

System Manual

MV Station

MVS6400-LV/MVS7040-LV/MVS7320-LV



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1 About This Manual

1.1 Validity

This manual is intended for the following product:

- MVS6400-LV
- MVS7040-LV
- MVS7320-LV

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

1.2 Demonstration of the Model

Model	Rated power	Devices can be connected
MVS6400-LV	6400 kVA @ 40 °C	20 x SG350HX series
MVS7040-LV	7040 kVA @ 40 °C	22 x SG350HX series
MVS7320-LV	7320 kVA @ 40 °C	24 x SG305HX series

The function, appearance and wiring method of the models are the same, but the number of inverters is different. This manual takes MVS6400-LV as an example to briefly introduce the installation and wiring instructions of MV Station.

1.3 Target_Group

This manual is for technical personnel who are responsible for the transport, installation and other operations of the MV Station. Only qualified personnel can perform the installation, maintenance and troubleshooting of the MV Station. Unauthorized persons should not perform any operation on the MV Station and should be away from the MV Station to avoid potential hazards. 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

1.4 How to Use This Manual

A large number of pictures are provided to help users better understand and use this manual. These pictures are used for illustration only and may not be an exact representation of the real MV Station.

Read this manual carefully before installing the MV Station. Keep this manual and other product component information together to ensure ease of access. In addition to this manual, the following documentations are provided:

- MV Switchgear manual
- MV Transformer manual
- Other enclosed manuals

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1.5 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.

GEFÄHR

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

WARNUNG

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

VORSICHT

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

HINWEIS

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 found on the electrical parts of the product. 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.

Failure to read the warning signs may result in MV Station damage or safety incidents.

2 Safety Instructions

Operators must read through the manual carefully and have a good understanding of the relevant safety instructions before performing any operation on the MV Station.

Observe all the safety instructions listed in this manual and the user manuals for the transformer and MV Switchgear, etc.

2.1 General Safety Rules

GEFAHR

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.

GEFAHR

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.

GEFAHR

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.

WARNUNG

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

WARNUNG

Ensure that the installation environment (such as voltage, temperature, humidity, altitude, pollution level, water-proof and dust-proof level) is within the scope of equipment specifications.

⚠ WARNUNG

The locking device on the pressure relief valve must be removed before operation. refer to **""7.1.2 Opening Pressure Relief Valve""**.

⚠ WARNUNG

The installation, electrical connection, commissioning, maintenance, and troubleshooting must be carried out by professional electrical technicians conforming to local codes. Before performing operations, operators should have read this manual completely and mastered the safety issues related to the operation.

2.2 Ground Fault Protection

⚠ GEFAHR

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

⚠ GEFAHR

Before electrical connection, please ensure that the substation and electrical equipment inside it are intact and hazard-free. All electrical connections must meet electrical standards of local country/region.

⚠ GEFAHR

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.
- 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 10 minutes before operating it.
- Ensure that the MV Station is completely voltage-free.

2.6 ESD_Protection

⚠ VORSICHT

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 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.

⚠ WARNUNG

In local mode, do not perform any operation on the product (including but not limited to, handling, installing, powering on, and maintaining the product, performing electrical connection, and working at heights) in harsh weather conditions, such as thunder and lightning, rain, snow, and Level 6 or stronger winds.

⚠ WARNUNG

Make proper insulation protection during live line operation. At least two persons are required until the operation is done.
Properfiled rescue facilities are necessary since locations of most power stations are far away from the urban areas.

⚠ WARNUNG

The equipment shall be operated in accordance with local laws and regulations and strictly follow the safety precautions specified in this document.

⚠ WARNUNG

Before maintenance or device replacement, please ensure that the substation has been powered off and the high-voltage side switch and low-voltage side switch are disconnected.

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.
- Whenever necessary, wear proper protective equipment such as goggles, insulating gloves, and insulating shoes, and take all necessary auxiliary protective measures to ensure the safety of the personnel and the equipment.

2.8 Others

2.8.1 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.

2.8.2 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.

2.8.3 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.

MV Station is a booster device used in conjunction with the inverters. The main function is to convert the low-voltage from the inverters into medium-voltage and feed into the grid.

The MV Station integrates LV cabinet, MV transformer, MV switchgear, power distribution cabinet ,communication box and auxiliary transformer.

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

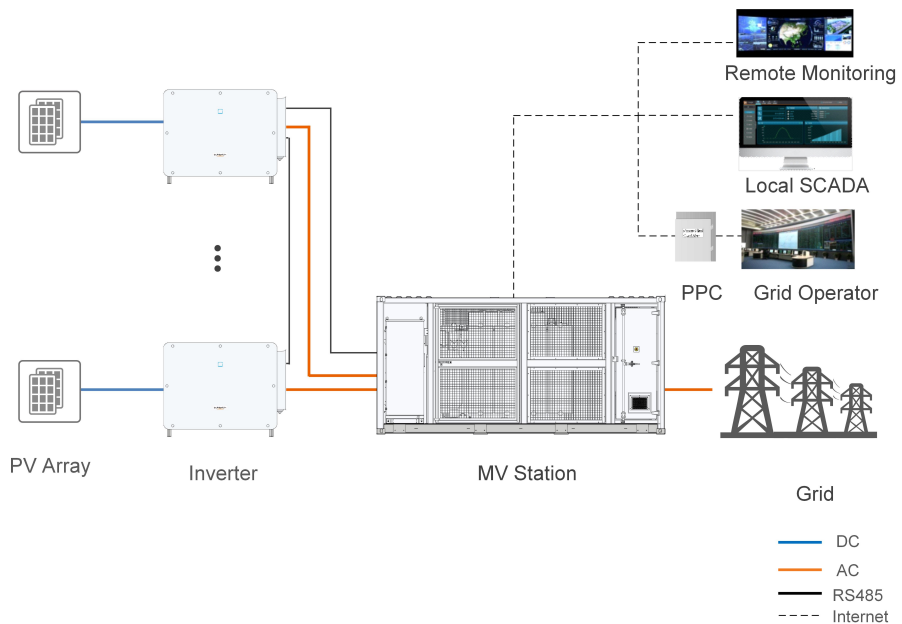


Abbildung 3-1 RS485 Communication

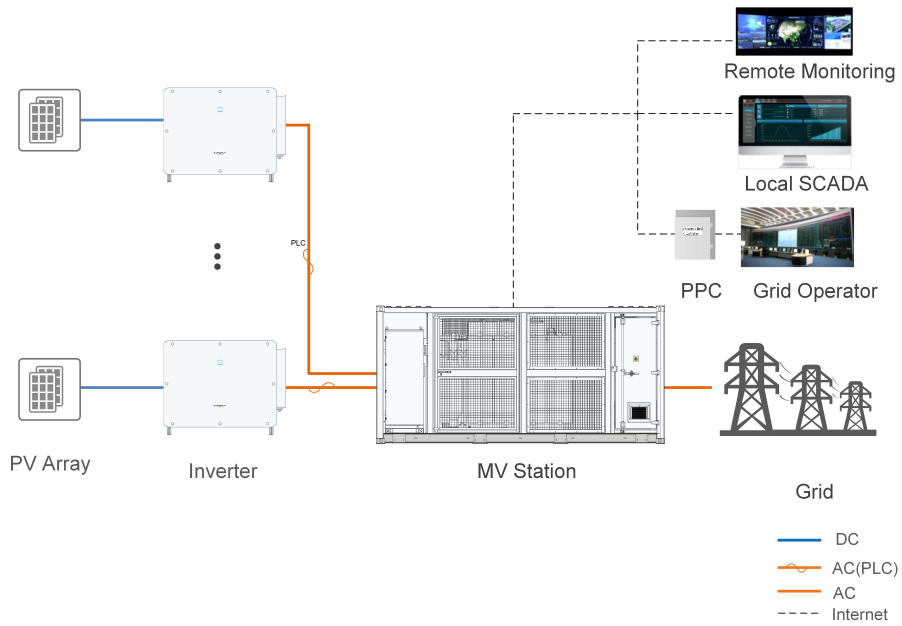
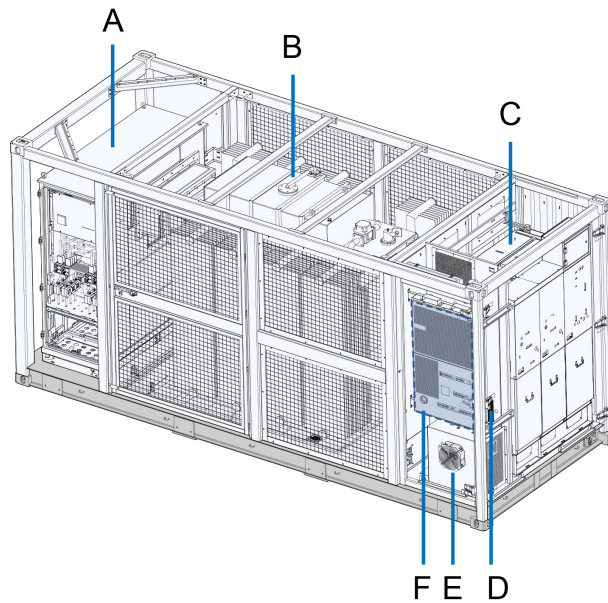


Abbildung 3-2 PLC Communication

3.2 Product Composition

MVS6400-LV is taken as an example to introduce main devices inside the MV Station. The product composition as shown in the following figure.



No.	Name	Description
A	LV cabinet	Connected to the PV grid-connected inverters
B	Transformer	Converts the inverter output low-voltage into grid-compatible medium-voltage
C	MV Switchgear	Grid connected protection device
D*	UPS	Supply uninterruptible power
E	Fan	For heat dissipation
F	Communication distribution cabinet	For communication and power distribution

* is optional.

3.3 Cable Entries

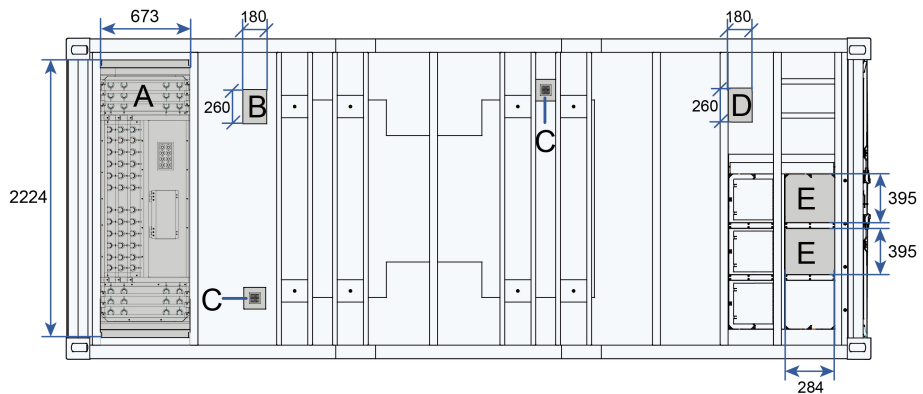


Abbildung 3-3 Bottom view (Dimensions in mm)

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

No.	Name	Description
A	LV side cable entries	All LV side cables connecting the MV Station go inside through these entries.
B	Oil tank cleaning port	Clean the oil tank through this port.
C	Oil leakage protection port	Clean the oil leakage protection device through this port.
D	Power distribution cables entry	All power distribution cables connecting external device go inside through this entry.
E	MV side cable entries	All MV side cables connecting the MV Station go inside through these entries.

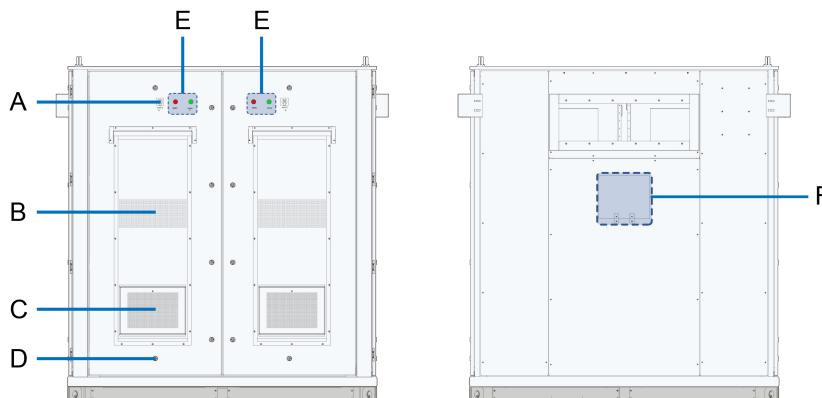
3.4 Internal Design

3.4.1 LV Cabinet

The LV cabinet is located at the LV room inside the MV Station. It is used to converge and transmit low voltage from the inverter to the step-up transformer, and feed it into the MV grid.

Appearance

The LV cabinet is located at the LV room inside the MV Station.

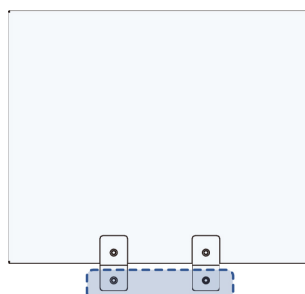


The figure above is indicative only, and actual product may differ.

No.	Name
A	Remote/Local switch button
B	Air outlet area
C	Air inlet area
D	Door lock, support for padlocks
	Air circuit breaker control switch button
E	In local mode , OPEN represents disconnecting the ACB. In local mode , CLOSE represents closing the ACB.
F	Pressure relief door

Pressure relief door corner piece

Before operation, the two fixing bolts between the corner pieces of the pressure relief door on the back of the lv cabinet and the back plate need to be removed. The positions of the fixing bolts are shown in the following figure:

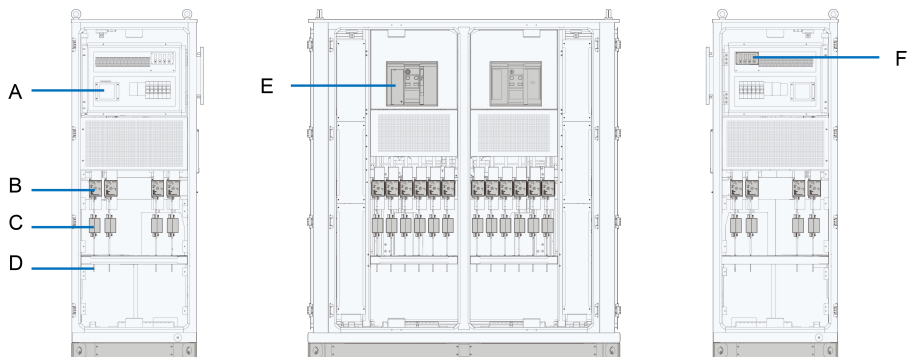




- During normal operation, ensure that the pressure relief door is closed.
- When maintenance of the MV Station involves dismantling the back panel, ensure that the pressure relief door is closed after the maintenance is completed.
- If there is a short circuit or arc inside the low-voltage cabinet, after repairing the fault, check and close the pressure relief door. If the pressure relief door is severely deformed, contact the SUNGROW for replacement.

Internal Structure

Take MVS6400 LV cabinet as an example, internal structure shows the figure below.



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

No.	Name
A*	Energy meter
B	Branch disconnector
C	Branch fuse
D	LV wiring terminals
E	ACB: Air circuit breaker
F	SPD

* is optional.

HINWEIS

ACB can only be closed when there is a lock, and the lock cannot be pulled out after closing.

3.4.2 Main Parts of Transformer

The transformer room mainly includes a transformer inside.