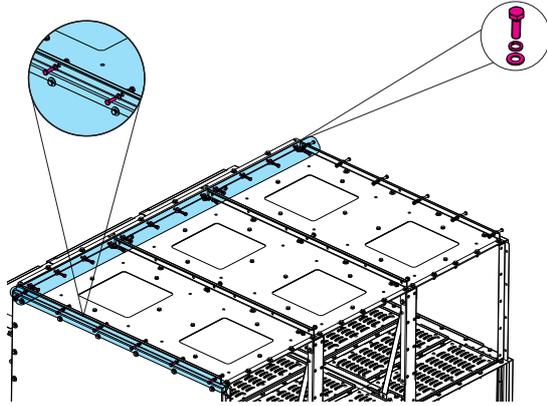
(1) Place the top cover subassembly E on the exhaust support top and assemble it using the top facing hardware C first.

Start the top cover assembly from the extreme panel side only and continue till the end of the switchboard.

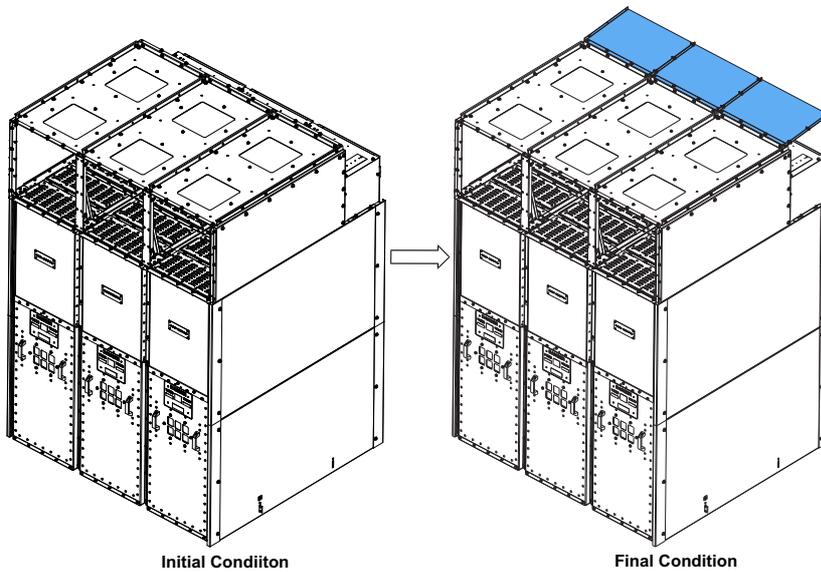




(2) Assemble the side and front using hardware set C and D next.

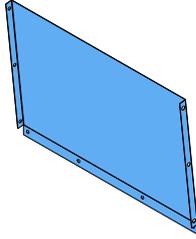


Step 4: Assemble the front deflector with the panel

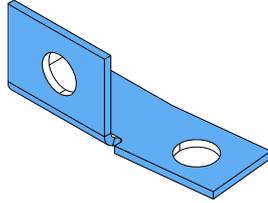


Hardwares and Parts

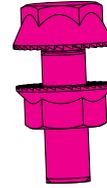
(A) External front deflector



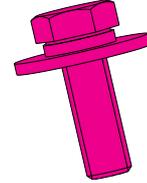
(B) Stiffener front deflector



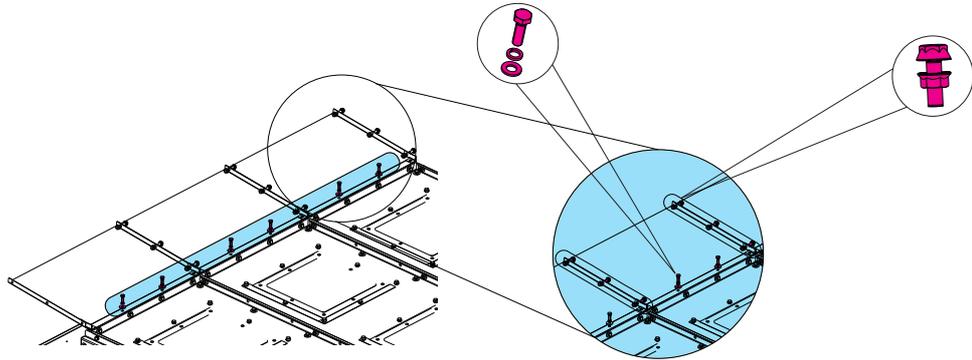
(C) Hex serrated screw M8x25 mm and nut



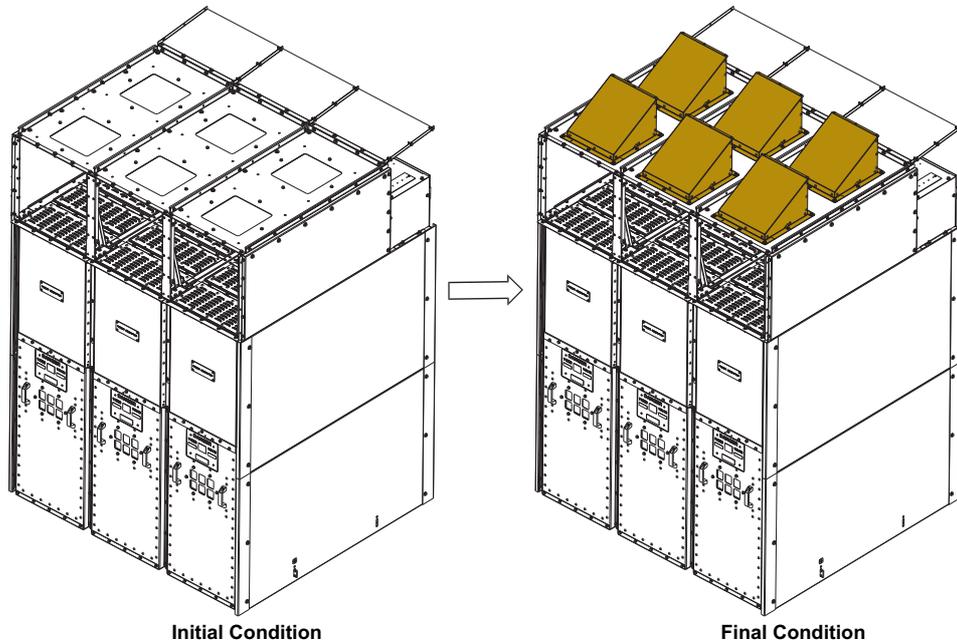
(D) Hex screw M8x25 mm, spring lock washer and plain washer large



(1) Assemble the front deflector A and stiffener B with the panel the hardware C and D shown below.



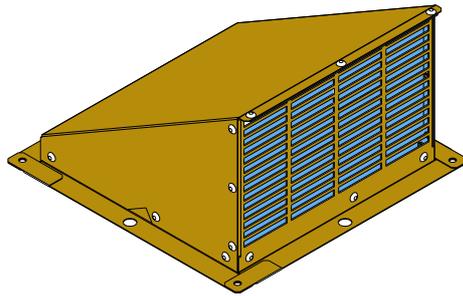
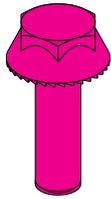
Step 5: Assemble the top Canopy on the top of the top cover



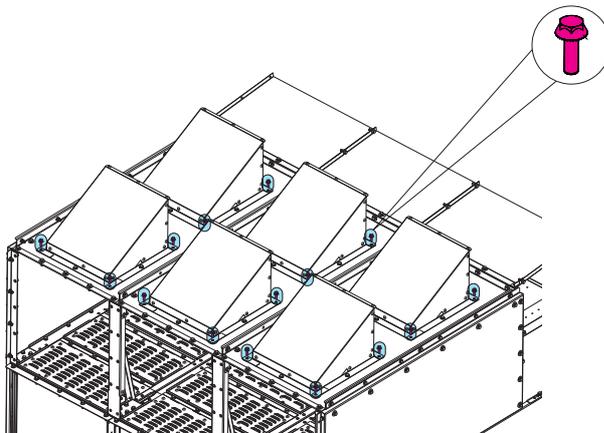
Hardwares and Parts

(A) Hex serrated screw M8x25 mm

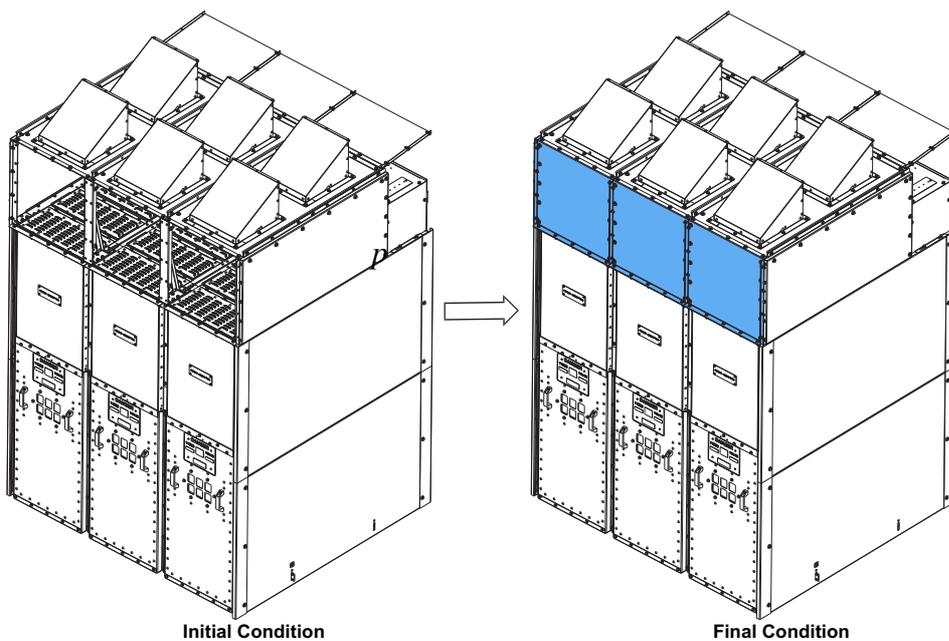
(B) Top Canopy assembly



Assemble the top Canopy assembly using hardware A as shown in the below image.

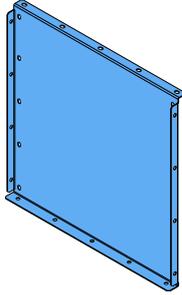


Step 6: Assemble the rear cover

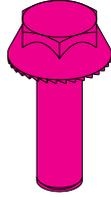


Hardwares and Parts

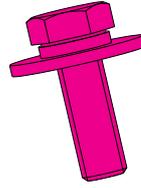
(A) Exhaust rear cover



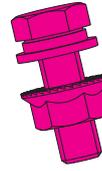
(B) Hex serrated screw M8x25 mm



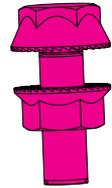
(C) Hex screw M8x25 mm, spring lock, and plain washer large



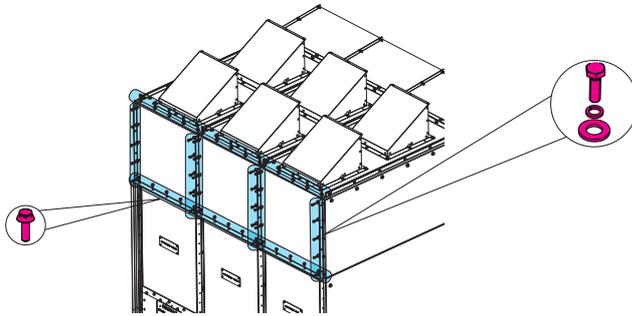
(D) Hex screw M8x25 mm, spring lock, plain washer, and serrated nut



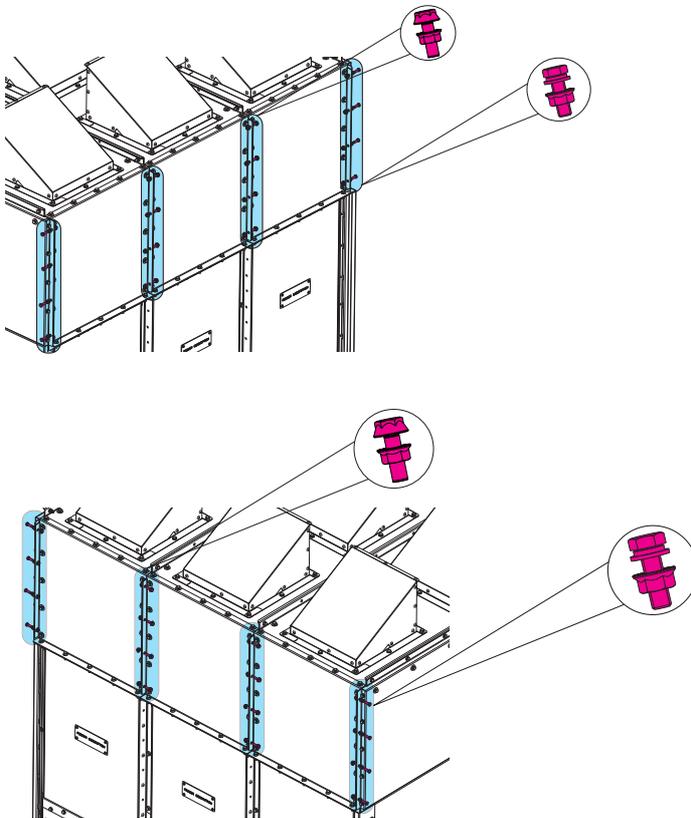
(E) Hex serrated screw M8x25 mm and serrated nut



(1) Assemble the exhaust rear cover A with panel from behind and top using hardware B and C.



(2) Assemble the exhaust rear cover with each other and also with panel using hardware set D and E.



Chapter 8 Commissioning

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Commissioning Procedure	66
Power Frequency Test of Busbar (Optional)	67

Commissioning Procedure

Overview

⚠ DANGER	
HAZARD OF ELECTRIC SHOCK	
Do not connect the high voltage supply. All the active parts should be grounded.	
Failure to follow these instructions will result in death or serious injury.	

NOTE: Whenever anomalies are detected, faults found, or switchgear not functioning properly, do not commission the switchgear and inform the manufacturer.

Cleaning and Checking the Panel Assembly

Follow the steps to clean and check the panel assembly:

Step	Action
1	Clean the switchgear to remove contamination resulting from assembly work.
2	Remove all attached information tags, cards, brochures, and instructions no longer needed.
3	Check the tightening torques of all screw fastenings and connections established on the site of installation: <ul style="list-style-type: none"> ● High voltage connection ● Ground conductor ● Panel screw fastenings ● Busbar links ● Deflector fastening ● Special attachments

Damaged Paint

The panels are powder coated. Minor damage to the paint can be repaired using commercially available paint (standard color RAL 9003 or corresponding color).

Remounting the Covers

Follow the steps to remount the covers:

Step	Action
1	Use secondary cable duct cover. For more information, refer to Connecting the Cables.
2	Fix cable compartment cover. For more information, refer to Removing Cable Compartment Cover.
3	Remove temporary base from the panel top if such a base is used.
4	Remount cladding between busbar compartment and circuit breaker compartment.

Inspection

Follow the steps to inspect the switchgear:

Step	Action
1	Check the switchgear for damage due to transport or assembly work.
2	Compare data on nameplate to the required ratings.
3	Check the connected cables for phase coincidence.

Racking-in the Trucks

Rack the following components into the panel:

- Circuit breaker Easycompact EXE
- Withdrawable voltage transformer MD

Close front doors.

Power Frequency Test of Busbar (Optional)

Overview

A test unit and test adapter (not included in scope of supplies) are required for the power frequency test.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK

Comply with the safety provisions. For more information, refer Safety Provisions (*see page 11*).

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

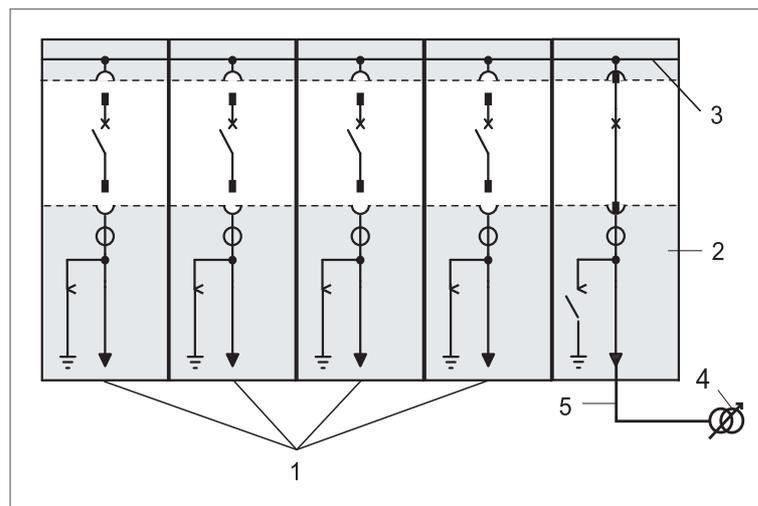
Preparation

Follow the steps to perform power frequency test of busbar:

Step	Action
1	All panels should be isolated from the power supply and grounded (see Standard Switching Operations).
2	Busbar: Disconnect voltage transformer, surge arrester, and ground voltage detection systems.
3	Incoming feeder panel for voltage test: Remove cable connection compartment cover and disconnect voltage transformer, surge arrester, and ground voltage detection systems. NOTE: Ensure that no high voltage cables are connected. Observe the assembly and operating instructions for the test unit and the test adapter.

Follow the steps to perform power frequency test of busbar on the feeder panel:

Step	Action
1	Connect test unit to the test cable.
2	Switch the earthing switch OFF.
3	Move circuit breaker truck Easyact EXE service position and switch circuit breaker ON.
4	Perform the power frequency test successfully for all three phases (L1, L2, L3) in accordance with the specifications of the test unit manufacturer. NOTE: Observe admissible test values for the switchgear and the admissible test values for power frequency tests after installation of switchgear in accordance with IEC 62271-200 : 2011.



- 1 Branch circuit panels
- 2 Incoming feeder panel for test voltage
- 3 Busbar
- 4 Test unit (for example, high voltage source, test transformers)
- 5 Test cable

After Power Frequency Test

Follow the steps after the power frequency test:

Step	Action
1	Switch circuit breaker OFF and put circuit breaker truck to disconnected position. Switch earthing switch ON.
2	Remove test unit and test cables.
3	Reconnect disconnected voltage transformers and surge arresters.

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As standards, specifications and designs change from time to time, please ask for confirmation of the information given in this publication.

06/2020