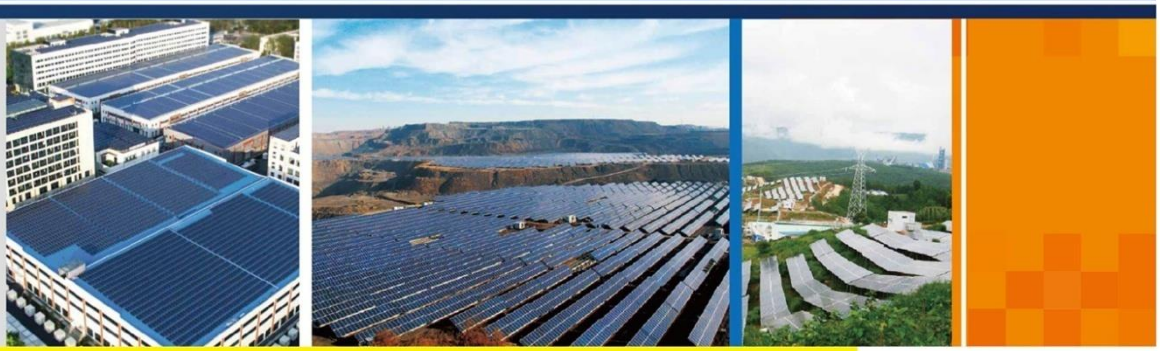


MVS6250/MVS6800

MV Station

Transportation and Installation Guide

MVS6250_6800-SEN-Ver11-202003

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1 About This Manual

1.1 Validity

This manual is intended for the following product

- MVS6250
- MVS6800

Hereinafter it will be referred to as " MV Station" unless otherwise specified.

1.2 Target Group

This manual is for technical personnel who are responsible for the transport, installation and other operations on the MV Station.

Only qualified personnel can perform the installation. Qualified personnel are:

- Equipped with certain electrical wiring and mechanical knowledge and familiar with electrical and mechanical principle diagram
- Familiar with the construction and working principle of the PV grid-connected power generation system; and familiar with the construction and working principle of the MV Station upstream and downstream equipment
- Trained especially in the installation of electrical devices
- Capable of coping with the dangerous and emergency situations during the installation and commissioning
- Familiar with the country/regional standards and specifications
- Familiar with this manual

1.3 Symbols Explanation

This manual contains important safety and operational instructions that must be accurately understood and respected during the installation and maintenance of the equipment.

To ensure the optimum use of this manual, note the following explanations of the symbols used.

DANGER

DANGER indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

WARNING

WARNING indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

CAUTION

CAUTION indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE indicates a situation which, if not avoided, could result in equipment or property damage.

NOTE indicates additional information, emphasized contents, or tips to help you solve problems or save time.

The symbols below may be pasted on the electrical parts of the MV Station or its internal device. Make sure to read the following symbols and fully understand them before installing the equipment.

Symbol	Explanation
	Lethal voltage inside! Do not touch!
	Hot surface! Do not touch the hot surface of the device.
	Protective earth. Earthing securely to ensure personal safety.

1.4 Terminology

Name	For short
MV Station	MV Station
COM100 Communication Box	COM100 / communication Box

The foregoing devices are expressed in the abbreviation form in this document unless otherwise specified.

2 Safety Instructions

Read the safety instructions carefully before installing the MV Station. Refer to corresponding manuals for the safety instructions on the internal devices.

2.1 General Safety Rules

DANGER

Touching the terminals or contactors connected to the grid may lead to electric shock!

- **Do not touch the terminals or conductors connected to the grid.**
- **Respect all safety instructions on the grid connection.**

DANGER

Lethal voltages are present inside the device!

- **Pay attention to and follow the warning signs on the device.**
- **Respect all safety instructions in this manual and other pertinent documents.**

DANGER

Electric shock or fire may occur due to device damage or system fault.

- **Visually inspect the MV Station for device damages or other hazards.**
- **Check if the external devices and circuit connections are safe.**
- **Only operate the device when it is safe to do so.**

WARNING

All installations and operations on the MV Station must be in full accordance with the national and local regulations and standards.

⚠ WARNING

The locking device on the pressure relief valve must be removed before operation. Refer to "Fig. 7-1 Remove the locking device of the pressure relief valve".

2.2 Ground Fault Protection

⚠ DANGER

If a ground fault occurs in the PV system, some parts that are supposedly voltage-free may carry lethal voltage. Accidental touch may cause serious damage. Make sure there is no system ground fault before performing operation and take proper protective measures.

2.3 Live Line Measurement

⚠ DANGER

High voltages are present inside the device. Death can result from burning and electric shock due to touching the live components of the MV Station. During live line measurement,

- **use suitable protective equipment, for example, dielectric gloves, and**
- **accompanied by other persons.**

2.4 Measuring Instrument

The instrument for measuring the electrical parameters should meet the following requirements:

⚠ WARNING

- **The instrument for measuring the electrical parameters should be a high-quality instrument with sufficient measuring range.**
- **Make sure the connection and use of the instrument are correct to avoid arc and other dangerous situations.**
- **Use suitable protective equipment, for example, dielectric gloves during live line measurement.**

2.5 Voltage-free Operations

Perform operations on the MV Station only when all devices inside the MV Station are completely voltage-free.

- Avoid any inadvertent re-connections.
- Verify that no voltage or current is present with appropriate testing devices.
- Ground and short-circuit whenever necessary.
- Cover possible live parts to avoid inadvertent touch.
- Ensure sufficient escape room.
- After the MV Station stops, wait at least 5 minutes before operating it.
- Ensure that the MV Station is completely voltage-free.

2.6 ESD Protection

⚠ CAUTION

Devices may be damaged irreversibly by electrostatic discharge (ESD).

- **Avoid unnecessary touching of the PCB.**
- **Observe all the ESD-related safety instructions. Wear proper personal protective equipment (PPE) such as wrist strap.**

2.7 Symbols on the Device Body

Symbols on the device contain important information on safe operations of the MV Station and its internal devices. Do not tear or damage them!

NOTICE

Do not damage or tear the symbols.

- **All symbols on the device body must be clearly legible.**
- **Replace the symbols once any damage or illegibility is detected.**

2.8 Safety Warning Signs

During transport, installation, maintenance, and troubleshooting of the MV Station, keep unauthorized persons away.

- Post warning signs near the MV Station upstream and downstream switches to prevent inadvertent connection.
- Place necessary warning signs or barriers near the on-site operation areas.

2.9 Daily Operation and Maintenance

Make sure the doors of the MV Station are closed and locked during daily operation to prevent internal devices from damages caused by rain or rodents.

Regularly check and maintain the MV Station and internal devices to ensure long-term and reliable operation of the MV Station.

WARNING

Make proper insulation protection during live line operation. At least two persons are required until the operation is done.

Proper filed rescue facilities are necessary since locations of most power stations are far away from the urban areas.

Take the followings into consideration during daily operation and maintenance:

- The nameplate is pasted on the MV Station body. It contains important parameter information of the devices. Protect the nameplate during all operations.
- Wear proper PPE, such as safety glasses, safety footwear, and safety gloves, if necessary.
- All necessary auxiliary measures are advisable to ensure personal and device safety.

2.10 Others

2.10.1 Manual Storage

Product manuals are an indispensable part of the product. Important information about the transport, installation of the MV Station is included in this manual. All the descriptions in this manual, especially those safety-related items, must be complied with. Please read all the instructions thoroughly prior to performing any operation work on the MV Station.

- Transport and install the MV Station strictly following the descriptions in this manual. Device damage, personal injury, or property loss may follow if otherwise.
- This manual and relevant documents should be available for relevant persons at all times.

2.10.2 Disposal of Waste

When the MV Station has come to the end of its service life, it cannot be disposed of together with household wastes. Some inside components can be recycled while some components can cause environmental pollution.

Please contact the local authorized collection point.

2.10.3 Manual Description



For user convenience, there are a large number of pictures in this manual. These pictures are indicative only. For details about the device, please refer to the actual product you receive.



Keep this manual at a convenient place near the device for future reference.



All the descriptions in this manual are for the standard MV Station. Please inform us in the purchase order if you have specific requirements. The actual product you receive may differ.

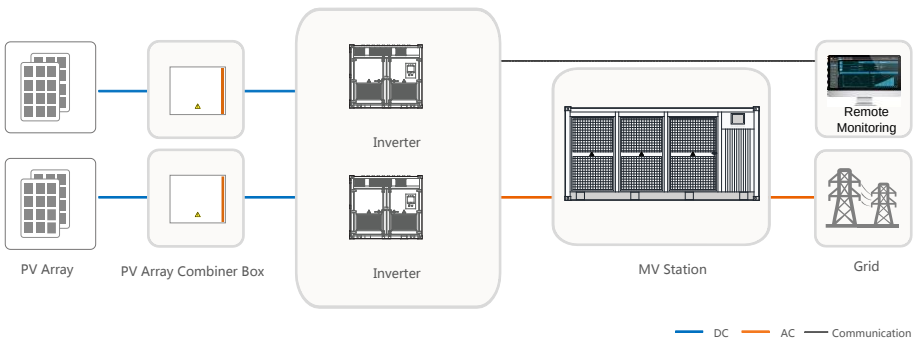
This manual may not cover all possible situations. Should a specific problem not explained in this manual occur, please contact Sungrow.

3 Product Description

3.1 System Overview

The MV Station is mainly applied to large-and-medium PV power station. The MV Station can meet the modular design and quick installation requirements of the large-and-medium PV power station and can ensure the long-term, reliable, and safe power generation compliant with the grid.

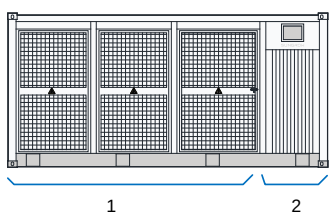
The PV power generation system with the MV Station is shown in the following figure.



3.2 External Design

3.2.1 Composition

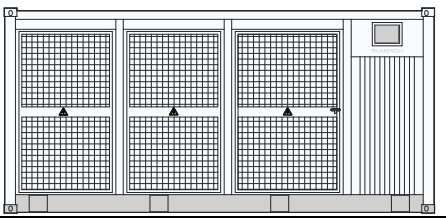
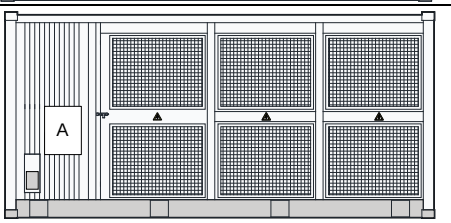
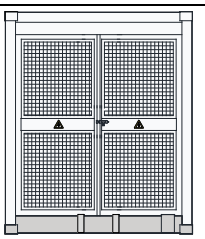
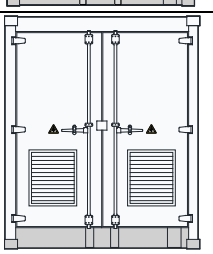
The MV Station consists of a transformer room and a switchgear room, as shown in the figure below.



No.	Name	Description
1	Transformer room	Including one MV transformer and an LV room inside. The MV transformer converts the inverter output low-voltage AC current into grid-compatible medium-voltage level.

No.	Name	Description
2	Switchgear room	Including an MV switchgear, a control panel, and a communication box. The MV switchgear is connection point of the MV Station and grid and also the main protection device for the connection and disconnection from the grid.

3.2.2 MV Station Views

View	Description
	Front view. Front of the MV Station.
	Back view. Back of the MV Station.
	Left view Left of the MV Station.
	Right view Right side of the MV Station.

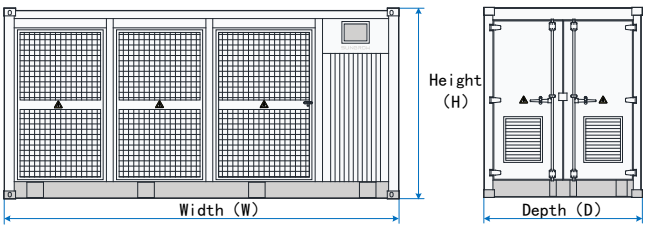
*Figures are indicative only, and actual product may differ.

Installation Area of Fire Extinguisher(optional)

Figure A above shows the installation area of the fire extinguisher. On site, fire extinguishers need to be installed according to the requirements of the installation location.

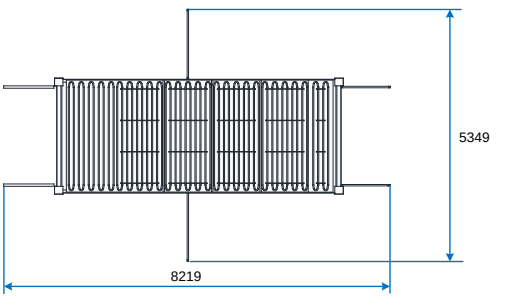
3.2.3 Exterior Dimensions

Dimensions



Width(W)	Height(H)	Depth(D)
6,058 mm	2,896 mm	2,438 mm

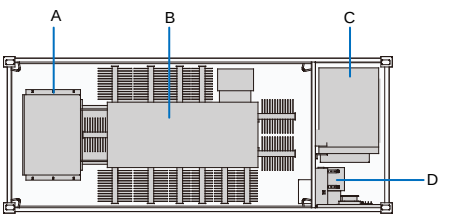
Clearance Requirements



3.3 Internal Design

3.3.1 Internal Composition

Device layout inside the MV station is as follows:



No.	Name
A	LV connection area
B	MV Transformer
C	MV switchgear

No.	Name
D	Communication box and control panel (upper part and lower part respectively)

3.3.2 Bottom Cable Entry

Cable entries are designed on the bottom of MV Station. All cables connecting MV Station and external devices run in and out through the bottom cable entries.

Bottom View

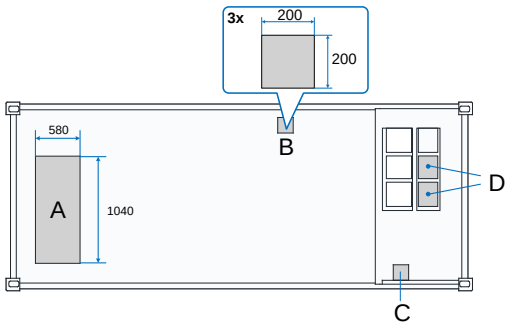
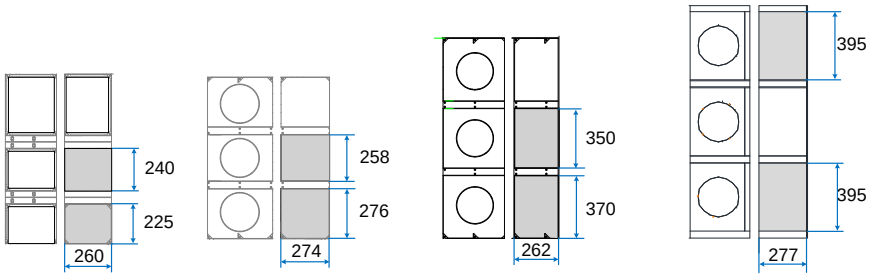


Table 3-1 Cable entry of MV Station

No.	Name	Description
A	LV side cable entry	All LV side cables connecting the MV transformer go inside through this entry.
B	Maintenance entry	This entry is designed for future cleaning and oil tray maintenance.
C	Communication and power distribution cables entry	All communication and power distribution cables connecting external device go inside through this entry.
D	MV side cable entries	All MV side cables connecting downstream MV grid go inside through these entries.

MV Side Cable Entries



(1) (2) (3) (4)

Table 3-2 Cable entry of the MV switchgear

Manufacturer of the MV switchgear	Grid voltage	Dimensions
Siemens	24kV	Refer to the foregoing figure (1)
ABB	24kV	Refer to the foregoing figure (2)
ABB	36kV	Refer to the foregoing figure (3)
OMAZABAL	24kV/ 36kV	Refer to the foregoing figure (4)

3.3.3 Internal Devices

The MV Station consists of the MV transformer, MV switchgear, communication box, and control panel.

MV Transformer

Figure	Name	Description
	Oil temperature Indicator	The alarm temperature is set to 90°C. When the oil temperature reaches the value, alarm signals will be sent to the communication unit. The tripping temperature is set to 100°C. When the oil temperature reaches the value, tripping signals will be sent to the communication unit. At the same time, the transformer will be disconnected from the upstream and downstream devices.

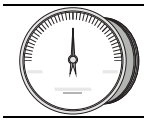
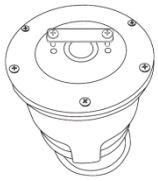
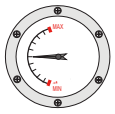
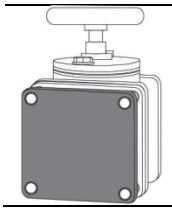
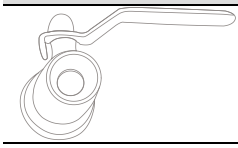
Figure	Name	Description
	Winding temp indicator*	To obtain the temperature of the winding. The alarm temperature is set to be 100°C[a)] The tripping temperature is set to be 110°C[b)]
	Pressure gauge	The pressure gauge is used to obtain the pressure inside the oil tank.
	Pressure relief valve	The valve automatically releases when the oil pressure inside the oil tank reaches 55kPa. The locking device on the pressure relief valve must be removed before operation. refer to "Fig. 7-1 Remove the locking device of the pressure relief valve".
	Oil level indicator	The MV transformer will stop operating if the oil level falls below the lowest scale on the oil level indicator or below the oil level scale required for safe operation of the transformer. When the oil level is excessively high, open the drain valve to lower the oil level. When the oil level is excessively low, disconnect the transformer and check the oil tank for leakage. If so, open the oil filling valve to fill the oil tank.
	Tap changer	The tap changer has five tap positions. For the voltage and current corresponding to each tap position, refer to the nameplate on the transformer.
	Drain valve with sampling	Open the valve for oil drainage when the oil level is excessively high or when operations such as maintenance are required.

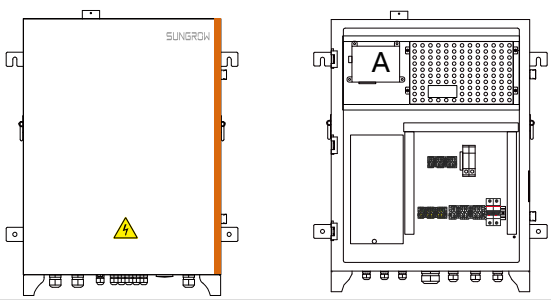
Figure	Name	Description
	Oil filling valve	when oil level of the MV transformer oil tank is low, open the valve for oil filling.
	Gas relay*	When a fault occurs in the transformer, the oil in the oil tank will be decomposed to generate gas, and the gas will rise and enter the gas relay. •In case the gas generated is light, the alarm signal contact will be connected, and alarm signal will be sent out. •In case the gas generated is heavy, the tripping signal contact will be connected, and the circuit breaker in the switchgear trips, so that the transformer will be disconnected from the grid to avoid device damage.

Note: * is optional.

Note: Parameters marked with a) and b) are factory default values and can be adjusted according to actual condition.

Communication Box

The exterior appearance and internal components of the combiner box are shown in figure below.



No.	Description
A	Ethernet switch

4 Identify and Store the MV Station

4.1 Identifying the MV Station

Identify the MV Station from its nameplate. The nameplate contains the following information: MV Station model, major technical parameters, marks of certification institutes, origins, and serial number.

⚠ WARNING

Very important technical parameters and MV Station-related parameters are displayed on the nameplate.

Protect the nameplate at all times!

4.2 Checking for Transport Damages

The MV Station has been strictly inspected and tested before delivery. Despite robust packaging, the container or inside devices may be damaged during transport. Therefore, once you receive the MV Station, a detailed inspection is necessary.

If any damage is detected, contact the forwarding company or Sungrow immediately.

- Examine the contents of the shipment to check the scope of delivery described in the packing list for completeness.
- Check to make sure the MV Station and inner devices are of the same models as those in your order.
- Check thoroughly the MV Station and inner devices for any possible damages during transport.

⚠ WARNING

Install and commission the MV Station only when it is technically faultless! Make sure before installing the MV Station that

- **the MV Station is intact without any damage; and**
- **all devices inside the MV Station are intact without any damages.**

4.3 Storage of the MV Station

If the MV Station is not to be installed immediately after delivery, store it appropriately:

- Store the MV Station indoors, for example, large warehouse or workshop, to prevent possible condensation or damp.
- If the MV Station has to be stored outdoors, elevate the MV Station base according to the geological and ambient conditions.
- When the ambient temperature is too low, heat the MV Station internal devices.

  Temperature: -35°C~+70°C; Relative humidity: 0 to 95%, and non-condensation
- Store the MV Station on a dry, clean, and solid ground with sufficient load-bearing capacity. The ground should be flat without water, bumps, or plantings.
- Lock the MV Station internal devices and the MV Station during storage.
- Take proper protective method to prevent the water and dust penetrating into the MV Station. Protect the MV Station air inlets and outlets at least.
- Consider the support feet of the MV Station when selecting the temporary storage platform.

Regularly, once every half a month at least, check the MV Station and internal devices.

5 Mechanical Installation

WARNING

Respect all local standards and requirements during mechanical installation.

5.1 Transport

All devices are installed inside the MV Station before delivery. The MV Station should be transported as a whole. Transport the MV Station by a crane with sufficient load capacity.

The MV Station is delivered to the user by the forwarding company. After unloading, the MV Station will be transported to the installation site by the plant staff.

WARNING

Local standards and regulations on the transport and loading & unloading of the container, especially those safety instructions, should be observed at all times.

- **All the accessory appliances used during transport should be maintained beforehand.**
- **The MV Station must be transported by qualified personnel. Qualified personnel are those who have relevant training experience, especially safety-related experience.**

NOTICE

Keep in mind the dimensions and total weight of the MV Station at all times!

Ensure that the following requirements are met:

- All the doors are locked.
- Choose the appropriate crane or hoist to transport the MV Station. The crane or hoist must be sufficiently capable of bearing the MV Station weight.
- An additional traction vehicle may be required when the road has a gradient.
- Anything, which may hinder the transport, like trees, cables (or the like), should be removed.
- If possible, transport the MV Station on fine weather days.
- Warning signs or barriers must be posted near the transport areas to avoid accidental injuries.

Additionally, the following requirements should be met when the MV Station is placed on the ground:

- Place the MV Station carefully and gently. Do not pull or push the MV Station on any surface.
- The place should be firm and flat with good drainage and no obstacles or outshoots. The MV Station should be supported by the four feet.

5.2 Hoisting the MV Station

5.2.1 Safety Precautions

⚠ WARNING

- **Observe the safety operating rules of the crane at all times.**
- **Standing within 5 to 10 meters away from the hoisting areas is strictly prohibited! Anybody standing under the boom or MV Station is strictly prohibited in the whole hoisting process.**
- **The hoisting work must be stopped on violent weather days. For example, in strong wind, heavy rain, or thick fog conditions.**

Please observe the following items:

- All safety requirements must be met.
- A professional instructor is required in the whole hoisting process.
- All the used slings must have the load-bearing capacity of at least 30t.
- The crane should have sufficient arm length and radius of gyration.
- All the connection point must be firmly connected.
- The length of the slings can be adjusted appropriately according to on-site conditions.
- Transport the MV Station in a level, smooth, and steady way.
- Transport the MV Station by connecting the four top corner fittings.
- Some accessories may be required to ensure the safety during hoisting.

The following figure illustrates the hoisting operations. Circle A describes the work areas of the crane. Anybody standing inside the circle B is prohibited for safety considerations.

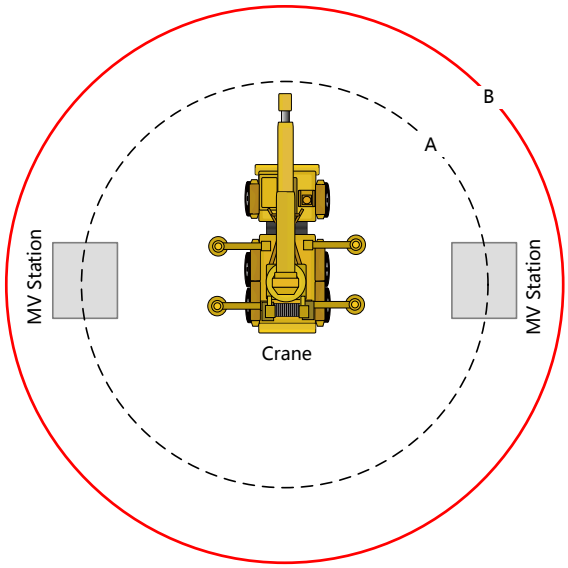


Fig. 5-1 Hoisting the MV Station

5.2.2 Hoisting

During the whole hoisting process, please observe the following rules:

- Hoist the MV Station in a vertical manner. Do not drag or drop the MV Station on any surface.
- When the MV Station has been hoisted for about 300mm away from the ground, stop to check if all the connections are still firm. After confirmation, continue hoisting the MV Station.
- When transported to the final location, the MV Station should be put down slowly and steadily.
- The final location should be firm, level, and well-drained. The MV Station is supported by four bottom fittings on the ground.

The MV Station should be hoisted by four top corner fittings as shown in the following figure.

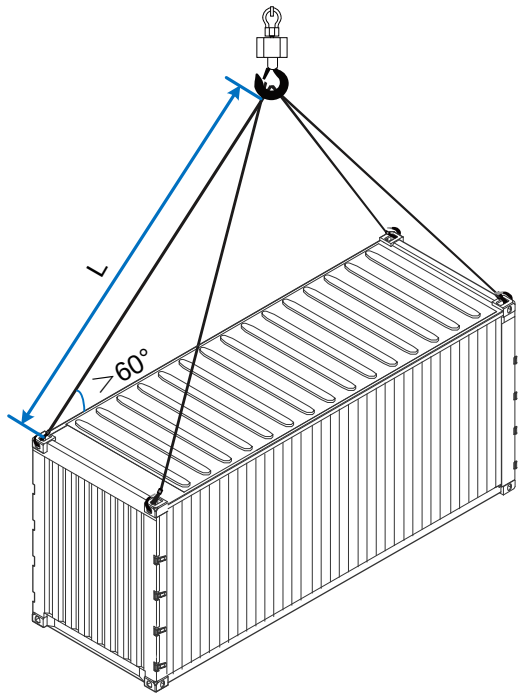


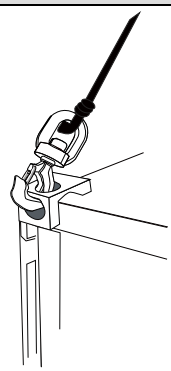
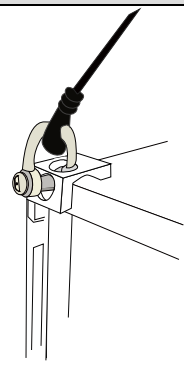
Fig. 5-2 Hoisting from top fittings

Item	Requirement
Steel Length(L)	> 6.5 m
Steel Rope Qty.	4 pieces

5.2.3 Fastening of Connectors

Use slings with hooks or U-hooks to hoist the MV Station.

The lifting devices should be correctly connected to the MV Station.

Lifting device	Hook	U-hook
Connections		
Notice	Insert the hook from inside to outside.	Lateral pin of the U-hook should be tightened.

WARNING

- **National and local safety rules should be observed at all times.**
- **Violating relevant safety rules may void pertinent warranty claims from Sungrow.**

5.3 Foundation

5.3.1 Selection of Installation Site

When selecting the installation site, consider the following requirements at least:

- Ambient and geological conditions, such as stress wave emissions, the level of underground water table and etc. should be taken into account.
- The ambient environment should be dry, well ventilated, and far away from inflammable materials.
- The ground at the installation site must be compacted enough. Relative compaction of the ground should be equal to or greater than 98%. Otherwise, take proper methods to strengthen the ground.

5.3.2 Foundation Requirements

WARNING

Pay attention to the high weight of the MV Station. Check thoroughly the conditions on the installation site (mainly the geographical and environmental conditions) before designing and constructing the foundation.

Improper foundation construction may affect the placement of the MV Station, open & close of the door, and future maintenance. Therefore, the foundation must be designed and constructed according to the related standard. The dimensions and weight of the MV Station, the cable route, and the future maintenance should be considered at all times.

The following conditions must be met:

- The bottom of the foundation should be firm enough.
- The foundation should be at higher than the ground level on site to prevent the rain from damaging the base or penetrating into the MV Station.
- Sufficient cross-sectional area and depth of the foundation should be maintained. The depth is designed according to local soil conditions.
- Cable route should be taken into account.

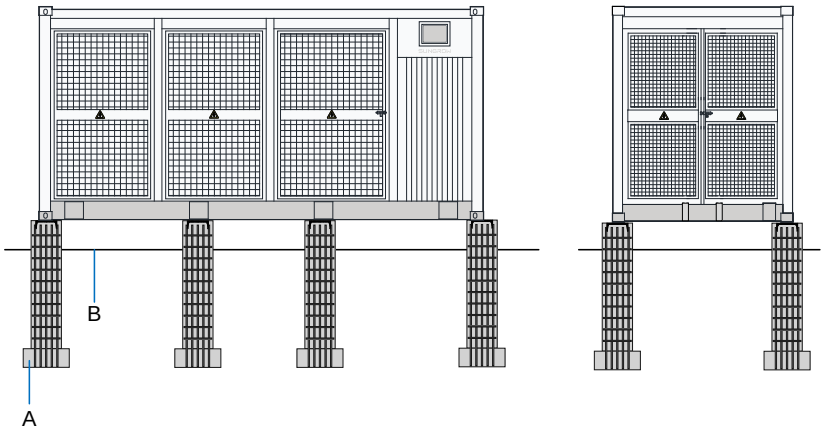
- According to the cable design of MV Station and for easy electrical connection, please establish cable trenches on the bottom of the MV Station, i.e. reserve the cable trenches inside the foundation and pre-bury the wire pipes.
- The dirt dug out should be cleared immediately.

5.3.3 Recommended Foundation Construction Plan

The following conditions must be fulfilled:

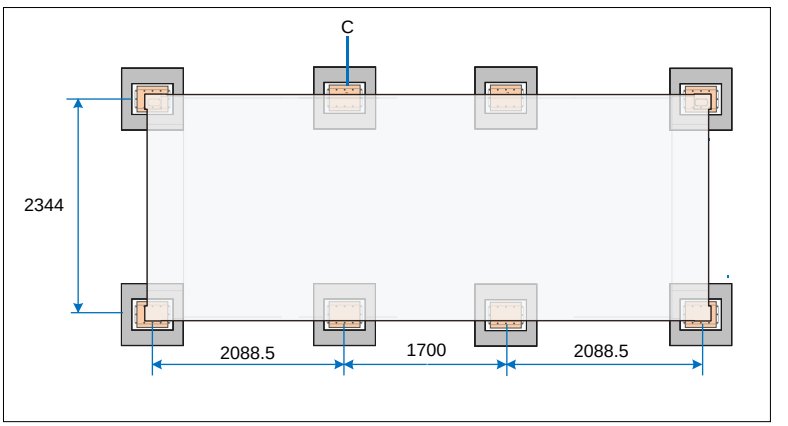
- The bottom of the foundation should be firm enough.
- The foundations must be suitable for the weight of the MV Station.
- The foundation should be at least 100mm higher than the solid ground on site to prevent the rain from damaging the base or penetrating into the MV Station.
- Sufficient cross-sectional area and depth of the foundation should be maintained. The depth is designed according to local soil conditions.
- Cable route should be taken into account.

Overall construction effect is shown below.



No	Name
A	Foundation
B	Solid ground, e.g. gravel

Foundation



No.	Name
C	Pre-embedded 20# channel steel

NOTICE

The foundation plan described in this chapter is for reference only.

Consult the professional personnel before construction.

5.3.4 Other Precautions

NOTICE

A drainage system should be designed on the installation site to prevent the MV Station from being immersed in water during heavy rainfalls.

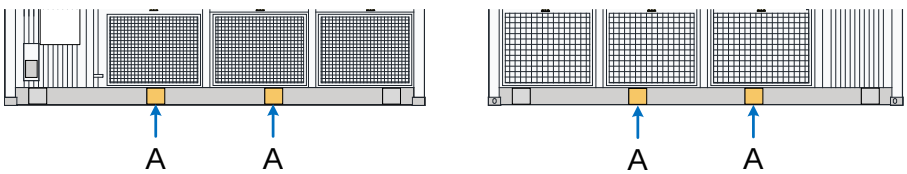
NOTICE

Do not plant any trees near the MV Station installation site to prevent the damage of the MV Station caused by tree leaves or stems.

5.4 Securing the MV Station(optional)

Overview

As shown by A in the figure below, the position for installing L-shape angle steel is reserved at the bottom of the container.



The number of L-shape angle steel shown in the figure above is for reference only, and it can be adjusted according to onsite conditions.

Preparing Installation Tools

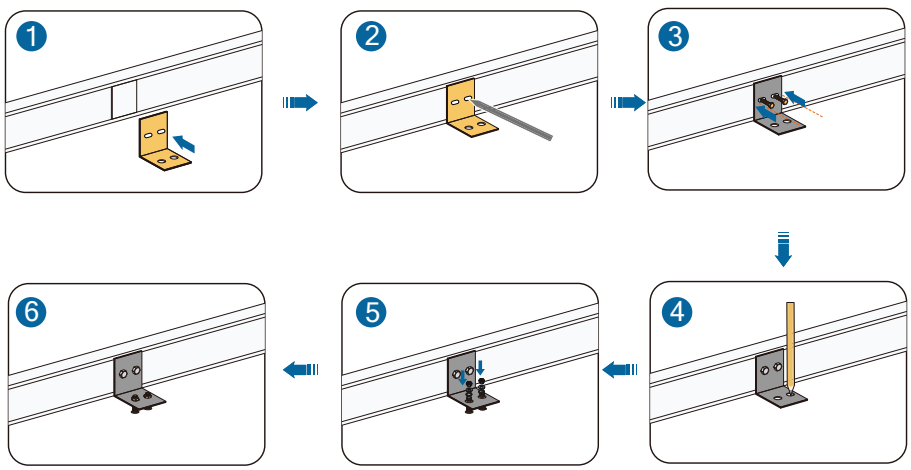
The following tools may be used in installing the L-shape angle steel:

No.	Name	Resource
1	Marker	Beyond the scope of delivery
2	φ22 percussion drill	Beyond the scope of delivery
3	Angle steel	In the scope of delivery
4*	M16×150 expansion bolts	In the scope of delivery
5**	M16×50/ M12x35 screw	In the scope of delivery

* The bolt specification is for reference only. Select appropriate bolts according to onsite conditions.

** The bolt specification may vary with different projects. Specifically, refer to the final deliveries.

Installation Method



Screw	Torque (N·m)
M12x35	60~70
M16x50 M16X150	119~140

Other Precautions

- A drainage system should be designed on the installation site to prevent the MV Station from being immersed in water during heavy rainfalls.
- Do not plant any trees near the MV Station installation site to prevent the damage of the MV Station caused by tree leaves or stems.

5.5 Removing Sealing Plates, Sealing Tapes and Fasteners

The sealing plates, sealing tape and fastens are attached to the enclosure of the MV Station to prevent moisture penetration during transportation.

Remove the sealing plates, sealing tapes and fastens before commissioning.



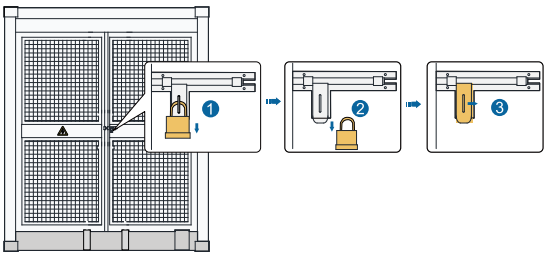
No.	Note
A	Sealing plates
B	Sealing tapes
C	Fastens
D1	Sealing plates, four larger plates(D2) and one smaller plate(D1). The larger one weights 43kg, while the smaller weights 21kg.
D2	

Further Operations

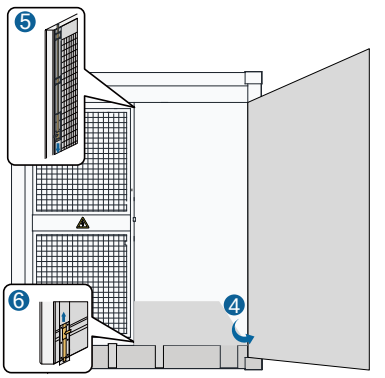
It unnecessary to reassemble these fasteners (shown in figure above) removed.

5.6 Opening the Door of Transformer Room

Step 1 Insert the key to open the door.

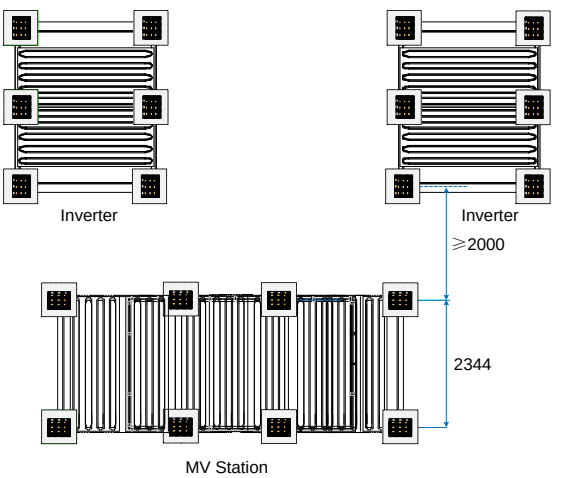


Step 2 Open the right door. Pull the upper and lower latches on the left door, to open the front left door.



5.7 Clearance Requirement

On site, MV Station works together with the inverter. Required clearances around MV Station and the inverter are shown in the figure below.



* The distance illustrated in this figure is the minimum values.

** This manual takes the inverter SG3125HV-20 as an example, and the inverter type may differ in actual project.

6 Electrical Installation

6.1 Safety Instructions

6.1.1 General Rules

DANGER

High voltage! Electrical hazards!

- **Do not touch the live components of the device.**
- **Make sure the MV Station are voltage-free before installation.**
- **Never put flammable materials in the vicinity of the MV Station.**

DANGER

If a ground fault occurs in the PV system, some parts that were voltage-free before may contain lethal voltage. Accidental touch may cause serious damage. Make sure there is no system ground fault before operation and take proper protective measures.

WARNING

- **Observe all the country-specific standards and regulations.**
- **Connect the MV Station to public grid only after receiving authorization from the local network operator.**

WARNING

Only professional electricians can perform the operations described in this chapter.

Observe all the instructions to connect the wires.

WARNING

Disconnect all the switches before electrical connection.

WARNING

Sand and moisture penetration may affect the performance of electric devices inside the MV Station!

- Do not perform electrical connection in sandy season or when the ambient relative humidity is above 95%.
- Perform electrical connection on fine weather days.

WARNING

Improper torque used may cause a fire to the connection point!

Fix the bolts by strictly following the torque requirements in this manual during electrical connection.

WARNING

Too small bending radius or excessive intertwine may damage the fiber!

When selecting fiber as the communication cable, please follow the related requirements of the fiber manufacturer about the min. allowable bending radius.

WARNING

Only professional electricians can perform the electrical connection. Professional electricians should meet the related requirements listed in "2 Safety Instructions" in this manual. Sungrow should hold no liability for any personal injury or property loss caused by ignorance of the safety instructions.

WARNING

Ensure the electrical insulation is satisfied before laying the cables. Follow the EMC regulation and lay the power cable and communication cable in different layers. Provide support and protection to the cables to reduce the stress of the cables when necessary.

WARNING

Strictly follow all the instructions when connecting the cables.

NOTICE

- **The installation and design of the MV Station must fulfill national and local standards and regulations.**
- **Sungrow should hold no liability for the MV Station or system fault caused by ignorance of the description in this manual.**

Select optical fibers as the external communication cable to lower the signal interference.

6.1.2 Five Safety Rules

During electrical connections and other operations on the inside device, observe the following Five Safety Rules:

- Disconnect all the external connections and disconnect the MV Station internal power supply.
- Avoid any inadvertent re-connections.
- Verify that no voltage or current is present with appropriate testing devices.
- Ground and short-circuit whenever necessary.
- Cover possible live parts to avoid inadvertent touch.

6.2 Circuit Diagram

By using MVS6250 as an example, the system schematic is as follows:

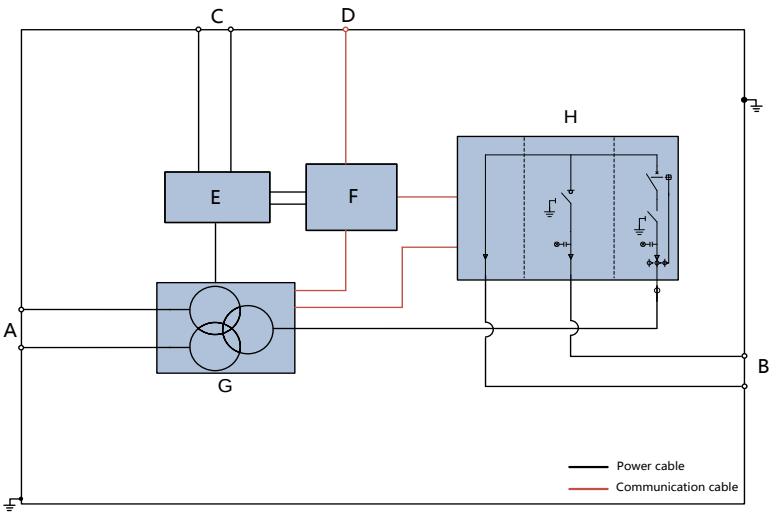


Fig. 6-1 MV Station main circuit diagram

Note: The switchgear shown above is for reference only, and the actual product may differ.

Devices in the above figure are:

Item	Name	Recommended specifications
A	Connect to the inverter	Six-phase, and each phase supports 400 mm^2 copper/aluminum wire utmost
B	Connect to MV grid	Depends on the switchgear type. Specifically, refer to the corresponding manual.
C	Auxiliary power supply port	-
D	Ethernet port	-
E	Control panel	-
F	COM100 Communication box	-
G	MV Transformer	-
H	MV Switchgear	-

6.3 Cable Connection

External cable connections of the MV Station include grounding cable connection, cable connection on LV side, cable connection on MV side, communication cable connection, and auxiliary power supply cable connection.

6.3.1 Ground Connection

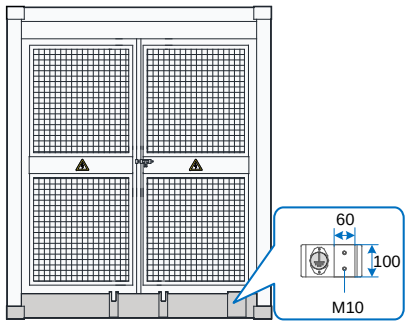
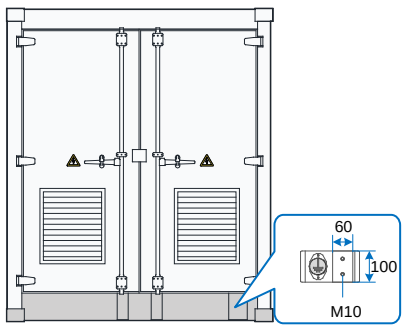
Brief Introduction

Generally, the ground connection includes equipotential connection of internal devices and external grounding.

External Grounding

For ease of onsite cable connection, two grounding points are designed at the exterior of the MV Station, as shown in the figure below.

On site, reliably connect both or either of the two grounding points according to actual conditions.

Illustrations	Description
	Left-side view of the MV Station. The external grounding point is shown in the left figure.
	Right-side view of the MV Station. The external grounding point is shown in the left figure.

Note: unit: mm.

The external grounding points of the MV Station can be grounded in the following two manners:

- Connect the grounding cable to the external grounding points with M10 bolts, where the recommended cable is of 50 mm^2 to 95 mm^2.
- Weld the grounding steel flat onto the external grounding point, after which anti-corrosion processing needs to be performed.

It is recommended that two points of the MV Station should be connected to the ground system of the PV plant.

The MV Station needs to be grounded on site. The following operations should also be conducted on site:

Measure the electrical conductivity between the device ground terminals and the total equipotential connection copper bar to ensure the effectiveness of the internal ground connection.

Perform the external grounding according to on-site situation and instructions of the plant staff.

The grounding resistance should be no more than 4Ω.

The grounding resistance should be determined according to local standards and regulations.

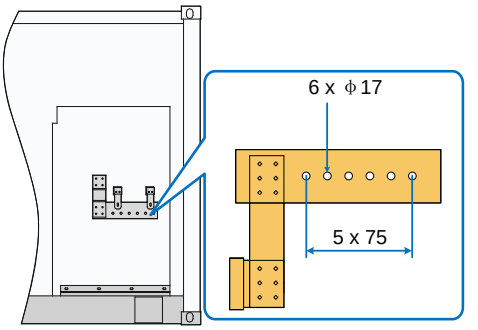
WARNING

The country-specific regulations and standards must be observed at all times!

6.3.2 LV Side Connection

Overview

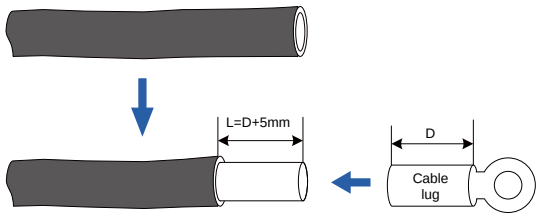
Copper bars for cable connection on the LV side of the MV Station are located at the LV connection area. The copper bars are shown in the figure below.



Cable Connection Steps

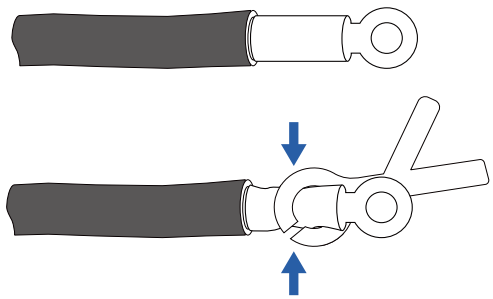
Step 1 Make sure the switch upstream of the inverter is in the OFF position.

Step 2 Strip off the insulation cover of the cable with a stripped length of 5mm longer than the depth of the cable lug.



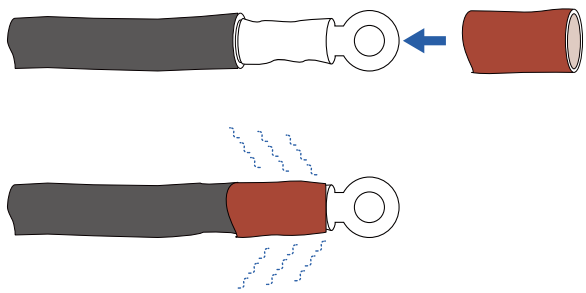
Step 3 Crimp the cable lug.

1. Insert the stripped cable into the cable lug.
2. Tighten the cable lug with relevant tools. The crimping number should be more than two.



Step 4 Insert the heat-shrinkable tubing.

1. A tubing with length of 2cm longer than the depth of the cable lug is recommended.
2. Insert the heat-shrinkable tubing into the cable lug.
3. Shrink the tubing with a hot air blower.



Cable protectors are recommended in the cable crosses if the multi-core cables are used.

Step 5 Connect the cable.

1. Fasten the cable connection terminals according to the order shown in the figure below.

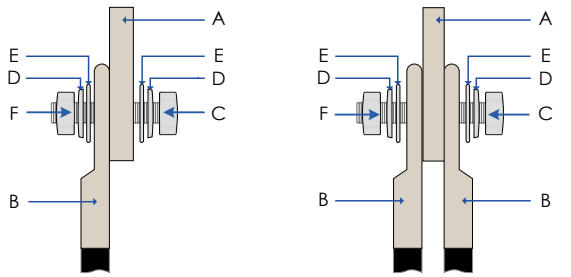


Fig. 6-2 Cable connection for copper terminal

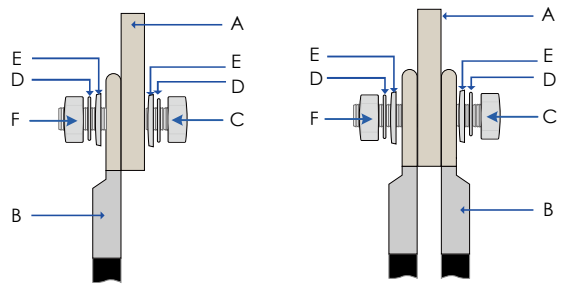


Fig. 6-3 Cable connection for copper-aluminum adapter terminal

A	B	C	D	E	F
Copper Bus	Copper-aluminum adapter terminal	Bolt	Spring washer	Flat washer	Nut

2. Fasten the M16 x 65 bolts (in the scope of delivery) with a screwdriver or spanner. The tightening torque: 119~145 N·m.

⚠ WARNING

- **Incorrect connection sequence may cause a fire. Please pay much attention to the connection sequence.**
- **Ensure the firmness of the cable connection. Poor connection or oxidation of the surface may cause over-heating or a fire.**

NOTICE

- **Long bolts may impair the insulation and may cause a short circuit.**
- **Remove the heat-shrinkable tubing between the cable lug and the copper bar if necessary. Poor contact or over-heating may follow if otherwise.**

Step 6 Confirm that all cable connections are secure.

6.3.3 MV Side Connection

Terminals connecting the external devices on the MV side of the MV Station are located on the MV switchgear.

On site, perform cable connection according to the MV switchgear manual.

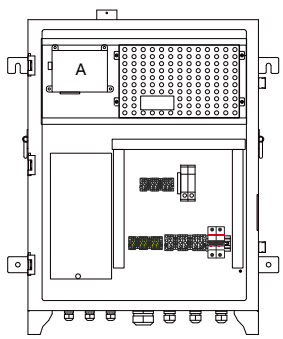
NOTICE

Ensure correct phase sequence during cable connection.

6.3.4 Communication Cable Connection

All internal communication terminals of the MV Station have been connected to the communication box COM100 before delivery. The data of all internal devices of the MV Station is uploaded to background via the COM100.

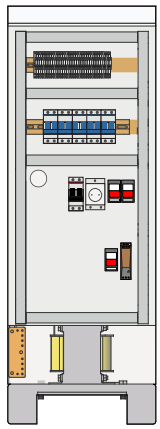
The external cable connection terminals of the COM100 are located at the Ethernet switch shown by A in the figure below.



No.	Name
A	Ethernet switch

6.3.5 Auxiliary Power Supply Cable Connection

Standby power sockets are reserved in the control panel, as shown in the figure below. On site, perform cable connection according to demands.



*The figure is indicative only, and actual product may differ.

On site, perform cable connections according to the actual wiring diagram.

6.4 Checking after Electrical Connection

Checking Item	Requirement
Equipment appearance	•The equipment is intact, and free from rust and paint flake-off. Repaint areas with paint flake-off (if any). •The labels on the equipment are legible. •The damaged labels must be replaced in time.
Appearance of cable	Cable sheathings are properly wrapped and free from obvious damage. Hoses that contain cables are intact.
Cable connection	•Cables are connected in the designed positions. •Terminals are prepared as required and securely connected. •Labels on both ends of each cable are clear and specific, and attached in the same direction.
Cable routing	•Power cables and communication cables must be routed separately. •Cables are neat and tidy. •The joints of cable ties are evenly cut without burrs. •Cables are placed properly and not tense at turning points. •Cable routes are straight and smooth, and do not intersect inside a cabinet.
Container	The container is clean and tidy inside, without any unnecessary cables, cable heads, terminals, or tools. No obvious garbage is found outside the equipment.

Checking Item	Requirement
Others	•Check the bottom of the MV Station and seal the gaps between the cables with fireproof mud. If cable glands are used, make sure they are tightened. Seal the unused terminal. •Reassemble the protective grid removed. •Water-proof processing should be done on the foundation of the MV Station.

7 Checking before Power-On and Power- Off

NOTICE

The operations described in this chapter must be performed by professional personnel in accordance with local regulations/standards.

7.1 MV Station Container

No.	Checking item
1	The installation conforms to the design requirements.
2	The container is level, and each door can be opened properly.
3	There is no crack, dent, or scratch on the container surface. Repaint areas with paint flake-off (if any).
4	Each container has at least two ground points and is grounded securely with a ground resistance of 4Ω or less.
5	The number and positions of external accessories conform to the enclosed document.
6	All markings are correct, clear, and complete.

7.2 MV Switchgear

No.	Checking item
1	There is no crack, dent, or scratch on the cabinet surface.
2	The SF_6 barometer pointer is in the green zone.
3	Rotate the current terminal, disconnect the scriber of the current terminal, and measure the resistance at both ends of the fracture. The value of three-phase resistance should be small and close. After the measurement, restore the current terminal to the connection position and tighten it. The standby current loop shall be shorted and grounded.
4	Apart the grounding wire of the secondary circuit and measure secondary loop to the ground resistance and resistance should be M Ω level. Recover the grounding wire and the resistance shall be 0 Ω.

No.	Checking item
5	If there is a relay protection tester or current source, check the value settings of the protective device, including the set value, control word, and soft clamping plate. The set value must match that provided by the user.
6	Check that the trip enable/disable slicer has been put into operation.
7	The door of power cable room is closed.
8	The auxiliary AC power circuit breaker in the cabinet is switched on.
9	The conversion switch is in the remote position.
10	The local operating switch has been padlocked.
11	The load switch is opening and the grounding switch is closing.
12	Remove all foreign matters in the medium-voltage ring main unit, such as tools, installation residual materials, etc.

7.3 MV Transformer

No.	Checking item
1	There is no crack, dent, or scratch on the transformer surface.
2	No oil leakage occurs on the transformer surface.
3	The indication of the oil level gauge of the transformer is in lower position of the normal operating range.
4	The oil temperature indicator of the transformer is close to the ambient temperature. The cover of the oil temperature meter is installed securely, the surface is clean, and the glass is intact. The temperature measurement loop is complete and intact.
5	The scale of transformer oil level indicator will show in 4 when temperature is 20℃.
6	The locking device of the pressure release valve has been removed, and the pressure release valve does not work. If not removed, follow the steps shown in the Fig.7-1 to remove the locking device.
7	The pressure gauge indicates a pressure of 0.
8	The tap changer is set according to the requirements of the user. If there is no special requirement, set it to the rated level (level 3). The methods to adjust the tap changer is shown in the Fig7-2. When setting the level, open the handle. After adjusting the level, close the handle to the slot. After the check is complete, tighten the protective cover for the level switch.
9	There is no packing residue on the transformer surface, and there is no foreign matter in the transformer room.

No.	Checking item
10	Check the external air insulation distance. Whether the air insulation distance between different voltage grade bushing and bushing to ground conforms to relevant standard.
11	The oil leak port of the transformer room is not blocked.
12	The screen door of the transformer room is closed and locked.

Remove the Locking Device

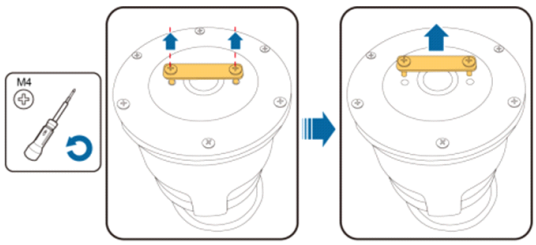


Fig. 7-1 Remove the locking device of the pressure relief valve

Adjust Voltage Ratio via Tap Changer

Tap changer can adjust transformer output voltage. When operating tap changer, ensure that transformer is in the no-excitation state, that is, the high and low voltage sides of transformer are not live. When voltage of the low-voltage side remains unchanged, the output voltage on high-voltage side at different taps are:

Tap position	Value
1	Nominal Value x 1.05
2	Nominal Value x 1.025
3	Nominal Value
4	Nominal Value x 0.975
5	Nominal Value x 0.95

Take tap position 1 as an example, the steps to adjust the voltage ratio is shown in the following figure.

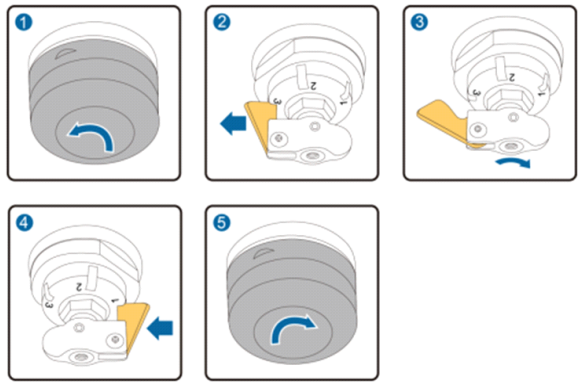


Fig. 7-2 Adjust the voltage ratio via the tap changer

7.4 LV Cabinet

No.	Checking item
1	The copper bar is not deformed, and no foreign matter is on the copper bar.
2	Check and make sure the neutral point of the transformer is not grounded, the input & output wiring to grounding resistance should be M Ω level; In the neutral point grounding system, outgoing wiring copper bar resistance shall be M Ω level and phase to phase resistance shall be M Ω level. (need to disconnect the auxiliary circuit breaker, or phase to phase resistance is generally 0 Ω).
3	Measure the fuse resistance. Resistances of three phases shall be small and the value is similar.
4	Lightning protection status indicates green.
5	Pull the current terminal chip to the open position and measure the resistance at both ends of the fracture. The value of three-phase resistance should be small and close. After the measurement, restore the current terminal to the connected position and tighten it. The standby current loop shall be shorted and grounded.
6	Apart the grounding yellow green wire of the secondary circuit and measure secondary loop to the ground resistance and resistance should be M Ω level. Recover the grounding wire and the resistance shall be 0 Ω.
7	The installation bolt of input cable has been tightened, and the cable is not loose after pulling.
8	The cable inlet hole has been sealed.
9	Each component is intact.
10	Clear all foreign matter in the switchgear, such as tools and remaining materials.

8 Troubleshooting

This chapter only lists the common troubleshooting methods on the transformer side. For more specific information, refer to the relevant transformer and ring network cabinet user manual.

Fault	Possible Reason	Measures
Pressure relief trip	The internal short circuit of the transformer is faulty.	If it is a short circuit fault, take an oil sample for oil sample chromatography to further determine the cause of the fault. It is strictly forbidden to put the transformer into operation before the cause of the fault is not ascertained and the fault has not been resolved. (Note: If it is determined that the internal fault is serious, the inside of the transformer has been damaged, contact Sungrow for replacement.)
	The pressure relief valve is faulty.	The pressure relief valve elastic element expander internal jam, or the bolt torque of the fastening film is too large, resulting in damage to the film, contact Sungrow for replacement.
	Improper oiling operation before servicing or installing the transformer. If the pressure relief valve on the tank is not opened as required.	After power off, open the oil hole to release the pressure inside the tank.
Low oil level trip	The secondary circuit causes a false alarm of low oil level.	Check the secondary circuit to confirm if it is malfunctioning.
	The transformer leaks oil or leaks for a long time. After the oil was drained due to maintenance or	Fill the transformer with oil.

Fault	Possible Reason	Measures
	test reasons, the oil was not replenished to the normal oil level in time.	
Oil temperature alarm	1. Transformer overload operation. Overload operation may result in a high oil temperature alarm.	1. Check if the transformer is overloaded.
	2. The heat dissipation channel is blocked.	2. Check the transformer heat dissipation channel for foreign matter jams.
	3. The secondary circuit causes a false alarm.	3. Check the actual oil temperature of the transformer to see if it is a false alarm.
Oil temperature trip	1. The transformer is overloaded.	1. Check if the transformer oil level is too low.
	2. Internal fault of the transformer.	2. Check if the temperature sensor is abnormal.
	3. Transformer secondary circuit failure. Long-term overload operation will cause the transformer temperature to continue to rise, resulting in overcurrent and high voltage tripping.	3. Check the load on the transformer. Check the load through the internal current meter of the low voltage cabinet. If the trip occurs due to an overload, it is recommended to reduce the running load.

9 Routine Maintenance

Due to ambient temperature, humidity, dust, and vibration, the MV Station and the inner components will age and wear. To ensure the system safety and maintain the efficiency of the MV Station, it is necessary to carry out routine and periodic maintenance.

All measures, which can help the MV Station work in good conditions, are within the maintenance scope.

9.1 Safety Instructions

⚠ WARNING

Lethal voltage inside the MV Station!

Wait at least 10 minutes after MV Station stops before opening the cabinet door. Make sure the device internal is completely voltage free before any work on the MV Station.

⚠ WARNING

Only qualified personnel can perform the work described in this chapter.

Do not leave any screws, washers or other metallic parts inside the MV Station to avoid damages to the MV Station.

⚠ WARNING

Sand and moisture penetration may affect the performance of electric devices inside the MV Station!

- **Do not perform electrical connection in sandy season or when the ambient relative humidity is above 95%.**
- **Perform electrical connection at fine weather days.**

WARNING

Voltages may still be present on cable connection terminals inside the MV Station even though the switches are disconnected. To avoid electric shock hazard, perform the following operations before starting maintenance work,

- **Disconnect all the switches of the MV Station;**
- **Disconnect the upstream and downstream switches of the MV Station.**

9.1.1 Safety Rules

Respect the following five rules in maintaining or servicing the MV Station to ensure the safety of the maintainer.

- Disconnect the MV Station from all the external connections and internal power supplies.
- Ensure that the MV Station will not be started accidentally.
- Verify that the MV Station interior is discharged completely with a multimeter.
- Disconnect all the power supply.
- Ensure that the high voltage output has no feedback power source.
- Ensure there is no personnel operating at high voltage wire end.
- All auxiliary power supply must be disconnected without the risk of connecting to the power again.
- Perform necessary ground and short circuit connection.
- Cover the adjacent electrical components with insulation cloth during operation.

9.2 Maintenance

9.2.1 Introduction

With IP54 protection degree, the MV Station can be installed outdoors. Harsh environment condition or long-time operation, however, may cause aging and damage to the MV Station. Check and maintain the MV Station periodically and replace the aged components, so as to effectively extend the service life and increase the device performance inside the MV Station.

Unscheduled maintenance is also required, especially when the system performance is poor.

9.2.2 Maintenance Interval

Maintain the MV Station and internal electric devices periodically to ensure the good

performance of the MV Station.

The maintenance interval described in this chapter is indicative only. The actual interval depends on the on-site environment condition. If the MV Station is located in harsh environment places, for example desert arrears, the maintenance interval shall be shortened. Particularly, cleaning and anti-corrosion processing should be performed more frequently.

If the MV Station is located in desert areas, it is advisable to check thoroughly the MV Station inside and outside and clean completely after the sand storm.

WARNING

Before performing maintenance, remove the internal protective grid. Make sure to reassembly the grid and fasten all the screws after the maintenance work.

Make sure all bolts are securely fixed.

WARNING

Repair immediately any anomalies found during routine maintenance. If there are any doubts, contact Sungrow.

9.3 Maintenance Items

Routine inspection and maintenance must comply with relevant regulations of the electric utility.

The inspection, maintenance, and repair can only be performed by trained personnel who are familiar with the equipment. The personnel must be certified and comply with the safety regulations issued by the electric utility.

Check Item	Check Method	Interval
System running status and cleanness	Check whether the equipment and internal equipment are damaged or deformed.	Monthly
	Check whether there is any abnormal sound or vibration when the equipment is running.	

Check Item	Check Method	Interval
	Check whether the temperature inside the equipment or the temperature of the equipment shell is too high.	
	Check whether warning labels are clear and replace them if necessary.	
	Check whether the humidity and dust in the equipment are heavy, and clean the equipment.	
Cable connection	Check whether power cables are loose. If so, properly connect them according to specified torques.	Once every six months after the first commissioning; once every two years after that.
	Check whether power cables and control cables are damaged and whether the cable exterior in contact with the metallic surface is scratched.	
	Check whether the insulation binding tapes on the wiring terminals of power cables are flaked.	
	Clean or replace the dust-proof network.	
Fan / heat exchanger	Check the working status of the fan / heat exchanger.	Once every six months after the first commissioning; once every half to one year after that.
	Check whether the fan/ heat exchanger produces abnormal sounds during operation.	
Device maintenance	For the maintenance of various equipment inside, refer to the related manuals.	–
MV switchgear	Check the SF_6 air pressure meter to see whether the pointer is in the green range. If the pointer is close to red, stop running it in time and supply it with gas.	Monthly

Check Item	Check Method	Interval
	Check the electric indicator to see whether theL1/L2/L3 indicator is normal. If not, replace theL1/L2/L3 indicator under power off condition.	
Transformer	Check the oil level meter indication of the transformer. If the oil level is low, power off the transformer and refill it in time.	Once a month
	Check whether there is oil leakage around the pressure release valve. If yes, tighten the valve.	
	Check whether there is oil leakage on the phase bushings of the high-voltage and low-voltage cabinets. If yes, tighten the valve.	
	Check whether there is oil leakage on the joint between the heat sink of the transformer and the flange of the oil tank. If yes, tighten the valve in time.	
	Check whether the real-time temperature of the oil temperature indicator is normal. If abnormal, measure the resistance of PT1\PT2 and PT3 by multimeter. If the result is not qualified, the temperature controller is faulty and needs to be repaired in time.	
	Check whether the sound of the transformer is normal during operation.	
LV cabinet	Check whether the surge protection device indicator is normal (green) or faulty (red).	Monthly
	Check whether there is condensation on the internal side panel and top cover.	

Check Item	Check Method	Interval
Other equipment	Replace the damaged lights in time.	If necessary
	Replace the damaged smoke sensor and fire extinguisher in time.	
	Replace the temperature and humidity controller in time.	

Note: For more information, refer to the MV transformer manual and MV switchgear manual.

10 Routine Maintenance

Due to ambient temperature, humidity, dust, and vibration, the MV Station and the inner components will age and wear. To ensure the system safety and maintain the efficiency of the MV Station, it is necessary to carry out routine and periodic maintenance.

All measures, which can help the MV Station work in good conditions, are within the maintenance scope.

10.1 Safety Instructions

⚠ WARNING

Lethal voltage inside the MV Station!

Wait at least 10 minutes after MV Station stops before opening the cabinet door. Make sure the device internal is completely voltage free before any work on the MV Station.

⚠ WARNING

Only qualified personnel can perform the work described in this chapter.

Do not leave any screws, washers or other metallic parts inside the MV Station to avoid damages to the MV Station.

⚠ WARNING

Sand and moisture penetration may affect the performance of electric devices inside the MV Station!

- **Do not perform electrical connection in sandy season or when the ambient relative humidity is above 95%.**
- **Perform electrical connection at fine weather days.**

WARNING

Voltages may still be present on cable connection terminals inside the MV Station even though the switches are disconnected. To avoid electric shock hazard, perform the following operations before starting maintenance work,

- **Disconnect all the switches of the MV Station;**
- **Disconnect the upstream and downstream switches of the MV Station.**

10.1.1 Five Safety Rules

Respect the following five rules in maintaining or servicing the MV Station to ensure the safety of the maintainer.

- Disconnect the MV Station from all the external connections and internal power supplies.
- Ensure that the MV Station will not be started accidentally.
- Verify that the MV Station interior is discharged completely with a multimeter.
- Perform necessary ground and short circuit connection.
- Cover the adjacent electrical components with insulation cloth during operation.

10.2 Maintenance

10.2.1 Introduction

With IP54 protection degree, the MV Station can be installed outdoors. Harsh environment condition or long-time operation, however, may cause aging and damage to the MV Station. Check and maintain the MV Station periodically and replace the aged components, so as to effectively extend the service life and increase the device performance inside the MV Station.

Unscheduled maintenance is also required, especially when the system performance is poor.

10.2.2 Maintenance Interval

Maintain the MV Station and internal electric devices periodically to ensure the good performance of the MV Station.

The maintenance interval described in this chapter is indicative only. The actual interval depends on the on-site environment condition. If the MV Station is located in harsh environment places, for example desert arrears, the maintenance interval shall be shortened. Particularly, cleaning and anti-corrosion processing should be performed more

frequently.

If the MV Station is located in desert areas, it is advisable to check thoroughly the MV Station inside and outside and clean completely after the sand storm.

WARNING

Before performing maintenance, remove the internal protective grid. Make sure to reassembly the grid and fasten all the screws after the maintenance work.

Make sure all bolts are securely fixed.

WARNING

Repair immediately any anomalies found during routine maintenance. If there are any doubts, contact Sungrow.

10.3 Maintenance Items

Check item	Check method
General check	•Check the tightness of the transformer and slightly retighten the screws, if necessary. •For the tap changer, perform a switching test across the entire range when the transformer is under voltage-free conditions. •Remove any rust patches and repaint. •Check and clean the cable entries, protective device. •Check the contacts of the low-voltage terminals for discoloration. •Check whether the protective covers of the low-voltage terminals are present and intact. •Check whether the contacts of the medium-voltage terminals are intact. •Clean the insulators. •Check the function and settings. •Check and lubricate the rubber seals on the cable entries. •Check the MV transformer for operating noise. •Check the grounding of the transformer.
Transformer monitoring protection devices	•Oil temperature indicator: Oil temperature is at the normal level. •Pressure relief valve: Check the contact of the pressure relief

Check item		Check method
		valve. •Oil level device: Oil level is at the normal level. •Pressure gauge: Pressure is at the normal level.
Transformer check	Leakage	•Tap changer •Pressure relief valve •Pressure gauge •Oil level indicator •Oil temperature indicator •Bushings of LV side and MV side •Drain valve •Welding seams

11 Parameters

11.1 Technical Parameter

MV Station input	MVS6250	MVS6800
Nominal voltage	2 x 600 V	
Grid frequency	50 Hz / 45~55 Hz, 60 Hz / 55~65 Hz	
Max. AC input current	2 x 3458 A	
MV Station output		
Output power	6250 kVA@50℃ 6874 kVA@45℃ 7186 kVA@25℃	
Nominal voltage	20~38.5 kV	
MV Switchgear		
Nominal voltage	Refer to "**Table 11-1Correspondence between nominal current and short circuit breaking current**"	
Nominal current		
Short circuit breaking current		
MV protection	50/51, 50N/51N	
MV Transformer		
Rated power	6250 kW	6874 kW
Maximum power	7186 kVA	7186 kVA
Voltage ratio	0.6~0.6/20~38.5 kV	
Transformer tap changer	0,±2x2.5%	
Vector Group	Dy11y11	
No Load Loss/Load Loss	EU548(customize available)	
Cooling	ONAN	
Type of Oil	Mineral oil(PCB free) or degradable	
General Data		
Dimensions(W x H x D)	6058 mm x 2896 mm x 2438 mm	
Weight	20,000 kg	
Operating temperature range*	-35℃~+60°C	

Storage ambient temperature*	-35°C~+70°C
Relative humidity	0% to 95%(no-condensing)
Max. operating altitude	1000m(standard)/>1000m(optional)
Degree of protection	IP54

*Parameters may vary subject to specific project requirement

Table 11-1 Correspondence between nominal current and short circuit breaking current

Manufacturer	Nominal voltage	Frequency	Nominal current	Short circuit breaking current
ABB	24kV	50Hz	630A	16kA
		60Hz	600A	
	36kV	50Hz	630A	20kA
		60Hz	600A	
Siemens	24kV	50Hz	630A	20kA
		60Hz		
Ormazabal	36kV	50Hz	630A	20kA
		60Hz		

11.2 Tightening Torques

Tighten the cable with proper torque shown below to prevent the poor contact, high contact resistance, or fire caused by the looseness of cable lugs:

Screw	Torque (N·m)	Screw	Torque (N·m)
M3	0.7~1	M8	18~23
M4	1.8~2.4	M10	34~40
M5	4~4.8	M12	60~70
M6	7~8	M16	119~140

Secure the cable in proper place to reduce the pressure of cable lug.

12 Contact Information

Should you have any question about this product, please contact us.

We need the following information to provide you the best assistance:

- Type of the device
- Serial number of the device
- Fault code/name
- Brief description of the problem

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