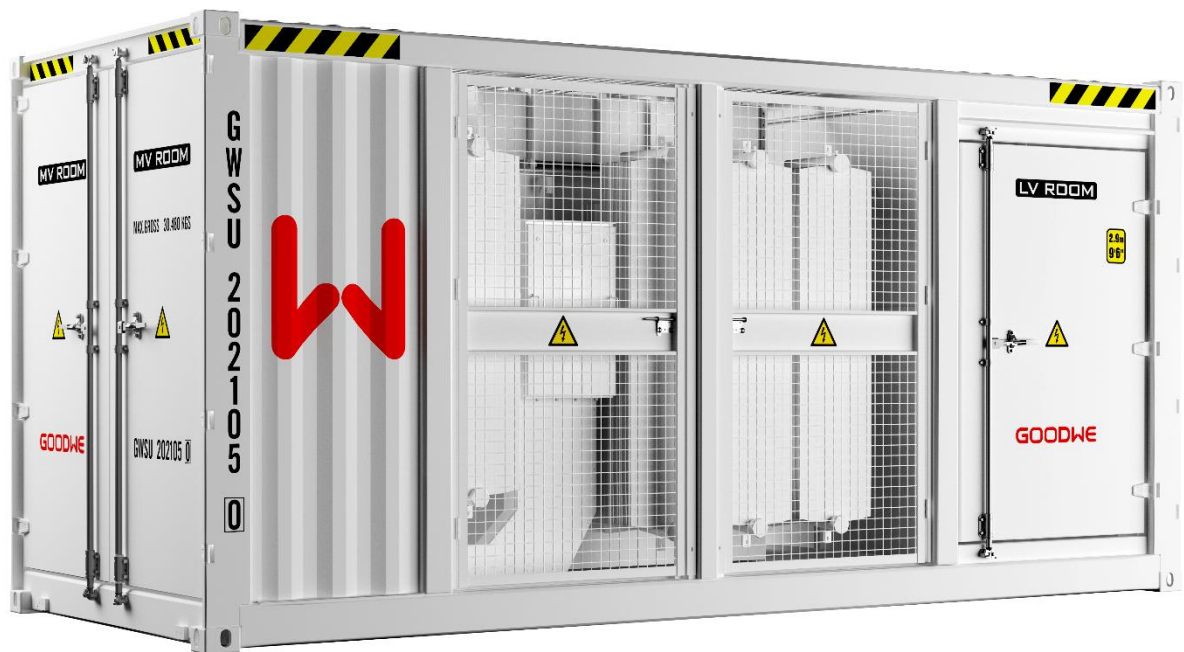

GOODWE

GW3500-7000K MVS Smart Transformer Station

Installation Guide



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1. About This Document

Instruction

This document is intended for installation personnel. It describes how to install the MVS Smart Transformer Stations (also referred to as the MVS) with the rated power ≤ 7000 kVA. Before installing the MVS, read through this document to understand the safety precautions and get familiar with the functions and features of the MVS.

Figures provided in this document are for reference only.

Intended Audience

This manual is applicable to personnel who transport, install and operate this product. They should at least meet the following requirements:

Have certain expertise in electronics, electrical wiring and machinery, be familiar with electrical and mechanical schematics diagrams.

Be familiar with the composition and working principle of photovoltaic grid connected power generation system.

Be familiar with the composition and working principle of MVS and its front and rear level equipment.

Have received professional training related to the installation and commissioning of electrical equipment.




Have the emergency response capability to the danger or emergency in the process of installation or commissioning.

Be familiar with the relevant standards and specifications of the country/region where the project is located, and must obtain the operation certificate of the relevant standards and specifications of the country/region where the project is located.



Be familiar with what is described in this manual.

Symbol usage

The symbols that may be found in this manual are defined as follows:

|  DANGER |
|--|
| Indicates a high-level hazard that, if not avoided, will result in death or serious injury. |
|  WARNING |
| Indicates a medium-level hazard that, if not avoided, could result in death or serious injury. |
|  CAUTION |
| Indicates a low-level hazard that, if not avoided, could result in minor or moderate injury. |
| NOTICE |
| Indicates a potential hazard that, if not avoided, could result in equipment malfunction or property damage. |

Please always pay attention to the danger warning signs on the housing of the MVS, including:

| Label | Explanation |
|---|--|
|  | This label indicates that there is a high voltage inside and touching it may cause an electric shock. |
|  | This label indicates that this is the protective earth (PE) terminal, which needs to be firmly grounded to ensure operator safety. |

2. Safety Information

In order to avoid possible casualties and property losses during installation or operation, and to effectively extend the service life of the MVS, please be sure to read all safety instructions carefully.

2.1. General safety rules

DANGER

There is a danger of electric shock if you touch the power grid or the contacts, terminals, etc. inside the equipment that connected to the grid!

Do not touch terminals or conductors connected to the power grid circuit.

Pay attention to all instructions or safety instructions regarding connection to the power grid.

Lethally high voltage exists inside the product.

Heed and follow warning signs on the product.

Observe the safety precautions listed in this manual and other documentation related to this equipment.

Damaged equipment or system failure can cause electric shock or fire!

Preliminary visual inspection of equipment for damage or other hazards before operation.

Check whether other external equipment or circuit connections are safe.

Make sure the equipment is in a safe state before operation

WARNING

- The installation and operation of the MVS must comply with the relevant standards and regulations of the country where the project is located.
- Make sure that the installation environment (such as voltage, temperature, humidity, altitude, pollution level, waterproof and dust proof level) is within the allowable range.
- Before operation, the locking device on the pressure relief valve must be removed. For details, refer to [6.2 Remove the Pressure Relief Valve Safety Plate](#).
- Mechanical installation, electrical connection, commissioning, maintenance and troubleshooting must be performed by professional technicians in accordance with local regulations.

NOTICE

- Place eye-catching warning signs at the front and rear of the MVS and at the switch to avoid accidents caused by wrong closing.
- Set up warning signs or safety tapes near the field operation area.

2.2. Grounding Fault Protection

⚠ DANGER

When a grounding fault occurs in a PV system, fatal high voltage may exist on the originally uncharged parts which is very dangerous if touched accidentally! Before operation, please wear insulated gloves and measure the grounding current of the equipment with a grounding ammeter to ensure that there is no grounding fault in the system. At the same time, relevant protective measures should also be taken.

2.3. Measuring Tools Requirement

⚠ WARNING

- The measuring range and usable conditions of the tools must meet the requirements of the site.
- Ensure that the connection and use of the measuring tool are correct and standard to avoid dangers such as arcing.
- When conducting electrical connections, trial runs, and other operations on MVS, it is necessary to use relevant electrical measurement equipment to ensure that all electrical parameters meet the requirements.

2.4. Perform Power-off

Only when it is ensured through a display or other way that the MVS, especially the housing of the MVS, is completely neutral, all operations can be performed on it.

Ensure that the escape route is unobstructed during the entire operation.

Ensure that the power-off equipment will not be accidentally re-powered.

After the MVS is completely out of operation, be sure to wait at least 10 minutes before operating the MVS to ensure the complete neutrality of the MVS.

Use a multimeter and electrical testing equipment to ensure that the whole

equipment is uncharged.

Necessary grounding and short-circuiting can be done only after confirming the neutrality.

Use insulating cloth to insulate and cover the operating parts near potentially live parts.

2.5. Electrostatic Discharge (ESD) Protection

⚠CAUTION

Wear static gloves, static wristbands, anti-static clothing, etc. before contact with electronic devices to protect the equipment from static damage.

2.6. Warning Labels

The warning signs on the body of the MVS and the internal electrical equipment contain important information for the safe operation of the MVS and internal equipment.

NOTICE

- Ensure that the warning labels of the body are clear and readable at all times, and do not cover, alter or damage it.
- Once the warning signs on the body are damaged or blurred, be sure to replace them immediately

2.7. Safety Warning Sign Setting

During on-site transportation, installation, overhaul, maintenance and other operations on the MVS, for the sake of safety, please observe the following items:

Place conspicuous warning signs at the front and rear of the MVS and on the switch to avoid switch-closing by mistake.

Set up warning signs or safety tapes near the field operation area.

2.8. Routine operation and maintenance

During daily operation, it is necessary to ensure that the doors of the MVS and the internal equipment are closed and locked, and the keys have been pulled out and handed over to the inspected person for safekeeping in order to avoid unauthorized people entering or exposure to rain, animals, etc of the internal equipment. At the same time, the MVS and internal equipment should be regularly inspected and maintained to ensure long-term reliable operation of the MVS.

 **WARNING**

- If the relevant operations are carried out when the equipment is live, be sure to do insulation protection, and ensure that at least two staffs are on site at the same time.
- The photovoltaic power station where the MVS is located is usually away from the urban area. Corresponding field rescue facilities shall be prepared as required.
- The equipment should be operated in accordance with local laws and regulations and strictly follow the safety precautions specified in this manual.
- Before maintaining or replacing equipment, make sure that the MVS is powered off and the HV side and LV side switches are disconnected.
- In daily operation and maintenance, please pay attention to the following:
 - The nameplate that contains important parameter information of the equipment is affixed to the MVS. Protect the nameplate during all operations.
 - Wear appropriate personal protective equipment during all operations, such as safety glasses, safety shoes and safety gloves.
 - It is recommended to take all necessary auxiliary measures to ensure personal and equipment safety.

2.9. Other precautions

Manual storage

The product manual is an integral part of the product. The manual contains important information on transport, installation, inspection, maintenance, etc. of the MVS. Please read this manual carefully before transporting, installing, overhauling and maintaining the MVS.

Please strictly follow the description in this manual to transport, install, overhaul and maintain the MVS. Otherwise, equipment damage, personal injury or property damage may be caused.

This manual should be kept in a safe place so that it is readily available to transport, installation and operating personnel.

Disposing of the product

The MVS cannot be treated as general waste when discarded as a whole or an individual equipment inside. Some components of the internal equipment can be recycled and reused, and some components will pollute the environment. Please contact the local authorized professional recycling organization to properly dispose of the product and internal components.

Manual Instructions

NOTICE

- In order to facilitate users to read and use this manual better, a lot of pictures are arranged in the manual. The pictures are for illustrative purposes only. For the specific details of the product, please refer to the actual product received.
- All descriptions in this manual are standard for MVS. If users have special needs, please explain to GoodWe staff when ordering. We will try our best to meet the needs. For the specific details of the product, please refer to the actual product received.
- This manual cannot cover all possible situations during installation, operation, maintenance, overhaul, etc. If you encounter situations that are not explained in the manual, please contact GoodWe in time.

3. Product Description

3.1. External Design of the MVS

3.1.1. MVS rated power $\leq 3500\text{kVA}$

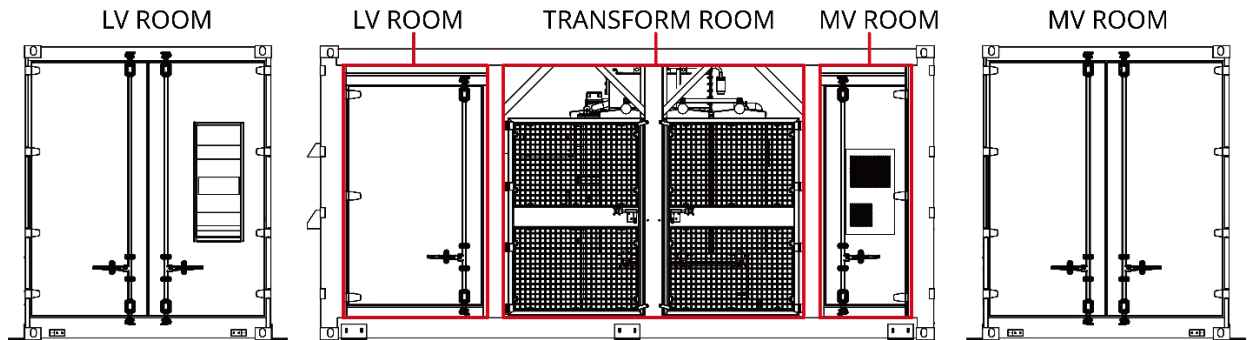


Figure 3-1 Appearance

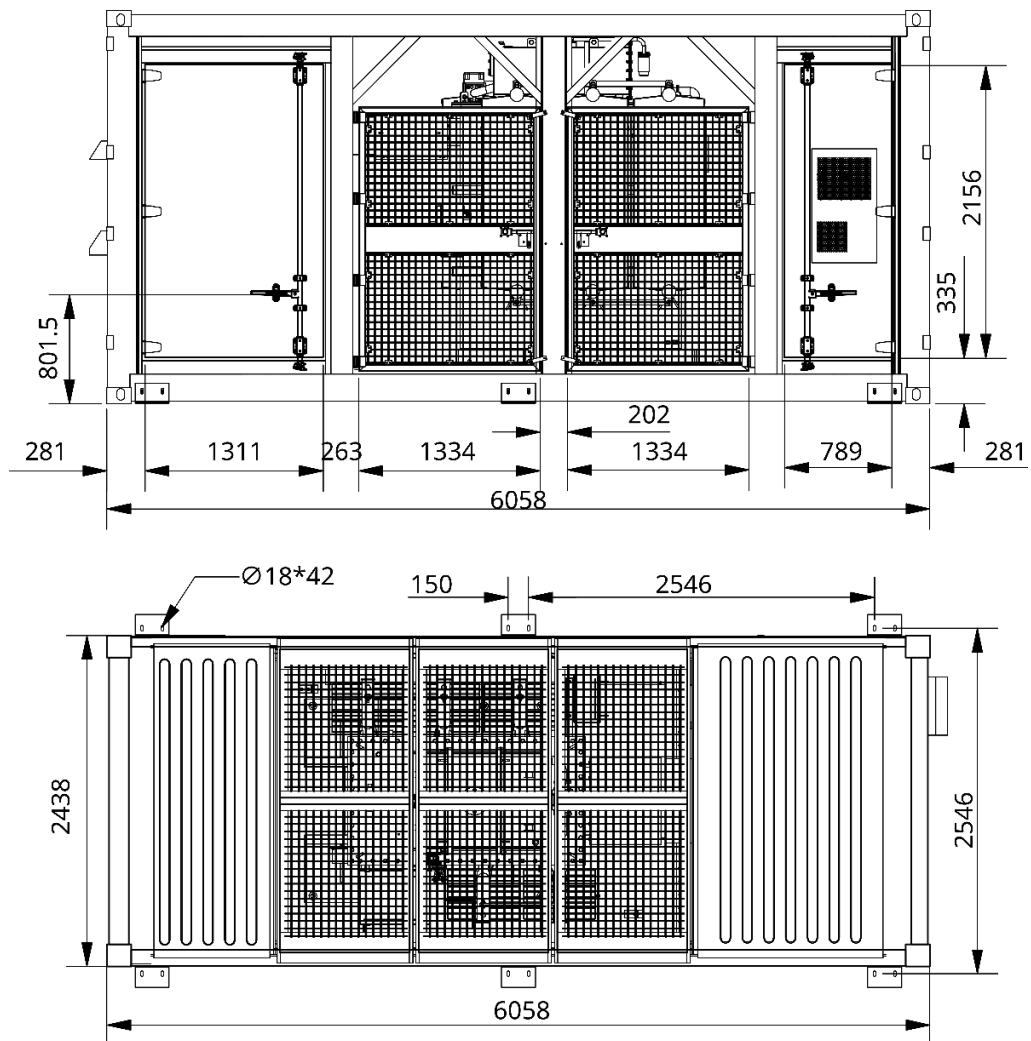


Figure 3-2 Dimension

3.1.2. MVS rated power 3500-7000kVA (Excluded 3500kVA)

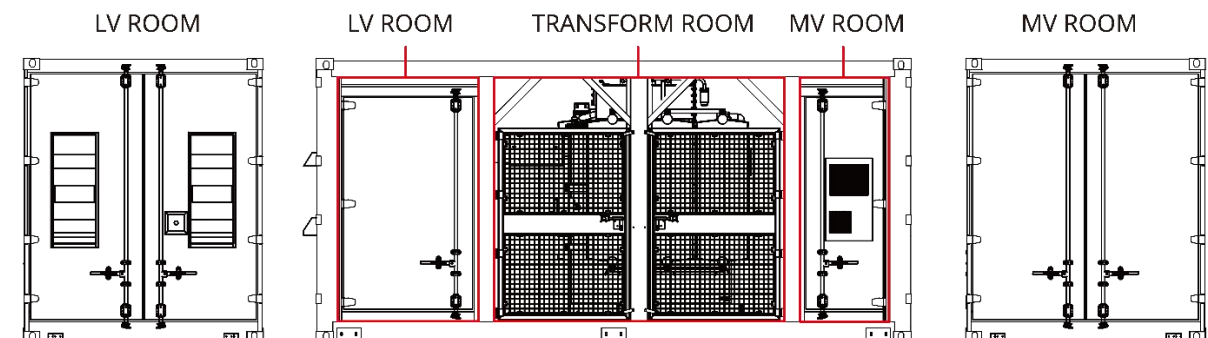


Figure 3-3 Appearance

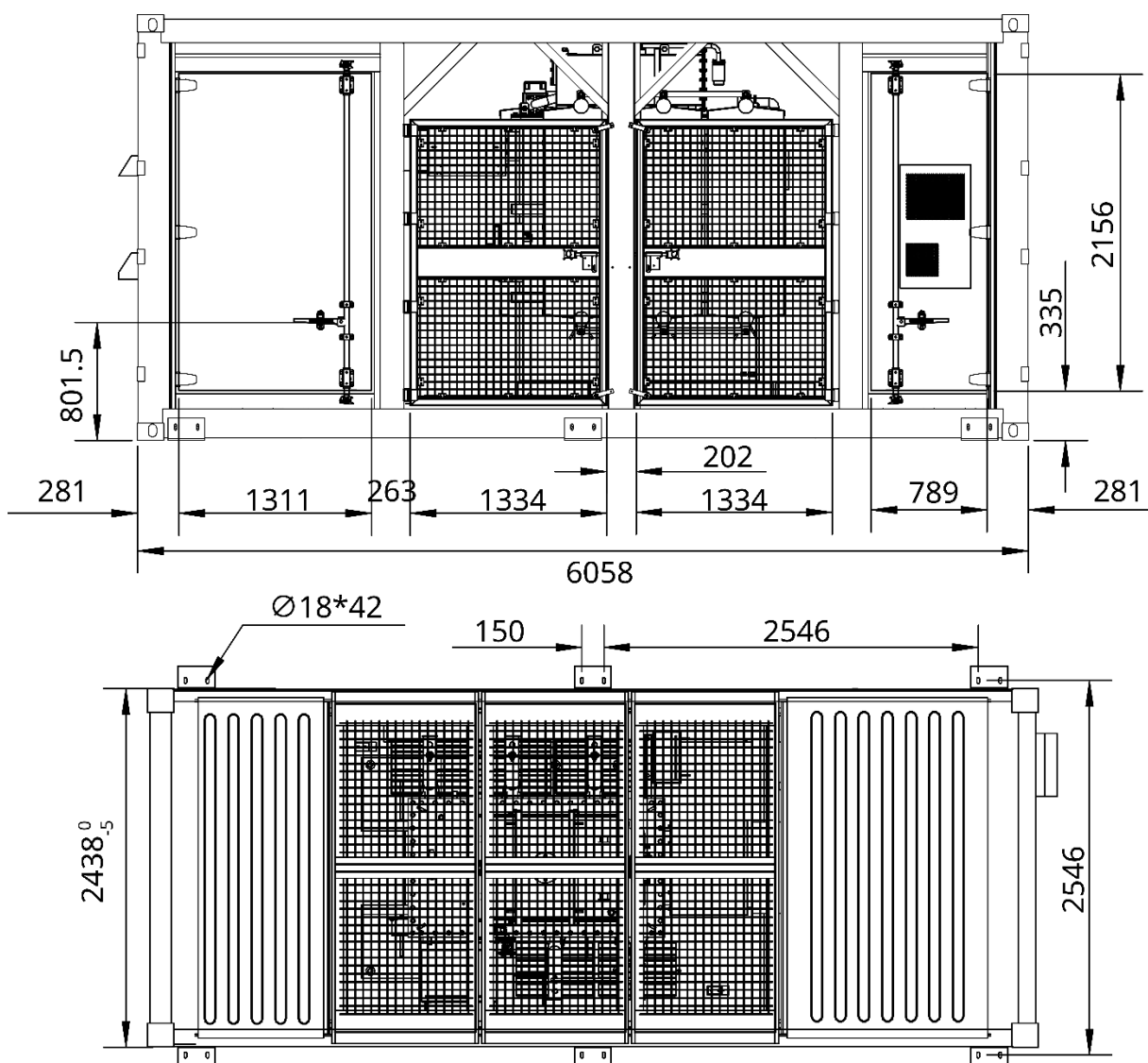


Figure 3-4 Dimension

3.2. Components

3.2.1. MVS rated power $\leq 3500\text{kVA}$

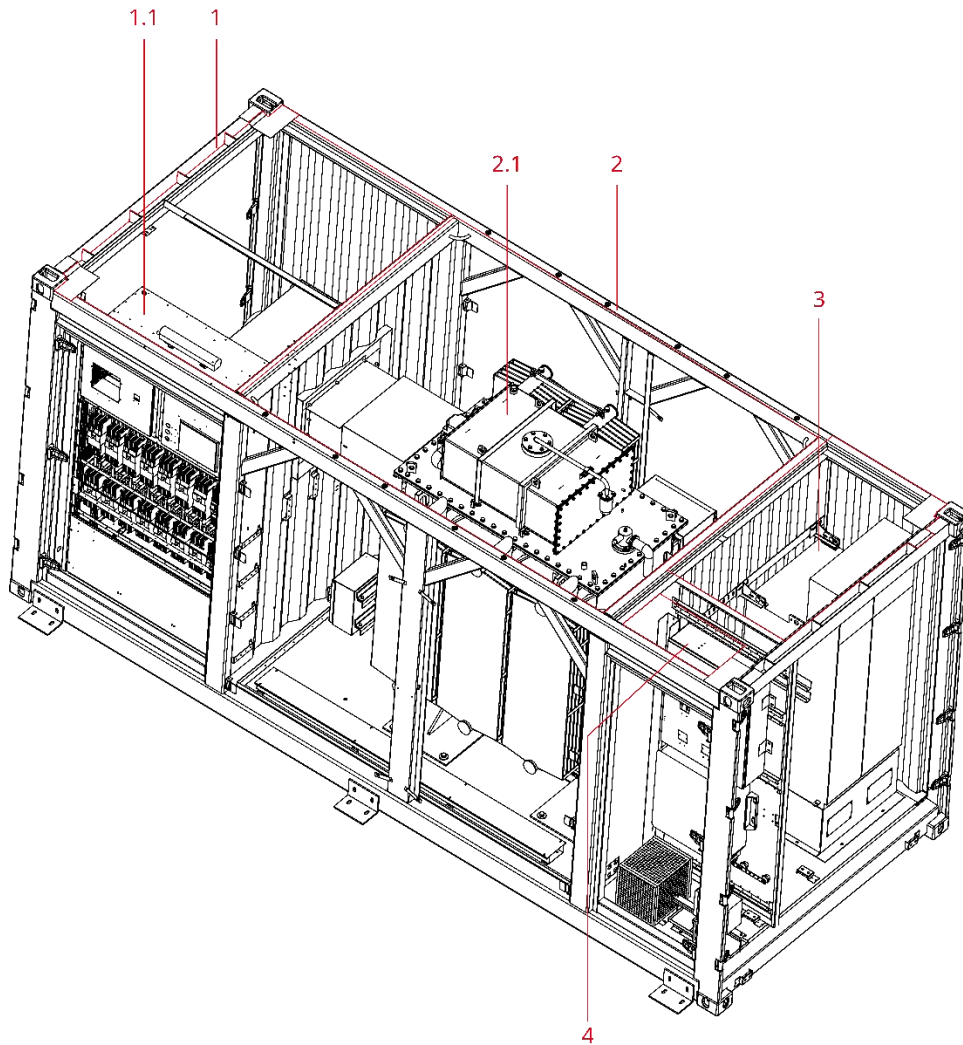


Figure 3-5 MVS Parts

| | |
|---------------------------|---------------------------|
| 1 LV(Low voltage) room | 1.1 D1 Cabinet |
| 2 Transformer room | 2.1 Transformer |
| 3 MV(Medium voltage) room | 4 Power distribution room |

3.2.2. MVS rated power 3500-7000kVA (Excluded 3500kVA)

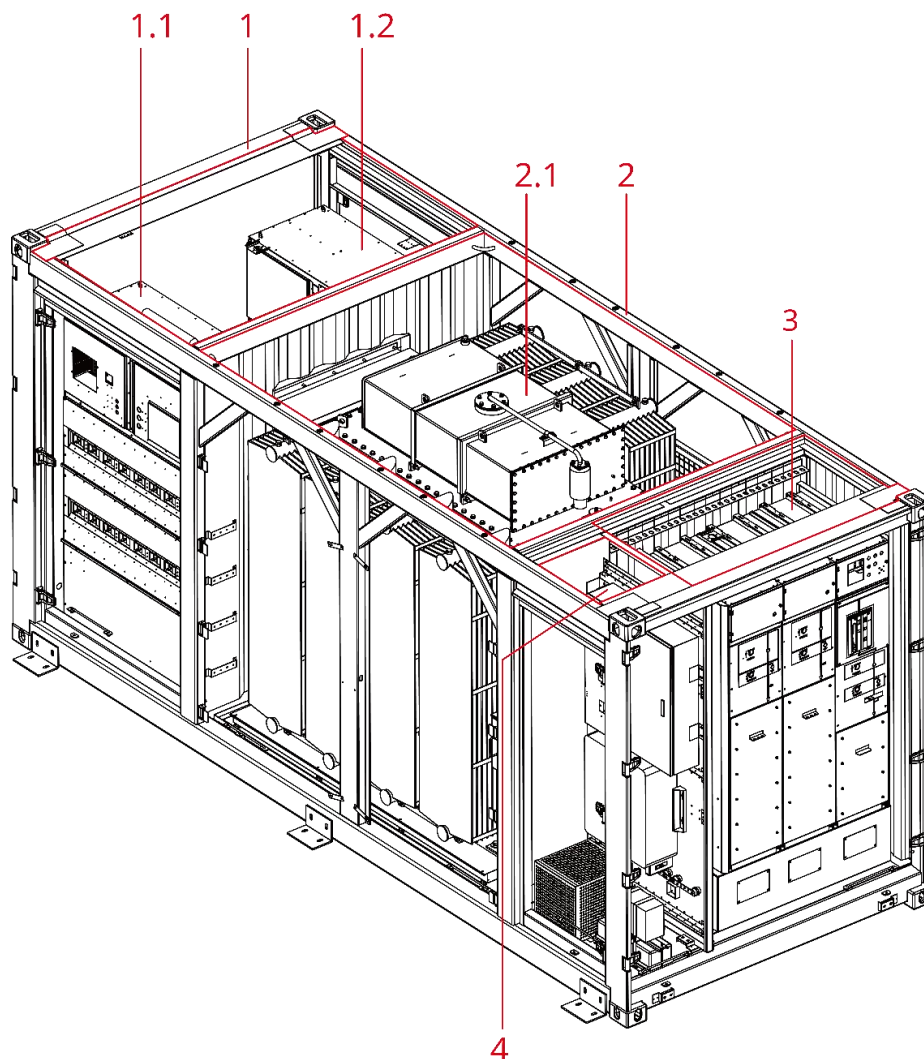


Figure 3-6 MVS Parts

| | |
|---------------------------|---------------------------|
| 1 LV(Low voltage) room | 1.1 D1 Cabinet |
| | 1.2 D2 Cabinet |
| 2 Transformer room | 2.1 Transformer |
| 3 MV(Medium voltage) room | 4 Power distribution room |

4. Installation

4.1. Inspection before Installation

NOTICE

The on-site foundation shall be designed by professional technical personnel such as the design institute.

Before placing the MVS on the foundation, check if the drainage holes have been blocked. If there is any blockage, please clear it first. After checking that the drainage pipes are not blocked, assemble the water pipes and clamps, and wrap the pipes onto the drainage pipes with clamps. After checking that the clamps are not loose, proceed to the next step.



Figure 4-1 DN50 Tube

4.2. Preparing Installation Tools

NOTICE

- The illustrated tools are for reference only, please refer to the actual product.
- Due to the different on-site conditions, this list may miss a few tools that may be used. Please prepare the tools based on the actual situation.
- Some special tools and installation materials shipped with the product are not listed, please refer to the actual situation.

Installation tools

| Tools | | | |
|--------------------------------------|---|--|--|
| Hammer drill Drill bit: $\Phi 26$ mm | Insulated torque socket wrench (including an extension bar) | Flat-head insulated torque screwdriver | Phillips insulated torque screwdriver M3, M4, M5, M6 |
| Diagonal pliers | Wire stripper | Adjustable torque wrench | Rubber mallet |
| Utility knife | Cable cutter | Adjustable torque Wrench Opening: 13-22 mm | Combination wrench |
| Pipe wrench | Hex key (M6) | Power cable crimping tool | Electrician's knife |
| File Vacuum | cleaner | Multimeter | Marker |
| Steel measuring tape | Level | Hydraulic pliers | Heat-shrink tubing |
| Heat gun | Cable tie | Soft measuring tape | Handsaw |
| Cable stripper | Crane Hoisting capability ≥ 50 t; working radius ≥ 10 m | Lifting rope and lifting eye(4) Length of the lifting rope ≥ 6.5 m | Claw hammer |
| Step ladder | Electric screwdriver | | |

Safety tools

| Tools | | | |
|------------------|-----------------|-------------------|-------------------|
| Insulated ladder | Flashlight | Protective gloves | Insulated gloves |
| Safety goggles | Safety helmet | Insulated shoes | Fire extinguisher |
| Insulation pad | Reflective vest | Rescue pole | Voltage detector |

4.3. Hoisting the Equipment

| NOTICE | |
|--|--|
| <ul style="list-style-type: none"> Before hoisting the MVS, ensure that the crane and lifting rope meet the | |

load-bearing requirements.

- When installing and disassembling hosting equipment, do not drag on the container to prevent scratching the container.
- Before installing the equipment, please check the container for visible damage, such as holes, cracks, or other signs of internal damage, and verify the equipment model. If there are any abnormal appearances or wrong equipment models, please contact your dealer.
- Place the MVS flat before the crane is evacuated.

| Model | Weight | Steel cable length | Steel cable quantity |
|-------------|--------|--------------------|----------------------|
| GW3000K-MVS | <15t | >6.5 m | 4 |
| GW7000K-MVS | <23t | >6.5 m | 4 |

Hoisting precautions

| Process | Precautions |
|---------------------|--|
| Before the hoisting | The lifting capacity of the crane should be greater than 50 t, and the working radius should be not less than 10 m. If the on-site working conditions do not meet the requirements, professional personnel need to be sought for evaluation. |
| | Personnel carrying out lifting operations must undergo relevant training and pass the qualification. |
| | Lifting tools need to be inspected and must be completed before using. |
| | Ensure that the lifting tool is firmly fixed on a load-bearing fixture or wall. |
| | It is recommended to lift containers in clear and windless weather. |
| | Confirm that the crane and steel cable meet the requirements before lifting. |
| | The doors of the container have all been closed and locked. |
| | Ensure the safe and reliable connection of the steel cable. |
| During the hoisting | It is recommended to lift from left to right or from right to left to ensure smooth lifting. |
| | During the lifting process, unrelated personnel are strictly prohibited from entering the lifting area, and people are strictly prohibited from standing below the lifting arm. |
| | Ensure that the crane is positioned appropriately and long-distance hoisting is prohibited. |
| | Keep it level, and the diagonal of the cabinet should be inclined $\leq 5^\circ$. |
| | Ensure that the angle between the two cables $\leq 90^\circ$. |
| | The lifting equipment shall be lifted and put down gently. The cabinet shall fall slowly and steadily to avoid crash on the internal equipment. |
| | When the container is in contact with the foundation, remove the hoisting steel cable after the foundation is evenly stressed. |
| | Do not drag the steel wire ropes and lifting equipment, and do not hit it with hard objects. |
| | After the first hoist MVS is fixed, the subsequent MVS hoisting can be carried out. |

4.4. Hoisting Procedure

Step 1: Confirm the installation position according to the foundation design.

Step 2: Measure the support points of the foundation, ensuring that all support points are in a same plane with an error $\leq 5\text{mm}$.

Step 3: Use a crane to lift the MVS to the installation position.

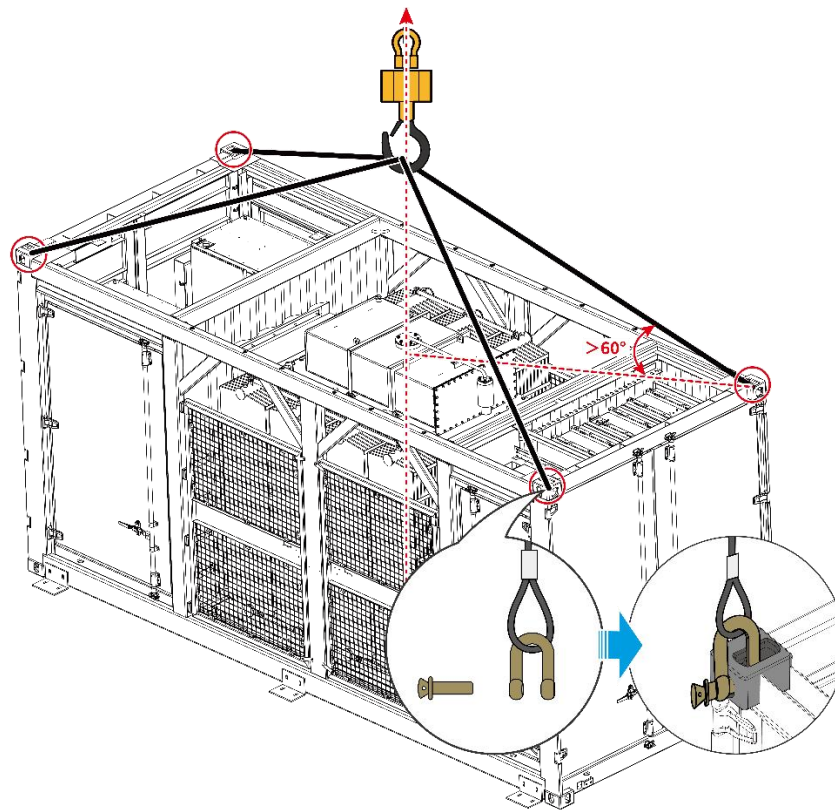


Figure 4-2 Hoisting MVS

Step 4: Remove the rainproof cloth from the MVS.

Step 5: Use pressure pliers to remove the customs lock.

Step 6: A wooden container of spare parts is shipped along with the MVS; Open the wooden container and take out the plates, padlock key, unlock all padlocks, and close all doors of the MVS.

Plate specifications: 150 * 150 * 2 mm 8 pieces; 150 * 150 * 4 mm 8 pieces.

Step 7: Slightly lift the MVS 50 mm above the foundation with a crane, and place an appropriate amount of plates under the MVS. The specific number of plates is subject to the actual situation. It is recommended to place 2 pieces of 150 * 150 * 4mm and 1 piece of 150 * 150 * 2mm plates on each side. The plates should be placed at a depth that is flush with the MVS when viewed from above, the plate

cannot be seen. The plates are only for supporting the MVS.

Step 8: Place the MVS on the ground and checks if the door can be opened smoothly. If not, lift the MVS again to adjust the plate until the door can be opened smoothly. Please refer to [6.1 Opening or Closing the Cabinet Door](#).

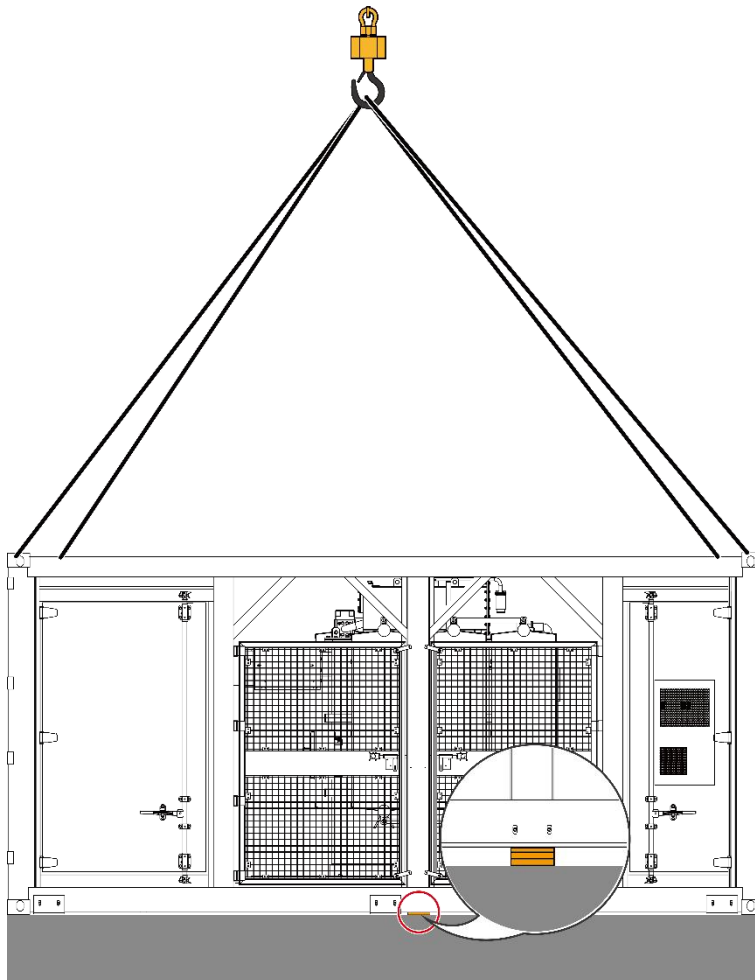


Figure 4-3 Place the shims

Step 9: Remove the hoisting equipment.

4.5. Inspection after hoisting

| No. | Inspection item | Inspection standard | Yes/No | Note |
|-----|-----------------|--|--------|------|
| 1 | Deliverables | <p>Check if the deliverables are complete, if there are any loose screws or any obvious external damage. If there are any missing items, loose screws, or any damage, please contact your dealer.</p> <p>Note:</p> | | |

| | | | | |
|---|----------------|---|--|--|
| | | <p>Please refer to the packing list for the quantity of delivered items.</p> <p>The documents are important materials, please keep them properly.</p> | | |
| 2 | MVS doors | All doors can be opened and closed smoothly. | | |
| 3 | MVS appearance | The container has no obvious deformation, tearing, or paint peeling. | | |

4.6. Fixing MVS

NOTICE

- When building the foundation, it is necessary to reserve a fixed position for angle steel on the foundation.
- There are 6 angle steel fixing positions totally on the MVS, and each position has 2 installation holes. When fixing the angle steel, all installation holes need to be fixed.

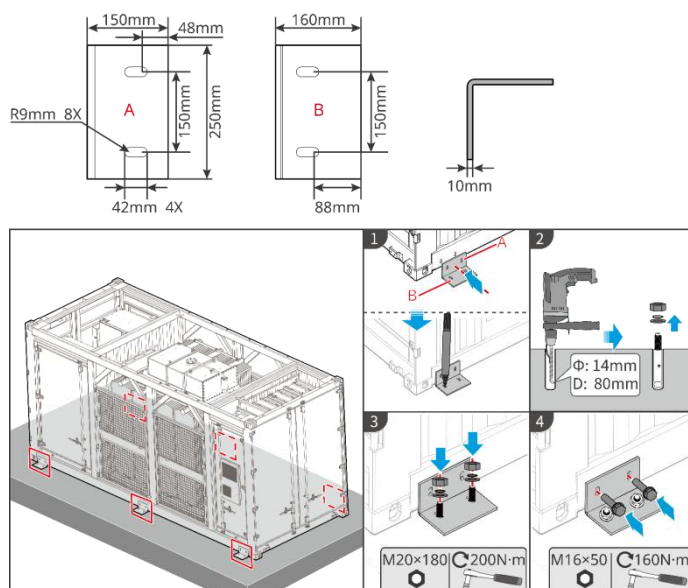


Figure 4-4 Fixing the MVS

Note: The design institute civil engineering professional verification shall prevail.

5. Inspection after Installation

| No. | Inspection item | Inspection standard | Yes/No | Note |
|-----|--|--|--------|------|
| 1 | Inside the MVS | 1. There are no foreign objects or water soaking marks inside. 2. There are no components detached in the medium and low voltage room. 3. There are no deformation, damage or oil leakage of the transformer housing, and the surface has no oil stains. 4. The transportation straps for the fixed transformer have been removed. | | |
| 2 | The contact surface between the MVS and the foundation | The contact between the MVS and the foundation is good and the support force is evenly distributed. | | |
| 3 | SF6 densimeter for MV room RMU. | The pointer of SF6 densimeter is located in the green area. If the pointer is close to the yellow or red area, please contact the after-sales service center. | | |
| 4 | Switch mechanical operation test | 1. The energy storage opening and closing of the low-voltage cabinet air circuit-breaker can be operated manually, and it is recommended to operate it five times. 2. All Molded case circuit breaker in the low-voltage cabinet can be operated for opening and closing, and it is recommended to operate them five times. 3. The load switch, circuit breaker, and earthing switch of the ring main unit can be operated in sequence, and it is recommended to operate them five times. 4. The interlocking mechanism of the MVS is operable, it is recommended to operate it five times. | | |

| | | | | |
|---|--------------------------------|--|--|--|
| 5 | Inside the low-voltage cabinet | Check that the grounding copper bar inside the low-voltage cabinet is not loose, the screws are not loose or missing, and all components and devices are not loose or displaced. | | |
| 6 | Oil level gauge | Check that the oil level gauge in the transformer oil storage tank shows normal oil level. | | |
| 7 | Shocking indicator | Check that no shocking indicator is red. | | |

6. MVS Parts

NOTICE

- When operating the transformer, make sure that both the medium voltage and low voltage sides of the transformer are not live.
- Ensure that the operation on components, which need to be operated in this section, are completed before the device is powered on. The order of operation is not mandatory.

6.1. Opening or Closing the Cabinet Door

NOTICE

- Only qualified personnel are allowed to operate. Unauthorized personnel are strictly prohibited from entering.
- Before opening or closing the cabinet door, the operation area must be identified and the operation scope must be defined.
- The opening and closing methods of the LV room, MV room, distribution room, and transformer room are the same. The figure is for illustrative purposes only.

Step 1: Open the Cabinet Door

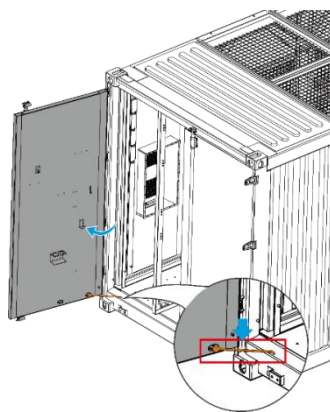


Figure 6-1 Open the Cabinet Door

Step 2: Close the Cabinet Door

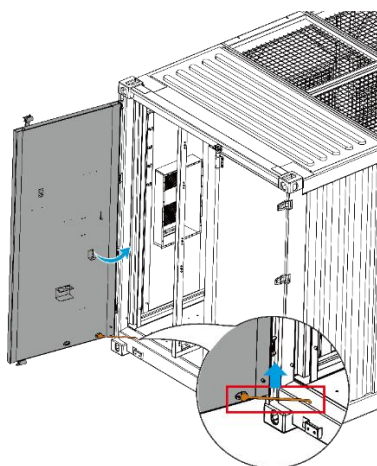


Figure 6-2 Close the Cabinet Door

6.2. Remove the Pressure Relief Valve Safety Cover

6.2.1. MVS rated power $\leq 3500\text{kVA}$

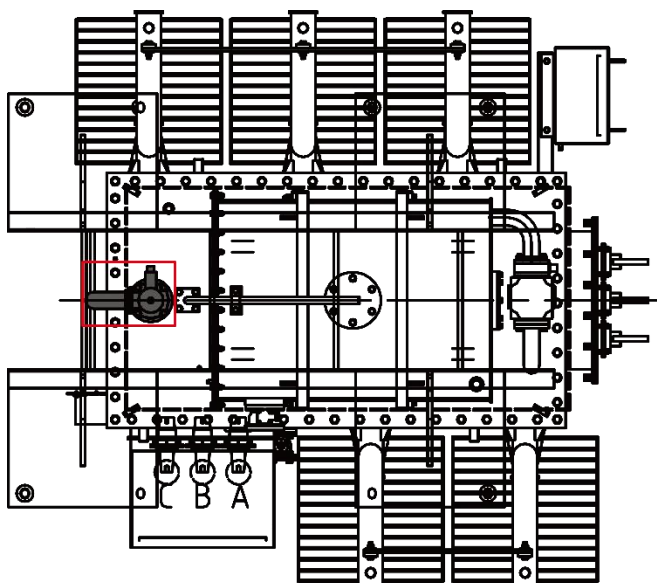


Figure 6-3 The installation position of the pressure relief valve in the top view of the transformer

6.2.2. MVS rated power 3500-7000kVA (Excluded 3500kVA)

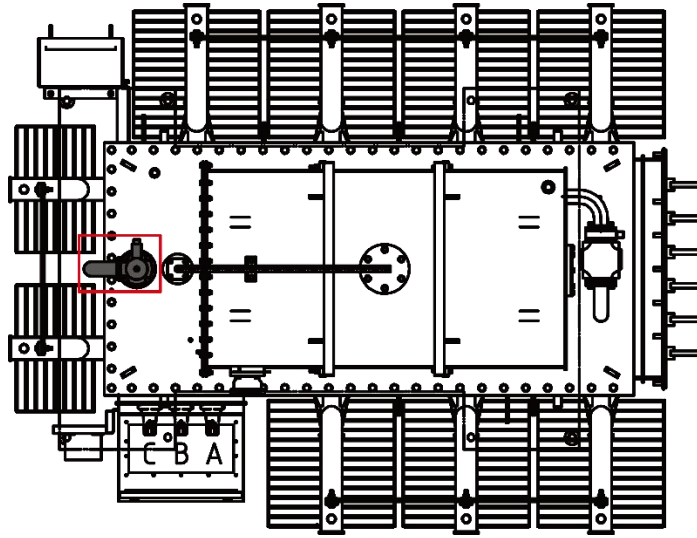


Figure 6-4 The installation position of the pressure relief valve in the top view of the transformer

Remove the pressure relief valve safety cover

Turn counterclockwise to remove the pressure relief valve safety cover.



Figure 6-5 pressure relief valve safety cover

6.3. Installing Moisture Absorber

The MVS has reserved installation positions for a moisture absorber. Install the corresponding moisture absorber according to the configured moisture absorber type.

6.3.1. MVS rated power $\leq 3500\text{kVA}$

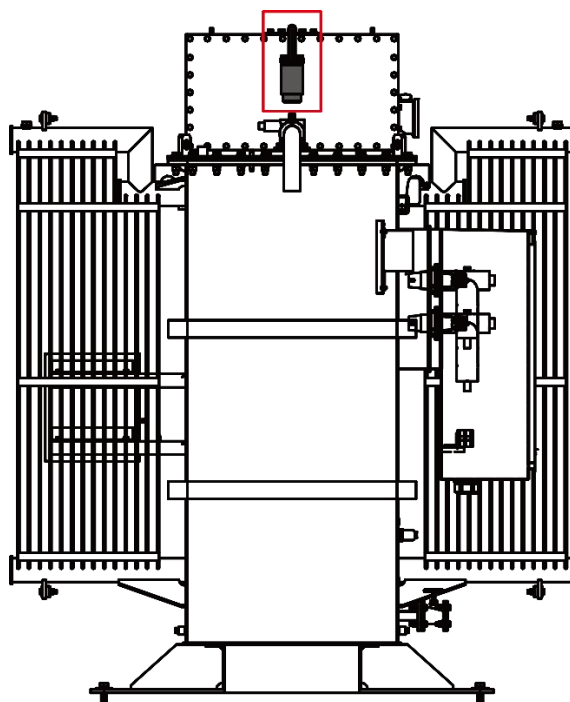


Figure 6-6 Installation positions for moisture absorber

6.3.2. MVS rated power 3500-7000kVA (Excluded 3500kVA)

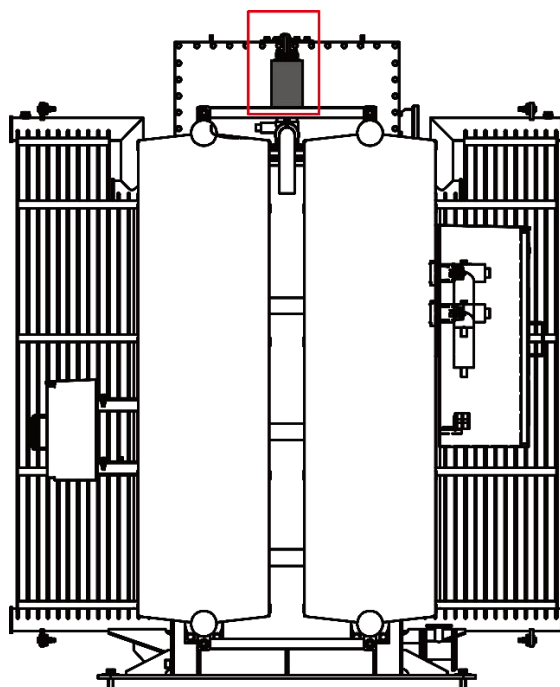


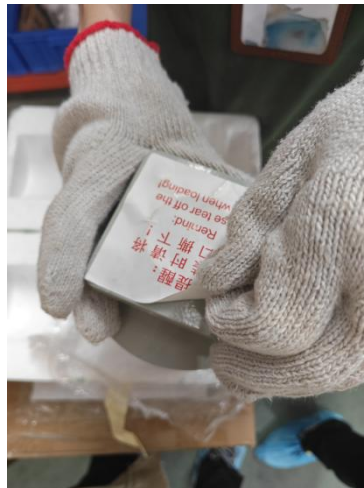
Figure 6-7 Installation positions for moisture absorber

Procedure

The connection between the oil drain valve and the flange of the oil drain valve is for oil discharge and injection, and for taking oil samples and replenishing oil. Users need to provide oil drain valve flange with a diameter of 50mm by themselves.

Step 1: Turn the knob on the oil drain valve at the bottom of the transformer counterclockwise, place it in the open position, start the oil filter, and extract the oil from the transformer.

Step 2: Tear off the adhesive paper from the flange.



Step 3: Place a sealing gasket on the flange.



Step 4: Install the respirator to the breathing tube port, tighten the bolts diagonally, and install the sealing gasket as shown in the following figure.



Step 5: Remove the oil cup and fill the cup with oil level between the two red lines.



Step 6: Install the oil cup.



6.4. Install the heat exchanger rain shield

Procedure:

Step 1: Before installation, take out the heat exchanger rain shield from the spare parts wooden container, and tear off the film on the surface.

Step 2: Align the upper and lower screw holes of the heat exchanger rain shield with the heat exchanger, and fix the screws in the holes.

Step 3: After installation, apply structural adhesive (structural adhesive needs to be prepared by the customer) to the gap between the rain shield shell and the heat exchanger shell, and then check the joint between the heat exchanger, rain shield and the MVS, and apply structural adhesive to ensure there is no gap at the connection.

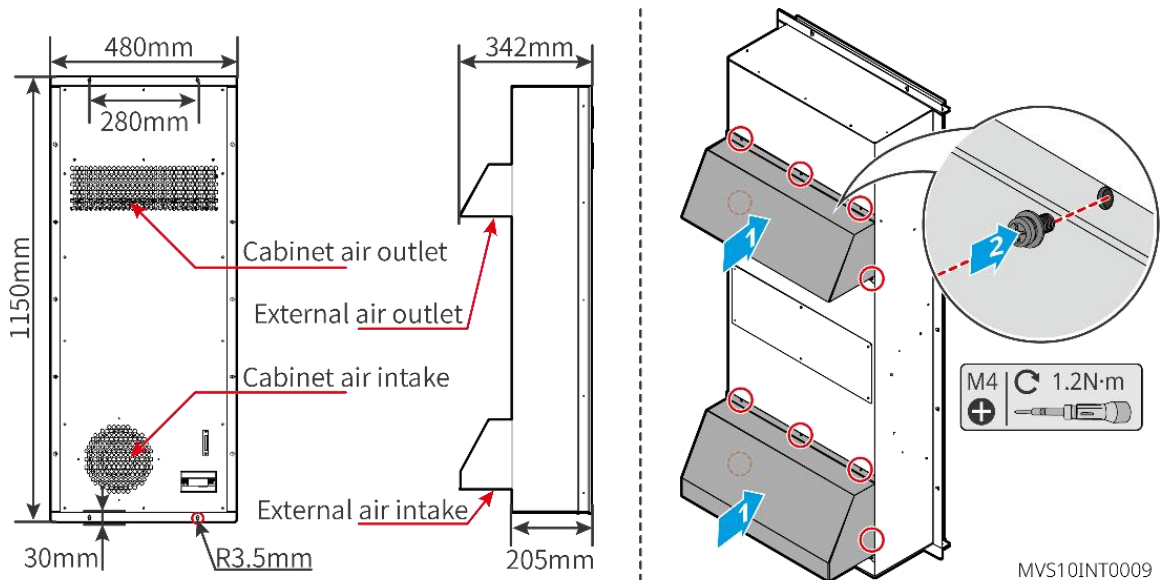


Figure 6-8 Install the heat exchanger rain shield

6.5. Remove the Shockproof Foam in Oil Surface Temperature

Meter

Step 1: Rotate the oil temperature gauge with both hands until the cover is loose, and then remove the cover.

Step 2: Remove the shockproof foam, align the slot with the gap, and twist the cover back.

Step 3: Adjust the red pointer to be parallel to the gauge pointer.

7. Insulation test of MVS

Insulation tests for MVS include: insulation tests on the low-voltage side of the transformer and busbars insulation tests on the low-voltage side. For detailed operations, please refer to the 'GW3500-7000K MVS Smart Transformer Station User Manual'.

8. Electrical Connections

Precautions

DANGER

- Wear personal protective equipment and use dedicated insulated tools to avoid electric shocks or short circuits.
- Before connecting cables, ensure that the upstream and downstream switches of the MVS are turned off, and that the MVS is not energized. Otherwise, the high voltage may result in electric shocks.

WARNING

- The product warranty does not cover equipment damage caused by incorrect cable connections.
- Only qualified electricians can perform operations about electrical connections.
- Operation personnel must wear PPE when connecting cables.
- Before connecting cables to ports, leave enough slack to reduce the tension on the cables and prevent poor cable connections.

NOTICE

- If the oil tank is at the bottom of the MVS, ensure good ventilation on the top of the oil tank. Otherwise, the moisture from the oil tank will enter the container, resulting in condensation inside the container due to high humidity. As a result, short circuits may occur, causing the MVS failure.
- Please use a cleaning agent to clean the insulation interface of the lightning arrester. After the cleaning agent evaporates, apply silicone grease evenly.
- When multiple MVSs are cascaded, insulation plugs must be installed on the G3 cabinet of the last MVS.
- The cable colors shown in the electrical connection diagrams provided in this section are for reference only. Select cables in accordance with local cable specifications. (Green-and-yellow cables are only used for protective earthing.)

Cable Connection Requirements

Before connecting cables, clean the terminals. Do not touch the terminals after they are cleaned.

Cables must be neatly arranged and cable insulation layers must be intact.

Cable connectors prepared onsite must be secure, reliable, and neat, and conform to specifications.

Power cables, grounding cables, and signal cables should be securely and reliably connected in conformity with wiring regulations.

The power cable routing meets the requirements for strong and weak current routing and in compliance with the cable routing plan. Power cables and signal cables should be bound separately.

Both ends of cables should be marked with a label that is concise, easy to understand, and faces outward.

Cable ties should be neatly cut without sharp edges, evenly distributed, bound to a proper strength, and fastened toward the same direction.

The bound cables should be close to each other, straight, and neat.

The redundant cables should be coiled neatly for identification.

Cables should not be overly bent to avoid damaging the cable cores.

Cables should not be tied where they bend.

8.1. Preparing Cables

- Cables should have sufficient current-carrying capacity and should not be overloaded.
- Cables with the same functions should be of the same specifications and type.

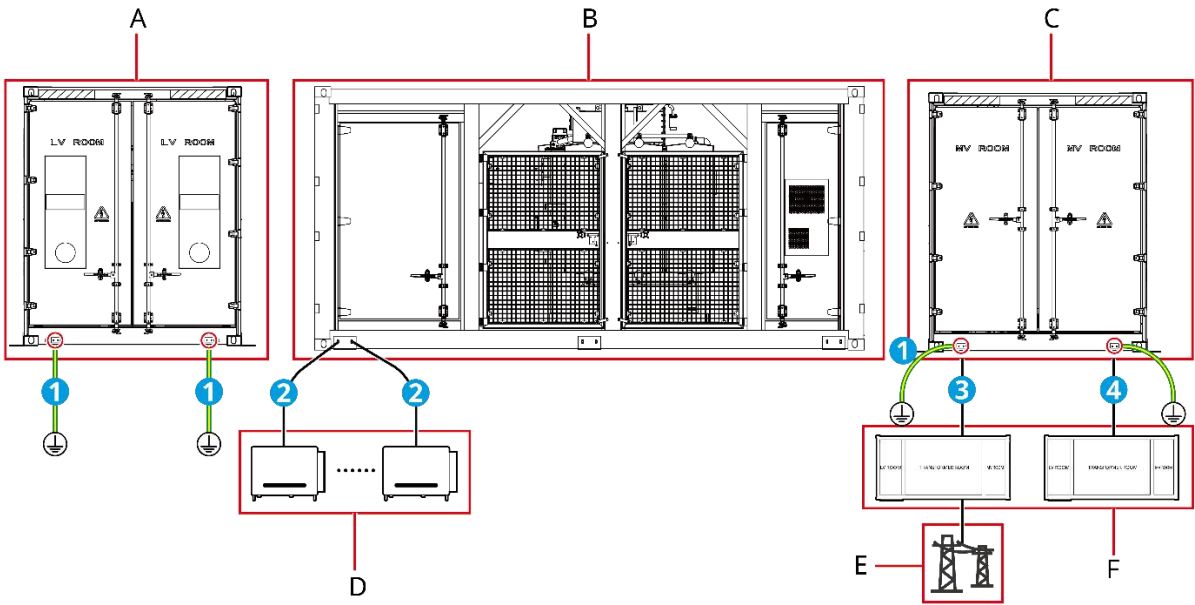


Figure 8-1 Wiring diagram (configure the components in the dotted containers as required)

| | | |
|----------------------------------|---------------------------|----------------------------------|
| (A) Side view of the MVS LV Room | (B) Front view of the MVS | (C) Side view of the MVS MV Room |
| (D) Inverter | (E)Grid | (F) MVS |

| No. | Cable | Type | Cross-Secti onal Area | Outer Diameter | Source |
|-----|----------------------|---|---|-----------------------------------|--|
| 1 | PE cable | Single-core outdoor copper M12 screw, OT/DT terminal cable, and | 70mm ² -240 mm ² | 10mm-32m m | Prepar ed by the custom er |
| 2 | AC input power | Single-core three-core outdoor copper/ or | 50mm ² -240 mm ² | Single-core : 16mm-35m m | Prepar ed by the |

| | | | | | |
|---|--------------------------|--|---|-------------------------------|--------------------------------|
| | cable a | copper-clad aluminum/aluminum alloy cable and M12 OT/DT terminal | | three-core: 16mm-72mm | customer |
| 3 | Cabinet G1 cable b | Single-core or three-core outdoor copper/ copper-clad aluminum/aluminum alloy cable and separable shielded cable connector | Single-core : 70mm ² -630 mm ² three-core: 70mm ² -300 mm ² | Single-core : 30mm-70mm | Prepared by the customer |
| 4 | Cabinet G3 cable b | | | three-core: 30mm-120 mm | Prepared by the customer |

Note a: AC input power cables can be 300 mm² and 400 mm² single-core cables under the following conditions.

- Outer diameter of a single-core cable ≤ 35 mm.
- Dimensions of a wiring terminal: width ≤ 43 mm; length ≤ 136.5 mm; outer diameter of the crimping tube ≤ 37 mm.

Note b: the restrictions between the cable diameter and voltage level of the ring main unit are as follows:

- For a single-core cable, if the voltage level is higher than or equal to 23 kV, the maximum cable diameter is 70 mm; if the voltage level is lower than 23 kV, the maximum cable diameter is 65 mm.
- For a three-core cable, if the voltage level is higher than or equal to 23 kV, the maximum cable diameter is 120 mm; if the voltage level is lower than 23 kV, the maximum cable diameter is 105 mm.

8.2. Connecting the MVS to the Grounding Grid

Grounding Requirements

The grounding grid should be constructed underground around the MVS. The grounding should comply with the local regulations on electrical safety.

Do not connect protective devices such as fuses and switches to the grounding grid.

Procedure

Step 1: There are two grounding points on each side of the MVS container, and select the nearest point for connection. Connect one grounding cable to each of the LV room and MV room.

Step 2: Use two M12 grounding bolts to connect the MVS to the on-site grounding grid through a grounding terminal.

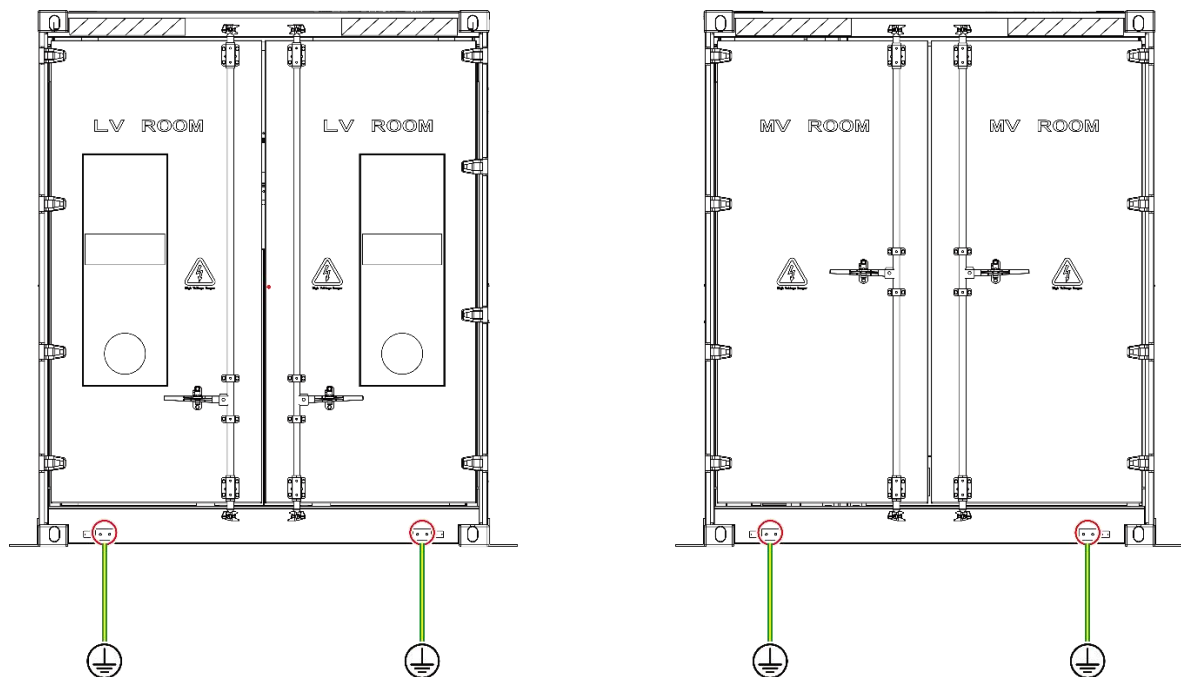


Figure 8-2 Connect the grounding point of MVS to the grounding grid

Step 3: To enhance the corrosion resistance of a ground terminal, apply silicone grease or paint on it after connecting the PE cable

8.3. Connecting AC Input Power Cables

Requirements on an OT or DT Terminal

NOTICE

- The cables and terminals are to be chosen by the customer, with the manual content provided for reference only. Cables will not be included in the shipment. For terminals, it is recommend to purchase the GoodWe products.
 - The cable material must comply with local regulations and standards.
 - Do not connect aluminum wiring terminals to the AC terminal block directly, which may cause electrochemical corrosion and affect the reliability of cable connections.
 - Comply with the IEC 61238-1 requirements when using copper-to-aluminum wiring terminals, or aluminum wiring terminals along with copper-to-aluminum washers.
 - When copper-to-aluminum wiring terminals are used, the copper part of the copper-to-aluminum wiring terminals must be at least 5 mm longer than the AC terminal block. The aluminum side cannot contact the AC terminal block.
 - Do not mix up the aluminum and copper sides of a copper-to-aluminum washer. Ensure that the aluminum side of the washer contacts the aluminum wiring terminal, and that the copper side contacts the AC terminal block.
-
- If a copper cable is used, use copper wiring terminals.
 - If a copper-clad aluminum cable is used, use copper wiring terminals.
 - If an aluminum alloy cable is used, use copper-to-aluminum wiring terminals, or aluminum wiring terminals along with copper-to-aluminum washers.
 - AC input power cable holes for corresponding MCCB:

8.3.1. MVS rated power $\leq 3500\text{kVA}$

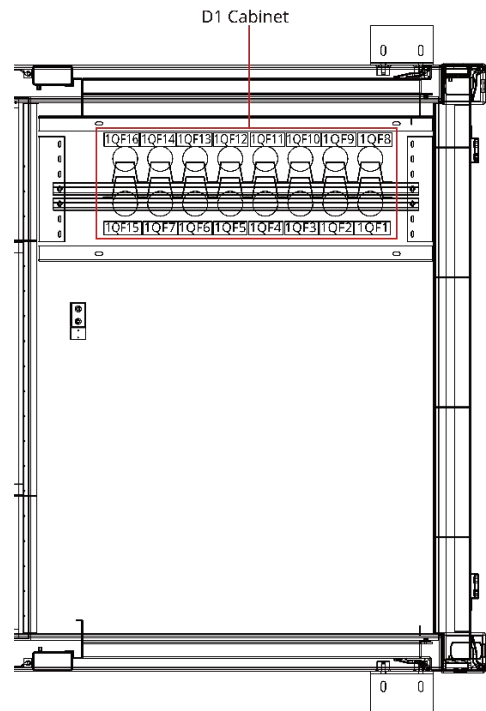


Figure 8-3 AC input power cable holes for corresponding MCCB

8.3.2. MVS rated power 3500-7000kVA (Excluded 3500kVA)

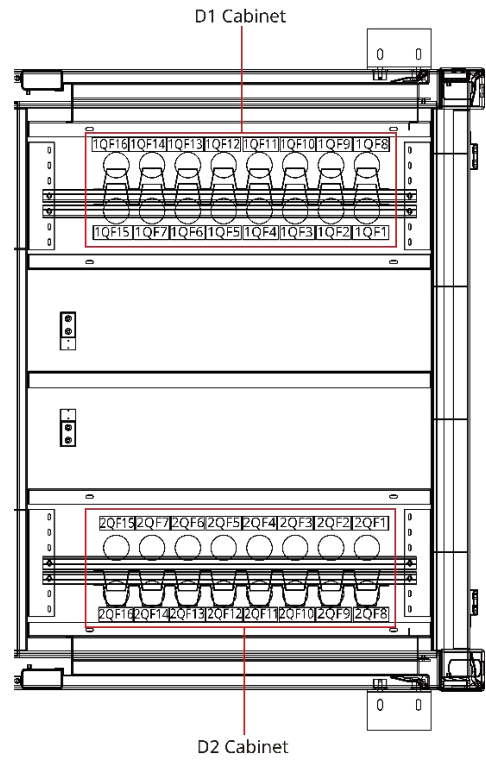


Figure 8-4 AC input power cable holes for corresponding MCCB

Procedure

WARNING

Failure to connect the cable clip securely will damage the low-voltage connection bar support insulator and cause the breaking of the insulator.

Notice

- The screw assembly whose model is subject to the delivery should be tightened according to the corresponding standard torque.
- Pre-tighten the nuts of the AC input power cables with a torque of 5 N·m when securing the cables.
- The wiring terminal must be installed with heat-shrink tubing at the crimping area of the cable conductor. Ensure that the electrical clearance between the conductors is greater than 20 mm.
- AC input power cables shall be laid out according to the design, routed to the wiring positions on the corresponding switches, and labeled

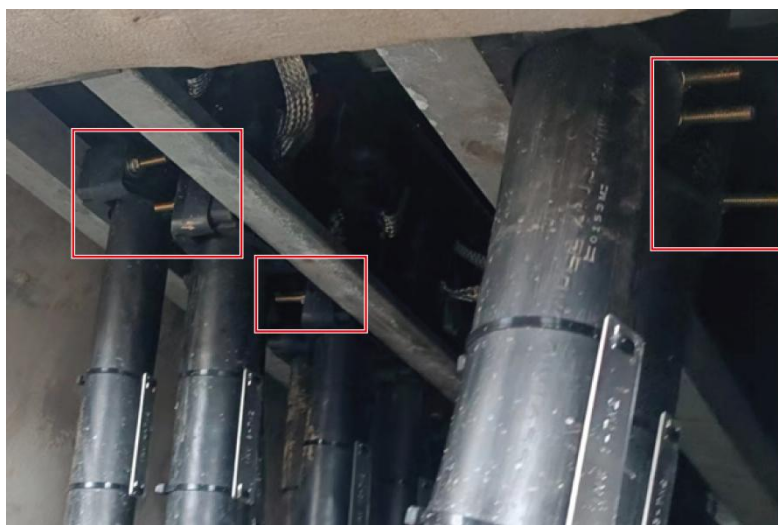


Figure 8-5 Connect the cable clip

Step 1: Install the cable clamp of the AC input cable before connecting the AC input cable.

Step 2: Thread through the cable clip, connect the AC input cable, and tighten the screws on the cable clip. It is recommended to use a fixed wrench to secure the nut and use a socket wrench to tighten the bolt.

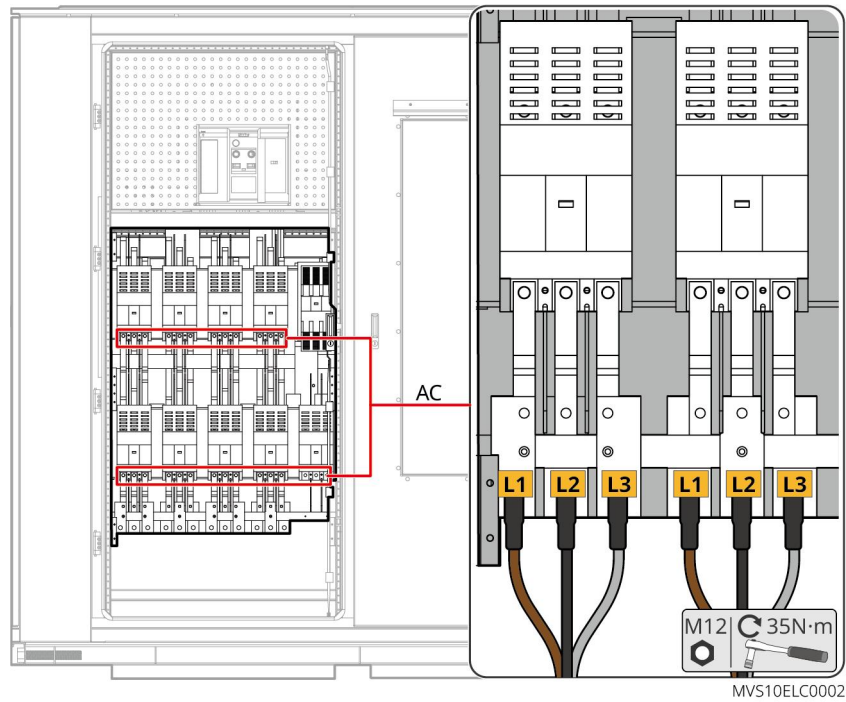


Figure 8-6 Connecting AC input power cables

Step 3: Seal the cable holes at the bottom with fireproofing mud.

8.4. Connecting AC Output Power Cables

NOTICE

If the outer diameter of a cable is small, fill the removed insulation layer between the cable clip and the cable to ensure that the cable is securely connected. If the cables are not securely connected, the ring main unit may be damaged, causing gas leakage.

Interlocked the door of the power cable room of the ring main unit with the earthing switch. The door of the power cable room can be opened only when the earthing switch is closed.

When connecting the incoming cables, ensure that the earthing switch of the upstream outgoing cable cabinet is closed. After connecting cables, ensure that the earthing switch of cabinet G1 in the ring main unit of the MVS is opened.

Before closing the earthing switch of ring main unit in the MVS, turn off the switch in the upstream cabinet G3.

If multiple MVSs are cascaded, cabinet G3 of the last MVS should be installed with insulation plugs by the Engineering, Procurement, Construction (EPC) party.

Route cables to corresponding positions according to the design and label the cables.

If the foundation is too high to connect cables, the customer needs to add a construction platform to facilitate cable connections.

If the cables are not securely connected, the RMU may be damaged, causing gas leakage.

Reserve pressure relief channels for the RMU, and add protective measures to prevent high temperature gas from burning nearby personnel during pressure relief.

If the oil tank is at the bottom of the MVS, ensure good ventilation on the top of the oil tank. Otherwise, the moisture from the oil tank will enter the container, resulting in condensation inside the container due to high humidity. As a result, short circuits may occur, causing the MVS failure.

Procedure

NOTICE

- The cable room of the load switch cabinet supports double row cable connection.
- Failure to connect cables securely will damage the ring main unit and cause gas leakage.

- The following figure demonstrates the connection method of the CCV, and other types of ring main cabinets follow the principle of connecting upstream G3 cabinets to downstream G1 cabinets.

Step 1: Cut a cable inlet hole according to the cross-sectional area of the cable.

Step 2: Prepare terminals and secure them by referring to the installation guide to the split-type shielded cable connector.

NOTICE

If a fault indicator is to be installed on site, the shield of the cable needs to be grounded after it enters the G1 cabinet, so that the shield grounding position as down as possible, in order to facilitate the installation of the fault indicator when the shield does not need to pass through the sensor.

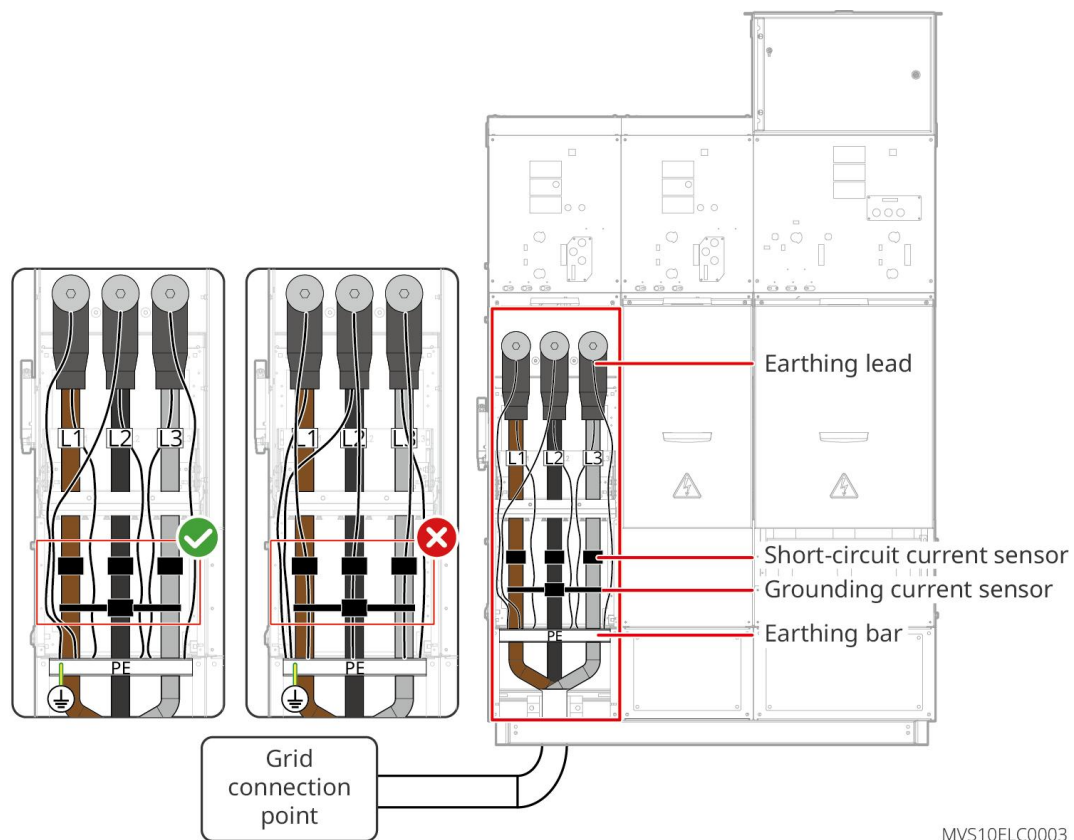


Figure 8-7 Connecting an AC output power cable (a single MVS)

NOTICE

- Please note that the bushing (head) grounding cables could not pass through the magnetic ring of grounding sensor.
- It is recommended to use grounding cables with 2 mm²-4 mm² to ensure proper installation.

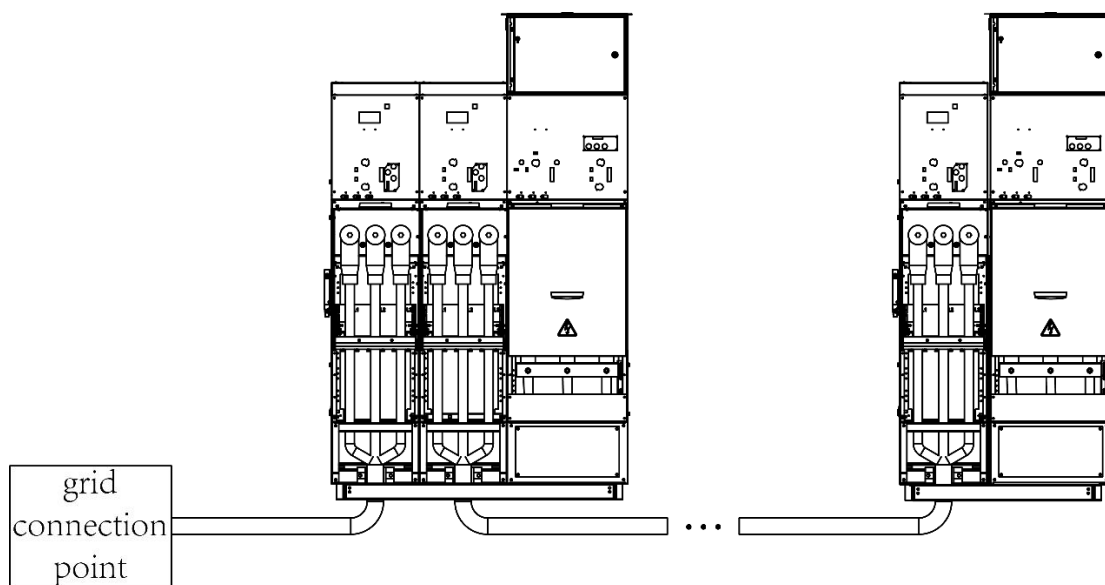


Figure 8-8 Connect the AC output power cables (for MVs cascading when cabinet G2 is on the right (CCV or DCV))

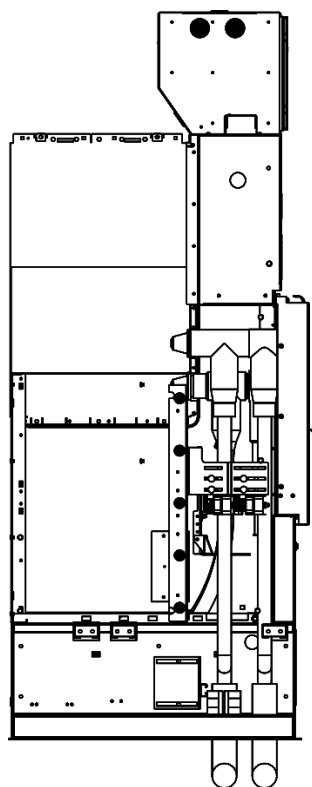
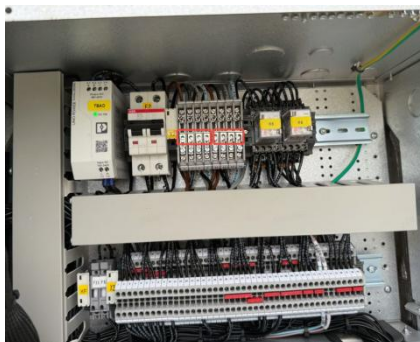


Figure 8-9 Schematic diagram of double row cable connection

Step 3: Fill the insulation layer cut off during cable production between the cable and the cable clip to ensure the secure connection of cables.

Step 4: Make sure the Earthing lead of Tee connector do not pass through any indicators (If there are fault sensors installed)

Step 5: Open the control compartment of RMU and remove the short-circuiting metallic bar.



Step 6: Use fireproof mud to seal the bottom wire holes, remove debris from the cable room, and close the cable room door.

8.5. Installation of fault indicators (optional)



Figure 8-10 Fault Indicators

8.5.1. Installation Preparation

Prepare tools: wire strippers, nylon ties, Phillips screwdriver, hobby knife, metal hose and fiber optics.

Use the stripping pliers for the optical fiber.

8.5.2. Installation Steps

NOTICE

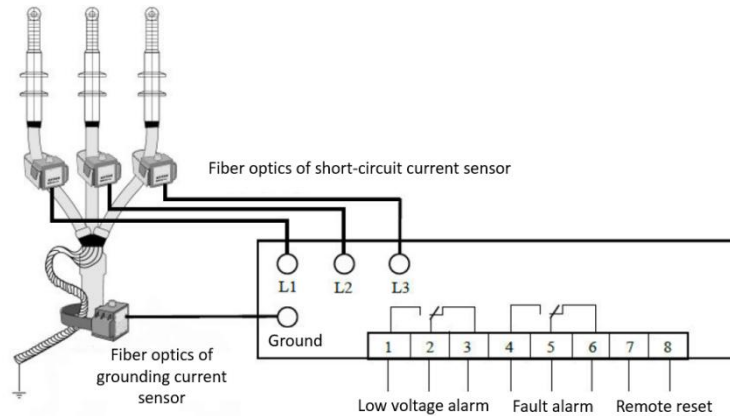
- Be careful not to break the optical fiber during threading to ensure that the communication function of the optical fiber is intact.
- Ensure that the metal hose is firmly tied inside the RMU.

Step 1: Install the short-circuit current sensors on each of the single-phase cable.

Step 2: Install the grounding current sensor on the three cables.

- If a single-core cable is used on site, all three cables must through the grounding current sensor.

- If a three-core cable is used on site the grounding current sensor needs to be fixed on the bus.



- If the grounding position of cable is above the sensor, it needs to pass through the sensor and be grounded.
- If the grounding position of cable is below the sensor, it is grounded directly.

Step 3: Remove the light shield of 3 optical fibers and connect the short-circuit current sensor and the fault indicator main unit.

Step 4: Remove the light shield of the remaining 1 fiber and connect the grounding current sensor and the fault indicator main unit.

9. Verifying the Installation and Cable Connections

| No. | Acceptance criteria | Yes/No | Note |
|-----|---|--------|------|
| 1 | All onsite components are installed correctly and securely. | | |
| 2 | All switches are OFF. | | |
| 3 | All cables are connected correctly and securely. | | |
| 4 | All screws are tightened. | | |
| 5 | Unused cable holes are covered with waterproof caps. | | |
| 6 | The cable holes in use are sealed. | | |
| 7 | The installation space is proper, and the installation environment is clean and tidy. | | |
| 8 | All doors of the MVS are closed and properly locked. | | |

10. Power-On

The MVS power-on process includes powering on the auxiliary loop, smart subarray controller, and the low-voltage loop. For details, see 'GW3500-7000K MVS Smart Transformer Station User Manual'.

11. Appendix

| | |
|------|-------------------------------|
| AC | Alternating Current |
| ACB | Air Circuit-Breaker |
| DC | Direct Current |
| FU | Fuse |
| LV | Low Voltage |
| MCB | Micro Circuit Breaker |
| MCCB | Molded Case Circuit Breaker |
| MV | Medium Voltage |
| MVS | Medium Voltage Station |
| O&M | Operations & Maintenance |
| PE | Protecting Earthing |
| PLC | Power Line Communication |
| PPE | Personal Protective Equipment |
| RMU | Ring main unit |
| SPD | Surge Protection Device |
| UPS | Uninterruptible Power Supply |
| VCB | Vacuum Circuit Breaker |



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