INOVANCE

Advancing industrial technology,
for a better world



MD880LC Series Multi-Drive Cabinet

Design and Maintenance Guide

Industrial Automation | New Energy Vehicle | Intelligent Elevator | Intelligent Robot | Digital Energy | Rail Transit

Data code 19012484A02

Legal Information

Copyright

Copyright © 2024 Shenzhen Inovance Technology Co., Ltd. All rights reserved

This documentation is the exclusive property of Shenzhen Inovance Technology Co., Ltd. No individual or entity may excerpt, reproduce, modify, translate, or distribute any content herein without written consent from Inovance.

Legal action will be taken against infringement.

Trademarks

INOVANCE is a registered trademark of Shenzhen Inovance Technology Co., Ltd. and its affiliates. All other trademarks or registered trademarks mentioned in this documentation are the property of their respective owners. Unauthorized use of these trademarks by third parties for any purpose without written authorization could violate the rights of their owners.

Disclaimer of Liability

Due to continuous updates and improvements of products and technologies, the content of this documentation may not fully match the actual products. In the event of any discrepancies, the actual products shall prevail.

The contents are subject to change without notice due to product upgrade.

Waste Disposal

The storage, use, and disposal of this product (including optional accessories) must comply with local laws and regulations.

Qualified Personnel

The product/system described in this documentation may be operated only by personnel qualified for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel can identify the risks of the product/system and prevent possible dangers.

Proper Use of the Product

Proper transportation, storage, assembly, installation, commissioning, operation, and maintenance are required to ensure the safe operation of the product without any problems. The required ambient conditions must be met. All operations must follow the guidelines provided in this documentation.

Preface

Introduction

This user guide describes design of the MD880LC series cabinet, including the auxiliary cabinet, cable incoming cabinet, basic rectifier cabinet, active rectifier cabinet, inverter cabinet, and DC chopper cabinet, as well as maintenance and inspection on the cabinet.

This user guide is intended for designers of MD880LC series product cabinet layout.

More documents

Name	Code	Description
MD880LC Series Multi-drive Cabinet Design and Maintenance Guide	19012484	Presents the design and maintenance of the cabinet, including auxiliary cabinet, cable inlet cabinet, and basic rectifier cabinet, active rectifier cabinet, and inverter cabinet.
MD880LC Series AC Drive (Multi-drive System) Installation Guide	19012448	Presents preparations before installation, unpacking and transportation, mechanical installation, electrical installation, daily maintenance, and component replacement.

Revision history

Date	Version	Description
May 2025	A02	**Added the following content:** • Added "H6w Active Rectifier Cabinet (*"4.5.1 H6w Active Rectifier Cabinet" on page 48*)." • Added "H6w Inverter Cabinet (*"4.6.1 H6w Inverter Cabinet" on page 54*)." • Added "H6w DC Chopper Cabinet (*"4.7.1 H6w DC Chopper Cabinet" on page 59*)." • Added "H7w DC Chopper Cabinet (*"4.7.2 H7w DC Chopper Cabinet" on page 60*)." • Added "Replacing the DC Fan of H6w Active Rectifier Module (*"5.4.1 Replacing DC Fan of the H6w Active Rectifier Module" on page 67*)." **Revision:** • Updated "Model Description (*"1.1.2 Cabinet Model" on page 16*)". • Updated "Power Cabinet Inlet/Outlet Load Interface (*"1.1.3 Cable Inlet/Outlet Load Interfaces of the Power Cabinet" on page 17*), Structure Type H7 changed to H7w, H8 changed to H8w". • Updated "Active Rectifier Filter Module DC Fan Replacement (*"5.4.4 Replacing DC Fan of the Active Rectifier Filter Module" on page 68*), and added replacement of 395 A Filter Module Fan".
September 2024	A01	Made minor corrections.
January 2024	A00	First release.

Access to the guide

This guide is not delivered with the product. You can download the PDF version in the following ways:

- Visit https://www.inovance.com/global, choose Service&Support > Support > Documentation Download.
- Scan the **QR code** on the product with your smartphone.
- Scan the QR code below to install **My Inovance app**, where you can search for and download the guide.

Warranty

Inovance provides warranty service within the warranty period (as specified in your order) for any fault or damage that is caused by proper operation of the user. Maintenance fees will be charged after the warranty period expires.

Within the warranty period, maintenance fee will be charged for the following damage:

- Damage caused by operations not following the instructions in the guide
- Damage caused by fire, flood, or abnormal voltage
- Damage caused by using the product for unintended functions
- Damage caused by using the product outside the specified scope
- Damage or secondary damage caused by force majeure (natural disaster, earthquake, and lightning strike)

When applicable, relevant maintenance fee will be charged according to the latest Price List of Inovance. If otherwise agreed upon, the agreed terms and conditions shall prevail.

For details, see the Warranty Card.

Table of Contents

Legal Information 1
Preface 2
Fundamental Safety Instructions 7
1 Cabinet System Composition 15
1.1 Single Cabinet Type 15
1.1.1 Cabinet Type and Width 15
1.1.2 Cabinet Model 16
1.1.3 Cable Inlet/Outlet Load Interfaces of the Power Cabinet 17
1.2 Overview of the Cabinet 17
2 General Cabinet Design Instructions 19
2.1 Installation Environment Requirements 19
2.2 Requirements on the Installation Site 19
2.3 Cabinet Structure 20
2.4 Fixation Mode 20
2.5 Cooling Design 21
2.5.1 Water Cooling System Design of the Cabinet 21
2.5.2 Water Circuit Flow Equalization Design 23
2.5.3 Technical Data of the Cooling Circuit 26
2.5.4 Cooling Circuit Design 32
2.6 Derating Data 34
2.7 Grounding the Mounting Structure 37
2.8 Material and Connection of Busbar 38
2.9 Cabinet Heater 38
2.10 EMC Requirements 38
3 Common Kit for Cabinets 40
4 Cabinet Structure and Dimensions 41
4.1 Auxiliary cabinet 41
4.2 Cable Incoming Cabinet 43
4.3 Basic Rectifier Cabinet 44
4.4 Thyristor Rectifier Cabinet 46
4.5 Active Rectifier Cabinet 48
4.5.1 H6w Active Rectifier Cabinet 48
4.5.2 H7w Active Rectifier Cabinet 50
4.5.3 H8w Active Rectifier Cabinet (820 A Cabinet Scheme) 51
4.5.4 H8w Active Rectifier Cabinet (1558 A Cabinet Scheme) 52

4.6 Inverter Cabinet. 54
4.6.1 H6w Inverter Cabinet 54
4.6.2 H7w Inverter Cabinet 55
4.6.3 H8w Inverter Cabinet 57
4.7 DC Chopper Cabinet. 59
4.7.1 H6w DC Chopper Cabinet 59
4.7.2 H7w DC Chopper Cabinet 60
4.8 Braking Cabinet. 62
4.9 Connection Cabinet 63
5 Maintenance 65
5.1 Safety Instructions for Maintenance and Inspection. 65
5.2 Precautions for Cleaning 65
5.3 Inspection Precautions 66
5.4 Components Replacement. 67
5.4.1 Replacing DC Fan of the H6w Active Rectifier Module 67
5.4.2 Replacing DC Fan of the H7w Active Rectifier Module 67
5.4.3 Replacing DC Fan of the H8w Active Rectifier Module 68
5.4.4 Replacing DC Fan of the Active Rectifier Filter Module. 68
5.4.5 Replacing the HSVM-10 Module 70
5.4.6 Replacing the HSVM-20 Module 73
5.4.7 Replacing the Surge Protection Board 75
5.4.8 Replacing the Fuse. 76
5.4.9 Replacing the Power Module. 77
5.5 Storage 77
5.6 Disposal and Recycle. 77
6 Service and Support 78

Fundamental Safety Instructions

Safety Disclaimer

- This chapter provides essential safety instructions for proper use of the equipment. Before operating the equipment, read through the guide and comprehend all the safety instructions. Failure to observe the safety precautions may result in serious injuries or death of personnel or device damage.
- "DANGER", "WARNING", and "CAUTION" in this guide only indicate some of the precautions that need to be followed; they just supplement the safety precautions.
- Use this product according to the designated environment requirements. Damage caused by improper use is not covered by warranty.
- Inovance shall take no responsibility for any personal injury or property damage caused by improper usage.

Safety Levels and Definitions



Indicates that failure to comply with the notice can result in death or severe personal injury.



Indicates that failure to comply with the notice may result in death or severe personal injury.



Indicates that failure to comply with the notice may result in minor or moderate personal injury or equipment damage.

Safety Precautions

- Drawings in the guide are sometimes shown without covers or protective guards. Remember to install the covers or protective guards as specified first, and then perform operations in accordance with the instructions.
- The drawings in the guide are shown for illustration only and may be different from the product you purchased.
- Operators must take mechanical precautions to protect personal safety and wear protective equipment, such as anti-smashing shoes, safety clothing, safety glasses, protective gloves, and protective sleeves.

Unpacking
 • Do not install the equipment if you find damage, rust, or signs of use on the equipment or accessories upon unpacking. • Do not install the equipment if you find water seepage or missing or damaged components upon unpacking. • Do not install the equipment if you find the packing list does not conform to the equipment you received.
 • Check whether the packing is intact and whether there is damage, water seepage, dampness, and deformation before unpacking. • Unpack the package in sequence. Do not hit the package violently. • Check whether there is damage, rust, or signs of bumping on the surface of the equipment and equipment accessories before unpacking. • Check whether the package contents are consistent with the packing list before unpacking.

Storage and transportation



- Large-scale or heavy equipment must be handled by qualified professionals using specialized hoisting equipment. Failure to comply may result in personal injury or equipment damage.
- Before hoisting the equipment, ensure that components such as the front cover and terminal blocks are secured firmly with screws. Loosely-connected components may fall off and result in personal injury or equipment damage.
- Do not stand or stay below the equipment when it is being hoisted.
- When hoisting the equipment with a steel rope, ensure the equipment is hoisted at a constant speed without suffering from vibration or shock. Do not turn the equipment over or let the equipment stay hanging in the air. Failure to comply may result in personal injury or equipment damage.



- Handle the equipment with care during transportation and mind your steps to prevent personal injury or equipment damage.
- When carrying the equipment with bare hands, hold the equipment casing firmly with care to prevent parts from falling. Failure to comply may result in personal injury.
- Store and transport the equipment strictly based on the requirements. Failure to comply may result in equipment damage.
- Do not store or transport the equipment in environments with water splash, rain, direct sunlight, strong electric field, strong magnetic field, and strong vibration.
- Avoid storing the product for more than 3 months. Long-term storage shall require stricter protection and necessary inspections.
- Pack the equipment strictly before transportation. Use a sealed box for long-distance transportation.
- Do not transport the equipment with other devices or materials that may harm or have negative impacts on the equipment.

Installation



- Installation must be carried out by skilled personnel who have undergone specialized electrical training and possess comprehensive electrical expertise. Non-professionals are not allowed to install the equipment.



- Read through the guide and safety precautions before installation.
- Do not install the equipment in places with strong electric or magnetic fields.
- Before installation, check that the mechanical strength of the installation site can bear the weight of the equipment. Failure to comply will result in mechanical hazards.
- Do not wear loose clothes or accessories during installation. Failure to comply may result in electric shock.
- When installing the equipment in a closed environment (such as a cabinet or casing), use a cooling device (such as a fan or air conditioner) to cool the environment down to the required temperature. Failure to comply may result in equipment over-temperature or a fire.
- Do not retrofit the equipment.
- Do not fiddle with the bolts used to fix equipment components or the bolts marked in red.
- When the equipment is installed in a cabinet or final assembly, a fireproof enclosure providing both electrical and mechanical protections must be provided. The IP rating must meet IEC standards and local laws and regulations.
- Before installing equipments with strong electromagnetic interference, such as a transformer, install a shielding equipment for the equipment to prevent malfunction.
- Install the equipment on an incombustible object such as metal and do not touch or attach the equipment to combustibles. Failure to comply can result in fire.



- Cover the top of the equipment with a piece of cloth or paper during installation. This is to prevent unwanted objects such as metal chippings, oil, and water from falling into the equipment and causing faults. After installation, remove the cloth or paper to prevent over-temperature caused by poor ventilation due to blocked ventilation holes.
- Resonance may occur when the equipment operating at a constant speed switches to variable speed operations. In this case, install the vibration-proof rubber under the motor frame or use the vibration suppression function to reduce resonance.

Wiring



- Equipment installation, wiring, maintenance, inspection, or component replacement must be performed only by professionals.
- Before wiring, disconnect all the power supplies of the equipment. Wait for at least the time designated on the equipment warning label before further operations because residual voltage still exists after power-off. Measure the DC voltage of the main circuit and make sure that it is below the safety voltage. Failure to comply can result in electric shock.
- Do not perform wiring, remove the equipment cover, or touch the circuit board with power on. Failure to comply can result in electric shock.
- Ensure the equipment is grounded properly. Failure to comply can result in electric shock.



- Do not connect the input power supply to the output end of the equipment. Failure to comply will result in equipment damage or even a fire.
- When connecting a drive to the motor, check that the phase sequences of the drive and motor terminals are consistent to prevent reverse motor rotation.
- Cables used for wiring must meet cross sectional area and shielding requirements. The shield of the cable must be reliably grounded at one end.
- Tighten the terminal screws with the tightening torque specified in the user guide. Improper tightening torque may result in overheat, damage to the connecting parts, or a fire.
- After wiring, check that all cables are connected properly and no screws, washers or exposed cables are left inside the equipment. Failure to comply may result in electric shock or equipment damage.



- During wiring, follow proper electrostatic discharge (ESD) proceduresand wear an anti-static wrist strap. Failure to comply can result in damage to the equipment or internal product circuits.
- Use shielded twisted pairs for the control circuit. Connect the shield to the grounding terminal of the equipment for grounding. Failure to comply can result in equipment malfunction.

Power-on



- Before power-on, check that the equipment is installed properly with reliable wiring and the motor can be restarted.
- Check that the power supply meets equipment requirements before powering on to prevent equipment damage or a fire.
- When the equipment is powered on, do not open the cabinet door or protective cover, touch any wiring terminal, or disassemble any component of the equipment. Failure to comply can result in electric shock.



- After wiring and parameter setting, perform a trial run to ensure the equipment operates safely. Failure to comply may result in personal injury or equipment damage.
- Before power-on, check that the rated voltage of the equipment is consistent with that of the power supply. Failure to comply may result in a fire. Failure to comply may result in fire.
- Before powering on, check that no one is near the equipment, motor, or machine. Failure to comply may result in death or personal injury.

Operation



- The equipment must be operated only by professionals. Failure to comply can result in death or personal injury.
- During operation, do not touch any connecting terminals or disassemble any component of the equipment. Failure to comply can result in electric shock.



- Do not touch the equipment enclosure, fan, or resistor with bare hands. Failure to comply may result in burns.
- During operation, prevent metal or other objects from falling into the equipment. Failure to comply may result in fire or equipment damage.

Maintenance



- Equipment installation, wiring, maintenance, inspection, or component replacement must be performed only by professionals.
- Do not maintain the equipment with power ON. Failure to comply can result in electric shock.
- Before maintenance, disconnect all the power supplies of the equipment and wait for at least the time designated on the equipment warning label.
- When a permanent magnet motor is used, do not touch the motor terminals immediately after power-off because the motor terminals can generate induced voltage during rotation even after the equipment is powered off. Failure to comply can result in electric shock.



- Perform routine and regular inspection and maintenance on the equipment in accordance with maintenance requirements and keep a record.

Repair



- Equipment installation, wiring, maintenance, inspection, or component replacement must be performed only by professionals.
- Do not perform maintenance on the equipment with power on. Failure to comply can result in electric shock.
- Before inspection and maintenance, disconnect all the power supplies of the equipment and wait for at least the time designated on the equipment warning label.



- Submit a request for repair services in accordance with the product warranty agreement.
- When the fuse is blown or the circuit breaker or earth leakage current breaker (ELCB) trips, wait for at least the time designated on the equipment warning label before power-on or further operations. Failure to comply may result in death, personal injury, or equipment damage.
- Troubleshooting and repair must be performed by professionals according to the repair instructions, with repair records kept properly.
- Replace quick-wear parts of the equipment in accordance with the replacement instructions.
- Do not operate on damaged equipment. Failure to comply may result in death, personal injury, or equipment damage.
- After the equipment is replaced, check the wiring and set parameters again.

Disposal
 • Dispose of retired equipment in accordance with local regulations and standards. Failure to comply may result in death, personal injury, or property damage. • Recycle retired equipment by observing industry waste disposal standards to avoid environmental pollution.

Safety label

To ensure safe operation, comply with equipment-related safety labels. See the following table for description of the safety labels.

Safety Label	Description
	• Read through the safety instructions before operating the equipment. Failure to comply may result in equipment damage, personal injury, or even death. • Do not touch the terminals or remove the cover with power on or within 10 min after power-off. Failure to comply can result in electric shock.

1 Cabinet System Composition

1.1 Single Cabinet Type

1.1.1 Cabinet Type and Width

Name	300-mm wide	400-mm wide	500-mm wide	600-mm wide	800-mm wide
Auxiliary cabinet	-	400-mm wide (2 x HCU)	-	600-mm wide (4 x HCU)	800-mm wide (6 x HCU)
Cable incoming cabinet	-	400-mm wide (800 A to 1250 A)	-	600-mm wide (2000 A to 2500 A)	800-mm wide (3200 A to 4000 A)
Basic rectifier cabinet	-	-	-	600-mm wide (D3D)	-
Thyristor rectifier cabinet	-	-	-	600-mm wide (D3T)	-
Active rectifier cabinet	-	400-mm wide (H6w + LC)	500-mm wide (H7w + LC)	600-mm wide (2 x H8w) 600-mm wide (H8w + LC)	-
H6w inverter cabinet	300-mm wide (H6w)	-	500-mm wide (2 x H6w)	-	-
H7w inverter cabinet	-	400-mm wide (1 x H7w)	-	600-mm wide (2 x H7w)	800-mm wide (3 x H7w)
H8w inverter cabinet	-	400-mm wide (1 x H8w)	-	600-mm wide (2 x H8w)	800-mm wide (3 x H8w)
Braking cabinet	-	-	-	600-mm wide (H7w)	-
H6w chopper cabinet	-	400-mm wide (H6w)	-	600-mm wide (2 x H6w)	-
H7w chopper cabinet	-	400-mm wide (H7w)	-	-	800-mm wide (2 x H7w)
Connection cabinet	-	400-mm wide	-	-	-
Connection cabinet	-	-	-	600-mm wide (D3T)	-

Note

- The 500-mm wide 2 x H6w inverter cabinet does not include the HCU controller and output reactor. To add an HCU controller to the cabinet, expand the cabinet to 600-mm wide.
- The 800-mm wide H7w inverter cabinet does not include the HCU controller. To add an HCU controller to the cabinet, expand the cabinet to 850-mm wide.

1.1.2 Cabinet Model

MD880LC-50C-800-0800
① ② ③ ④

① **Product series** MD880LC: MD880LC series	③ **Cabinet width** 300: 300 mm 400: 400 mm 500: 500 mm 600: 600 mm 800: 800 mm
② **Product type** 01C: Auxiliary cabinet 11C: 6-pulse basic rectifier cable incoming cabinet 12C: 12-pulse basic rectifier cable incoming cabinet 13C: Active rectifier cable incoming cabinet 20C[1]: Basic rectifier cabinet 40C: Active rectifier cabinet 50C: Inverter cabinet 60C: Braking cabinet 70C: Connection cabinet 80C: DC chopper cabinet	④ **Product parameters** 0299: Rated current of cable incoming cabinet (unit: A) 0395: Rated current of cable incoming cabinet (unit: A) 0800: Rated current of cable incoming cabinet (unit: A) 1250: Rated current of cable incoming cabinet (unit: A) 1600: Rated current of cable incoming cabinet (unit: A) 2000: Rated current of cable incoming cabinet (unit: A) 2500: Rated current of cable incoming cabinet (unit: A) 3200: Rated current of cable incoming cabinet (unit: A) H6w: H6w inverter module cabinet, H6w DC chopper module cabinet H7w: H7w inverter module cabinet H8w: H8w inverter module cabinet B: Braking module cabinet

Note

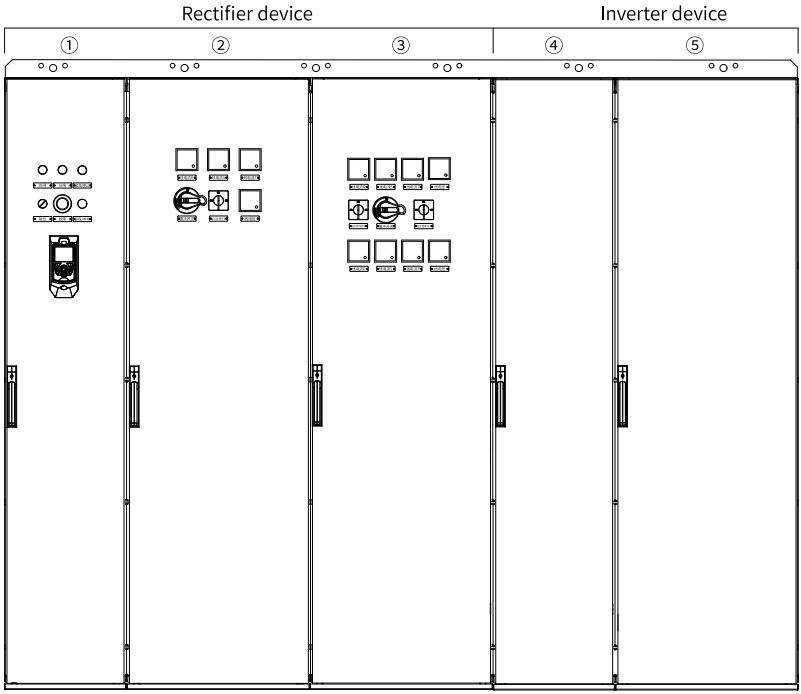
[1]: MD880LC-20C-600-1520-SCR: Thyristor basic rectifier cabinet

1.1.3 Cable Inlet/Outlet Load Interfaces of the Power Cabinet

Specifications of cable inlet/output copper busbar and number of wiring holes						
Item	Cabinet type	Name	Cabinet model MD880-xxxx	Copper busbar specifications (mm x mm)	Wiring hole (mm)	Recommended cable specifications (mm x mm)
1	Cable incoming cabinet	800 A - 400-mm wide	13C-400-0800	60x8	ϕ13x3	4x150
2		1250 A - 400-mm wide	13C-400-1250	(60x6) x 2	ϕ13x3	4x240
3		2000 A - 600-mm wide	13C-600-2000	(60x10) x 2	ϕ17x5	8x240
4		2500 A - 600-mm wide	13C-600-2500	(60x10) x 3	ϕ17x5	10x240
5		3200 A - 800-mm wide	13C-800-3200	(100x8) x 3	ϕ17x8	10x300
6		4000 A - 800-mm wide	13C-800-4000	(100x10)x3	ϕ17x8	8x400
7	Diode basic rectifier cabinet	6-pulse and 600-mm wide	20C-600-2000	(80x10) x 2	ϕ13x4	8x240
8		12-pulse and 600-mm wide	20C-600-2000	(80x10) x 2	ϕ13x8	8x240
9	Thyristor basic rectifier cabinet	6-pulse and 600-mm wide	20C-600-1520-SCR	100x10	ϕ13x3	5x185
10	Active rectifier cabinet	299 A - 400-mm wide	40C-400-299	40x6	ϕ13x3	2x70
11		395 A - 400-mm wide	40C-400-395	40x6	ϕ13x3	2x95
12	Inverter cabinet	H6w - 400-mm wide	50C-400-H6w	40x6	ϕ13x3	2x70
13		H7w - 400-mm wide	50C-400-H7w	40x8	ϕ11x2	See MD880LC Series AC Drive (Multi-Drive System) Hardware Guide for details.
14		2 x H7w - 600-mm wide	50C-600-2 x H7w	(40x8) x 2	ϕ11x4	
15		3 x H7w - 800-mm wide	50C-800-3 x H7w	(40x8) x 3	ϕ11x6	
16		H8w - 400-mm wide	50C-400-H8w	60x10	ϕ13x4	
17		2 x H8w - 600-mm wide	50C-600-2 x H8w	(60x10) x 2	ϕ13x8	
18		3 x H8w - 800-mm wide	50C-800-3 x H8w	(60x10) x 3	ϕ13x12	
19	Braking cabinet	Three-phase braking cabinet	60C-600-H7w	40x6	ϕ11x2	-
20	DC chopper cabinet	H6w - 600-mm wide	80C-600-H6w	50x5	ϕ13x3	2x95
21		H7w - 400-mm wide cabinet	80C-400-H7w	50x8	ϕ13x3	2x150

1.2 Overview of the Cabinet

The following figure shows an example of the cabinet with rectifier and inverter units. The cable enters the cabinet through the bottom.



No.	Name	Function
①	Auxiliary control cabinet	Used for centralized control of the system, including customer DI/DO interfaces, control power supply, HCU control module, instrument display, and panel control.
②	Cable incoming cabinet	Used for connection between the power grid of the factory and the rectifier cabinet, which includes the power input cable terminals and the switching devices.
③	Rectifier cabinet	Used as power supply for the entire drive system, converting the AC voltage from the grid into DC voltage to power up the inverter units connected to the common DC busbar, including the rectifier filter module, basic rectifier module, or active rectifier module, and the AC fuse.
④	Inverter cabinet	Used to drive the motor, including inverter power modules of different models, DC bus fuse, and DC disconnector (optional).
⑤		

2 General Cabinet Design Instructions

2.1 Installation Environment Requirements

No.	Requirement
1	The installation site must be equipped with cold source water to dissipate heat loss of the drive cabinet.
2	The environment in which the drive cabinet is installed must meet the specifications.
3	The wall behind the drive cabinet must be made of non-flammable material.
4	Reserve sufficient space in front of the drive cabinet for easy maintenance.
5	The floor that the drive cabinet is installed on must be made of non-flammable material, as smooth as possible, and strong enough to bear the weight of the cabinet. Check the floor flatness with a spirit level. The maximum permissible deviation from the surface level is 5 mm in every 3 meters. Level the installation site if necessary because the cabinet is not equipped with adjustable feet.



For easy maintenance, it is recommended to install the cabinet at a low position (lower than the front area). If the cabinet is installed at a high position, maintenance tools cannot be used when you replace the power module inside the cabinet.

2.2 Requirements on the Installation Site

During foundation design, take the following factors into consideration:

(1) inspection space in front of the cabinet modules;

(2) cabling of power cables, motor drive cables; and system control cables

Place the cable trench or cable duct below the drive during design. Route power cables and signal cables through different routes. The wiring diagram is shown below.

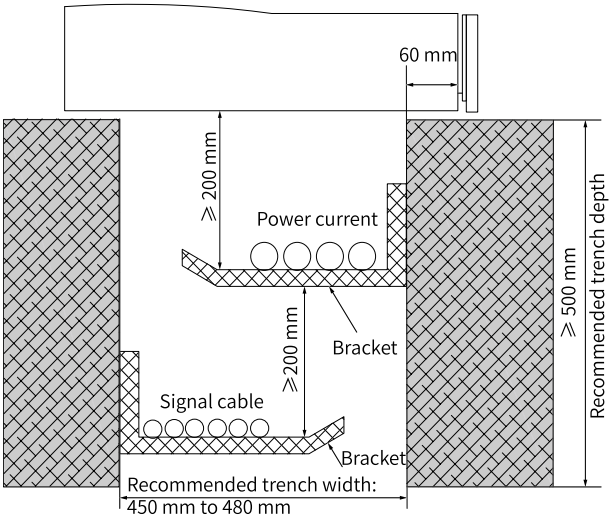


Figure 2-1 Requirements on the installation site

2.3 Cabinet Structure

- The cabinet frame must be sturdy enough to carry the weight of the drive components, control circuit and other equipment installed in it.
- The cabinet must protect the power module against contact and meet the requirements for dust and humidity.

2.4 Fixation Mode

- Fixing the cabinet
  The drive cabinet must be installed vertically and upright. Use bolts to secure the cabinet to the base through the inner holes.
- Joining cabinet sections together
  The long combined cabinets are delivered as separate sections. Adjacent sections are fastened to each other inside the connecting compartments at their rear ends. Special bolts for fastening are contained in plastic bags inside each cabinet.

2.5 Cooling Design

2.5.1 Water Cooling System Design of the Cabinet

Note

The coolant used for the MD880 water-cooled drive system is pure water or mixture of purified water and ethylene glycol.

Each cabinet is equipped with an inlet pipe and an outlet pipe, together with an inlet valve and drain valve. The inlet valve can be closed to isolate all modules in the cabinet from the main cooling circuit.

The following diagram shows the coolant pipe connection in a drive system consisting of the rectifier module and inverter module.

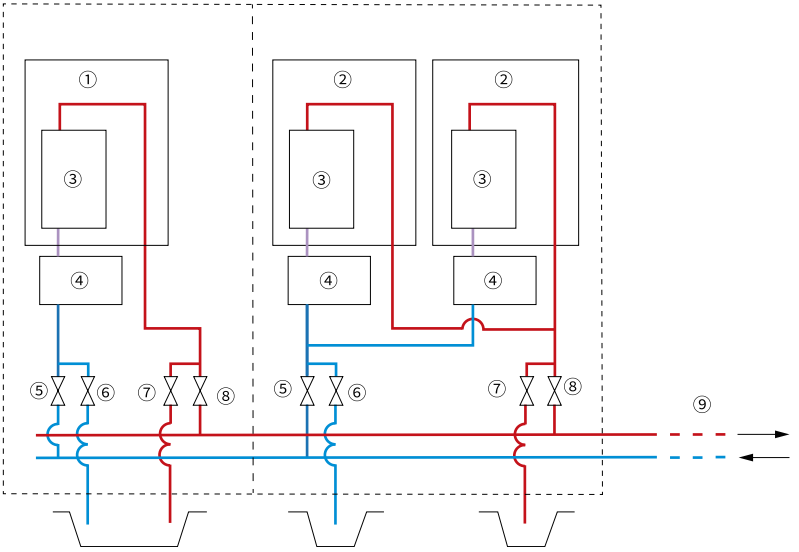


Figure 2-2 Internal water cooling system of H6w and H7w modules

Table 2–1 Internal cooling system of the diode rectifier module, H6w module, and H7w module

No.	Description
①	(Diode) rectifier module
②	Inverter module
③	Heatsink
④	Water-to-air heat exchanger

No.	Description
⑤	Inlet valve
⑥	Drain valve on the inlet side
⑦	Drain valve on the outlet side
⑧	Outlet valve
⑨	Coolant main pipe

The following diagram shows the coolant pipe connection in a drive system consisting of the thyristor rectifier module and inverter module.

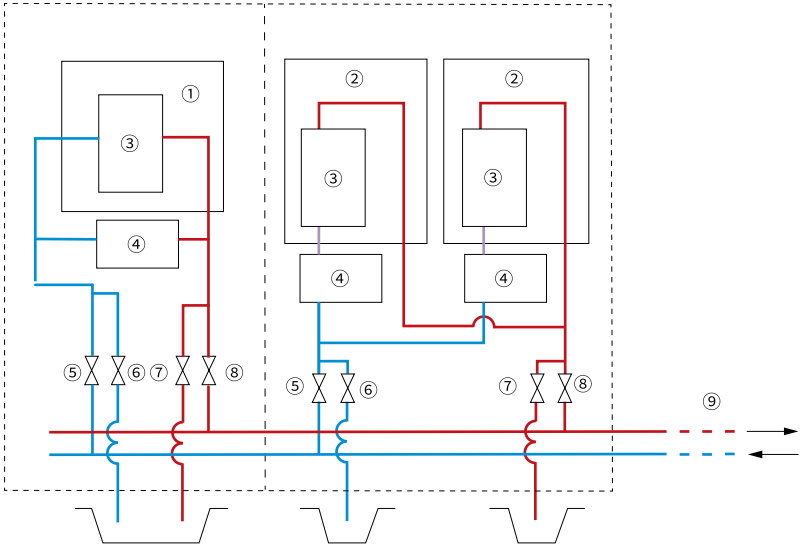


Figure 2-3 Internal water cooling system

No.	Description
①	Thyristor rectifier module
②	Inverter module
③	Heatsink
④	Water-to-air heat exchanger
⑤	Inlet valve
⑥	Drain valve on the inlet side
⑦	Drain valve on the outlet side
⑧	Outlet valve
⑨	Coolant main pipe

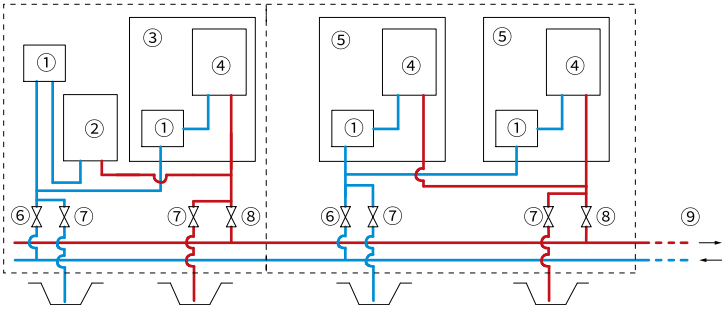


Figure 2-4 Internal water cooling system of the H8w module

Table 2–2 Descriptions of the internal water cooling system of H8w module

No.	Description
①	Water-to-air heat exchanger
②	Water-cooled reactor
③	Rectifier module
④	Water-cooled board
⑤	Inverter module
⑥	Inlet water valve
⑦	Drain valve
⑧	Outlet water valve
⑨	Coolant main pipe

Note

The coolant used in the MD880 water-cooled drive system is pure water or mixture of purified water and ethylene glycol.

2.5.2 Water Circuit Flow Equalization Design

Reasons for flow equalization design

When the H6w, H7w, and H8w modules are used in parallel cabinets, the flow can be uneven due to different water circuits in different cabinets. Therefore, you need to adjust the flow resistance of the H6w and H7w modules to make it match the flow resistance of the H8w module, so that flow equalization is achieved when the modules are used in parallel cabinets.

Method for adjusting water circuit flow resistance

For design of the water cooling system, see *"2.5.1 Water Cooling System Design of the Cabinet" on page 21*.

CAUTION

The water-to-air heat exchanger provided by Inovance has been designed properly to meet the needs for flow equalization of the water circuit. For those that do not have a water-to-air heat exchanger or contain a heat exchanger branch not provided by Inovance, install a small-bore flow-equalizing nozzle at the water inlet/outlet of the heat exchanger or module. The following table shows the flow-equalizing bore of H6w and H7w modules.

Module structure type	Water nozzle hole diameter (mm)
H6w module	6
H7w module	5.7

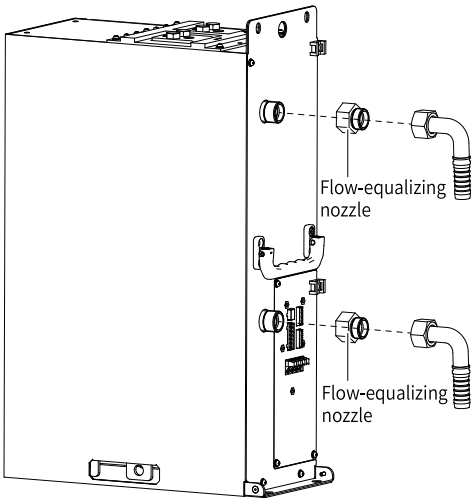


Figure 2-5 Diagram of the flow-equalizing nozzle of H6w module

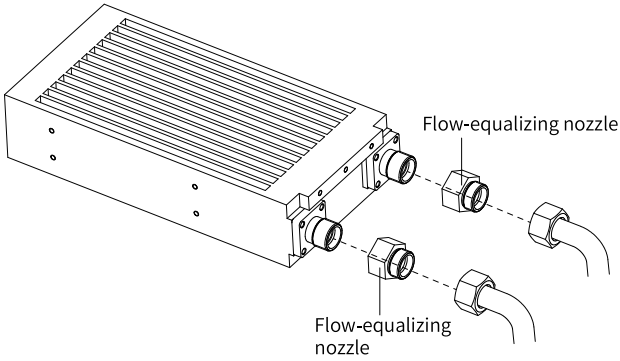


Figure 2-6 Diagram of the flow-equalizing nozzle of H6w water-to-air heat exchanger

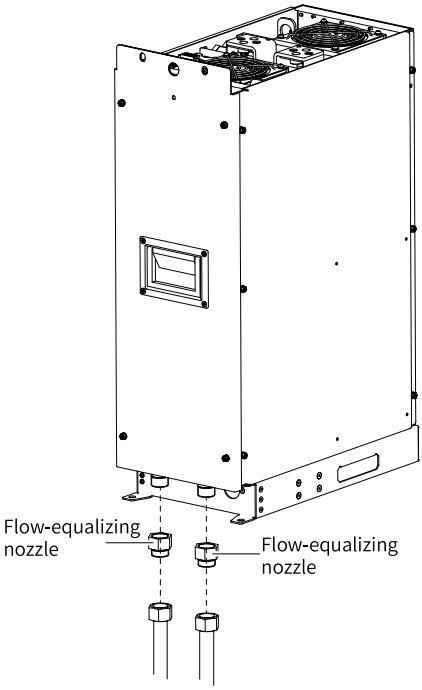


Figure 2-7 Diagram of the flow-equalizing nozzle of H7w module

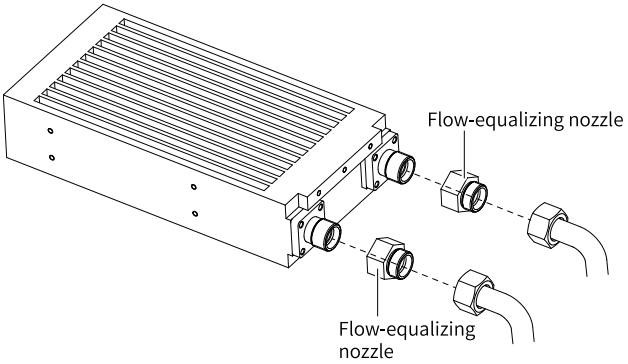


Figure 2-8 Diagram of the flow-equalizing nozzle of H7w water-to-air heat exchanger

2.5.3 Technical Data of the Cooling Circuit

Installation requirements

Reserve at least a distance of 310 mm and 350 mm above and below the module respectively to ensure effective air ventilation.

- H6w module, H7w module, and H8w module
  - When the H6w module is selected, no ventilation space can be reserved at the top and bottom. If there are other heating components (such as reactor) in the cabinet, you can install a water-to-air heat exchanger to take away the heat generated by these components.
  - When the H7w module is used, install a water-to-air heat exchanger to dissipate the heat generated by the module and other components in the cabinet.
  - When the H8w module is used, the water-to-air heat exchanger is integrated into the module and no external heat exchanger is needed. Install the drain valve at the lowest point in the cabinet system. See the following figure for configurations.

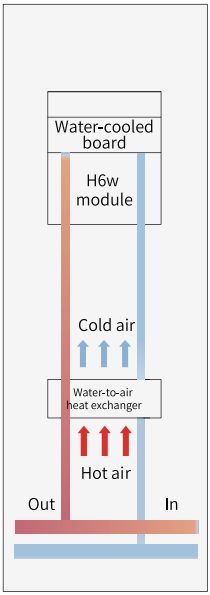


Figure 2-9 Cooling circuit inside H6w module cabinet

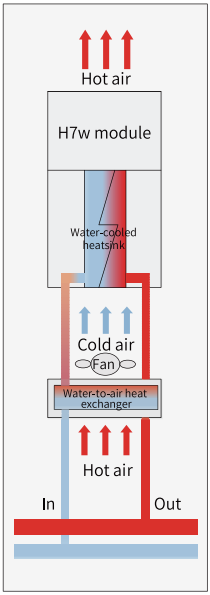


Figure 2-10 Cooling circuit inside H7w module cabinet

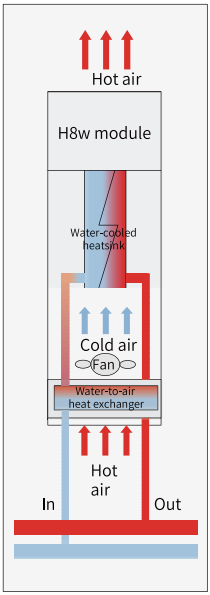


Figure 2-11 Cooling circuit inside H8w module cabinet

Table 2–3 Data of internal water cooling circuit

Model	Inlet air temperature (℃)	Air flow (CFM)	Flow (L/min)			Inlet water temperature (℃)	Inlet water pressure (bar)
			100% water	Water-Glycol solution ratio: 80:20	Water-Glycol solution ratio: 60:40		
MD880LC-40M-0299-5	< 50	70[1]	≥ 16	≥ 18	≥ 21	< 40	< 6
MD880LC-40M-0395-5							
MD880LC-40M-0530-7	< 50	360	≥ 16	≥ 18	≥ 21	< 40	< 6
MD880LC-40M-0650-7							
MD880LC-40M-0820-7							
MD880LC-50M-0149-5	< 50	70[1]	≥16	≥ 18	≥ 21	< 40	< 6
MD880LC-50M-0183-5							
MD880LC-50M-0245-5							
MD880LC-50M-0299-5							
MD880LC-50M-0349-5							
MD880LC-50M-0395-5							
MD880LC-50M-0530-7	< 50	360	≥ 16	≥ 18	≥ 21	< 40	< 6
MD880LC-50M-0650-7							
MD880LC-50M-0900-7							
MD880LC-80M-0300-5	< 50	70[1]	≥ 16	≥ 18	≥ 21	< 40	< 6
MD880LC-80M-0550-5							

Model	Inlet air temperature (℃)	Air flow (CFM)	Flow (L/min)			Inlet water temperature (℃)	Inlet water pressure (bar)
			100% water	Water-Glycol solution ratio: 80:20	Water-Glycol solution ratio: 60:40		
MD880LC-80M-0750-5	< 50	360	≥ 16	≥ 18	≥ 21	< 40	< 6
MD880LC-80M-0600-7							

Note

[1]: The H6w module is sealed without external ventilation.

- Thyristor rectifier module
  Reserve at least a distance of 100 mm above and below the thyristor rectifier module respectively to ensure effective air ventilation. Install an water-to-air heat exchanger to take away the heat generated by the reactor, module and other components in the cabinet. The system is equipped with an expansion tank to suppress pressure rise caused by volume change during temperature change. The system is equipped with a pump that provides the rated flow and pressure. Keep the pressure within the specified limit. Install a pressure regulator to ensure that the maximum permissible working pressure is not exceeded. Install a vent valve at the highest point of the cooling circuit and a drain valve at the lowest point.

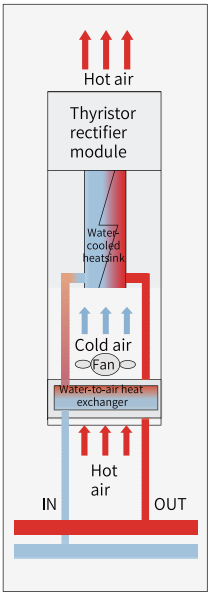


Figure 2-12 Cooling circuit inside the module cabinet

Table 2–4 Technical data of internal water cooling circuit

Model	Basic rectifier module inlet air temperature (℃)	Basic rectifier module air volume (CFM)	Rectifier module flow (L/min)			Rectifier module inlet water temperature (℃)	Rectifier module inlet water pressure (bar)
			100% water	Water-Glycol solution ratio: 80:20	Water-Glycol solution ratio: 60:40		
MD880LC-20M-2000-7	-	-	≥ 16	≥ 18	≥ 21	< 40	< 6
MD880LC-20M-1520-7+SCR	< 50	360	≥ 16	≥ 18	≥ 21	< 40	< 6

Coolant temperature control

The temperature of the coolant in the internal cooling circuit must be within the range specified below.

- The 20% ethylene glycol solution can withstand storage temperature as low as -10°C.
- The 40% ethylene glycol solution can withstand storage temperature as low as -25°C.
- Operations below 0°C (32°F) is prohibited regardless of coolant freezing point.
- If the coolant temperature ranges from 0°C to 5°C, additional glycol solution is recommended to prevent freezing.

Note

The minimum coolant temperature is dependent on ambient temperature and relative humidity.

Temperature limit

Anti-freezing: The freezing point of the coolant depends on the concentration of heat transfer fluid in the mixture.

The higher the concentration of heat transfer fluid, the higher the concentration of the coolant can be. This results in high pressure loss in the system. See the pressure limit.

Inlet coolant temperature:

- 0°C to 40°C (32°F to 104°F): The output current of the drive does not need to be derated.
- 40°C to 45°C (104°F to 113°F): The output current of the drive must be derated by 2% for every additional 1°C (1.8°F).
- 45°C to 50°C (113°F to 122°F):
  - If components with a maximum operating temperature of 55°C (131°F) are installed in the same space as drive modules, derate the output current of the drive by 6% for every additional 1°C (1.8°F).
  - If no such component is installed in the same space as the drive module, derate the output current of the drive by 2% for every additional 1°C (1.8°F).

Condensation is not allowed. As shown in the table below, the minimum coolant temperature to avoid condensation at 1 bar atmospheric pressure is a function of relative humidity (RH) and ambient temperature.

Table 2–5 Minimum temperature of the coolant

Ambient temperature (°C)	Minimum temperature of the coolant (°C)				
	RH = 95%	RH = 80%	RH = 65%	RH = 50%	RH = 40%
5	4.3	1.9	-0.9	-4.5	-7.4
10	9.2	6.7	3.7	-0.1	-3.0
15	14.2	11.5	8.4	4.6	1.5
20	19.2	16.5	13.2	9.4	6.0
25	24.1	21.4	17.9	13.8	10.5
30	29.1	26.2	22.7	18.4	156.0
35	34.1	31.1	27.4	23.0	19.4
40	39.0	35.9	32.2	27.6	23.8
45	44.0	40.8	36.8	32.1	28.2
50	49.0	45.6	41.6	36.7	32.8
55	53.9	50.4	46.3	42.2	37.1

Note

The coolant temperature must be 0°C (32°F) or above under all conditions. For example, at the temperature of 5°C and relative humidity of 50%, the coolant temperature cannot be below 0°C. At the temperature of 45°C and relative humidity of 65%, the coolant temperature cannot be below 36.8°C.

Pressure limit

- Flow resistance at rated flow (between main input/output pipelines): 200 kPa (16 L/min) for pure water; 300 kPa (18 L/min) for 20% (v/v) ethylene glycol aqueous solution; 400 kPa (21 L/min) for 40% (w/w) ethylene glycol aqueous solution
- Rated water supply pressure: 600 kPa
- Maximum short-time withstand water supply pressure: 900 kPa

Note

Take the rated pressure differential into account when sizing the liquid cooling circuit.

Coolant flow limit

The maximum coolant flow of all drive devices is 1.3 x rated value. For the rated coolant flow, see *"Table 2-3 " on page 28*.

2.5.4 Cooling Circuit Design

Cooling circuit material

The internal cooling circuit and the external cooling circuit must use the same materials, as shown below.

- 304 stainless steel
- Aluminum alloy
- EPDM rubber



When connecting external pipes to the internal cooling circuit, use only materials specified above. Do not use copper, brass, or bronze under any circumstances. Even minor dissolution of copper can cause copper precipitation on aluminum and subsequent galvanic corrosion. The liquid cooling system cannot contain any zinc (such as galvanized pipes).

If ordinary iron pipes or cast iron accessories (such as motor enclosure) are used on site, a cooling unit equipped with heat exchanger must be adopted to isolate the system.

Liquid filling and venting of internal cooling circuit

Ensure that both the drive and coolant are at room temperature before filling the cooling circuit.



- Make sure that the maximum permissible operating pressure is not exceeded. Keep the pressure within a proper range by draining surplus coolant when necessary.
- Air venting of the cooling circuit is a critical step, which must be performed with care. Air bubbles in the cooling circuit may reduce or completely block the coolant flow and result in overtemperature. Vent the air in the cooling system when filling the coolant or after replacing the power module.
- When filling the system, note that the drain valve can only be used to vent the air from the circuit so that it can be replaced by the coolant. The actual air venting of the circuit must be done through the external vent valve installed at the highest point of the cabinet system. The valve must be close to or locate in the cooling device.
- The active inverter module does not have a vent valve. The vent valve is installed on the top of the cabinet system.

The following shows procedure for filling and venting of the internal cooling circuit.

1. Open the vent valve of the cabinet system.
2. Attach a hose to the drain valve on the outlet side and lead it into a suitable container.
3. Open the inlet value and drain valve on the outlet side of the cabinet. Keep the outlet valve and the drain valve on the inlet side closed.
4. Fill the cooling circuit with coolant.
5. When the cooling circuit and module in the cabinet are filled up with coolant, the coolant starts to flow from the hose. Let some coolant flow out, then close the drain valve.
6. Close the inlet valve.
7. Repeat steps 2 to 6 for all cabinets.
8. Open the inlet and outlet valves of all cabinets. Discharge all the air in the system through the vent valve of the cabinet.
9. Close the vent valve of the cabinet.
10. Open the vent valve of the pump to discharge all the air.
11. Check the pressure again and fill the coolant if necessary.
12. Start the coolant pump. Discharge all the air in the system through the vent valve of the cabinet.

13. Wait for one to two minutes, and then stop the coolant pump or block the coolant flow with a valve.
14. Check the pressure again and fill the coolant if necessary.
15. Repeat steps 12 to 14 repeatedly until all the air is discharged from the cooling circuit. Listen for a humming sound or observe whether the pipe vibrates to find out if there is still air left in the circuit.

Draining internal cooling circuit

You can drain the water out of the module through the drain valve, without the need for draining the whole internal cooling circuit.



Hot pressurized coolant may be present in the cooling circuit. Do not perform any operation on the cooling circuit before the pressure is reduced by stopping the pumps and draining coolant.

To drain the internal cooling circuit, do as follows:

1. Attach the hose to the drain valve in the cabinet. Lead the hose into a suitable container. Make sure the ends of the hose are not immersed in the coolant at any position so that the air can displace the coolant in the system.
2. Open the drain valve and wait until all coolant is discharged.
3. If the drive is to be stored in temperatures below 0 °C, do as follows:
   a. Air-dry the cooling circuit naturally.
   b. Fill cooling circuit with 20% or 40% ethylene glycol solution.
   c. Drain the cooling circuit again.

2.6 Derating Data

Basic rectifier, active rectifier

Ambient-temperature-based derating

When the ambient temperature is within 45℃ to 55℃, the rated output current of the water-cooled basic rectifier module and water-cooled active rectifier module is derated by 0.5% for every additional 1℃. Output current = Rated current x Derating coefficient (k)

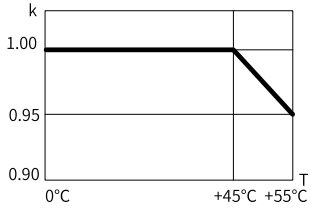


Figure 2-13 Ambient-temperature-based derating

Altitude-based derating

For altitudes of 1000 m to 4000 m, the output current of the water-cooled basic rectifier module and water-cooled active rectifier module is derated by 1% for every additional 100 m. Output current = Rated current x Derating coefficient (k)

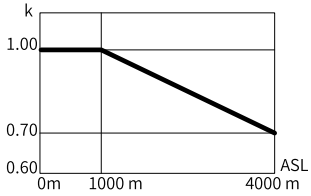


Figure 2-14 Altitude-based derating

Coolant-temperature-based derating

When the coolant temperature is within 40°C to 50°C, the rated output current of the water-cooled basic rectifier module and water-cooled active rectifier module is derated by 2% for every additional 1°C. Output current = Rated current x Derating coefficient (k)

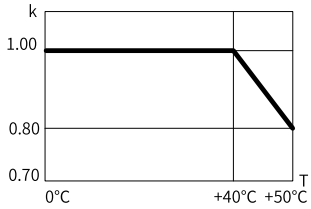


Figure 2-15 Coolant-temperature-based derating

Inverter module

Derating of H6w inverter module in 6-pulse basic rectifier application

The DC bus capacitor of the H6w water-cooled inverter module is designed based on the pre-condition that an upstream active rectifier module is available. The bus capacitance is low when a 6-pulse rectifier module provides the bus voltage. In this case, select between the following two schemes.

- When an additional bus capacitor is not installed, the rated output current is derated by 20%, and the output current equals 80% of the rated current.
- Add 20% capacitance to the DC bus. In this case, the H6w inverter module does not require derating.

Ambient-temperature-based derating

When the temperature is within 45℃ to 55℃, the rated output current of the water-cooled inverter module is derated by 0.5% for every additional 1℃. Output current = Rated current x Derating coefficient (k)

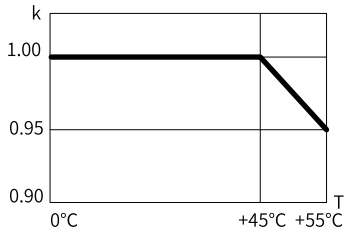


Figure 2-16 Ambient-temperature-based derating

Altitude-based derating

For altitudes of 1000 m to 4000 m, the output current of the water-cooled inverter module is derated by 1% for every additional 100 m.

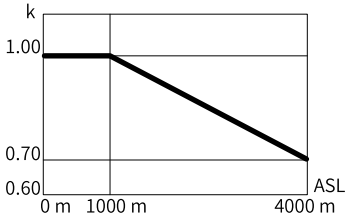


Figure 2-17 Altitude-based derating

Coolant-temperature-based derating

When the coolant temperature is between 40℃ and 50℃, the rated output current is derated by 2% for every additional 1℃. Output current = Rated current x Derating coefficient (k)

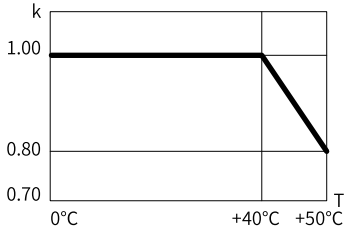


Figure 2-18 Coolant-temperature-based derating

Carrier-frequency-based derating

Model	Rated power	Carrier frequency (kHz)						
	(kW)	2.5	3.2	4	5	6	7	8
MD880LC-50M-0149-5	75	100%	100%	100%	100%	90%	85%	80%
MD880LC-50M-0183-5	90	100%	100%	100%	100%	90%	85%	80%
MD880LC-50M-0245-5	110	100%	100%	100%	100%	90%	85%	80%
MD880LC-50M-0299-5	132	100%	100%	100%	100%	90%	85%	80%
MD880LC-50M-0349-5	160	100%	100%	95%	88%	82%	76%	70%
MD880LC-50M-0395-5	200	100%	100%	95%	88%	82%	76%	70%
MD880LC-50M-0530-5	250	100%	87%	75%	62%	53%	46%	40%
MD880LC-50M-0650-5	355	100%	86%	73%	61%	52%	45%	40%
MD880LC-50M-0900-5	500	100%	87%	74%	63%	56%	48%	40%
MD880LC-50M-0530-7	500	100%	87%	75%	62%	53%	46%	40%
MD880LC-50M-0650-7	630	100%	86%	73%	61%	52%	45%	40%
MD880LC-50M-0900-7	900	100%	87%	74%	63%	56%	48%	40%

Note

The derating coefficient between the two carrier frequencies can be handled linearly.

2.7 Grounding the Mounting Structure

Ensure all jumper components and component-mounted racks are properly grounded, with unpainted contact surfaces.

CAUTION

Ensure that the module is grounded properly through the fixing points on the mounting base.

2.8 Material and Connection of Busbar

- It is recommended to use nickel plated copper or aluminum materials for the busbar.
- Before connecting the aluminum busbar, remove the oxide coating on the busbar and apply proper antioxidant joint compound.

2.9 Cabinet Heater

If there is a risk of condensation in the cabinet, use a cabinet heater. Although the heater is mainly used to keep the air dry, it can also be used for heating at low temperatures. The heater circuit control requires setting up a thermostat for closed-loop control. When placing the heater, follow the instructions provided by the manufacturer.

2.10 EMC Requirements

- The fewer and smaller the holes in the cabinet, the better the anti-interference and anti-attenuation performance can be. The maximum diameter of holes on the bimetallic contact surfaces within the enclosed cabinet structure is 100 mm. Pay special attention to the size of the grid holes at the cooling air inlet and outlet.
- The optimal electrical connection between steel panels is achieved by welding them together, and no holes are required. If welding is not feasible, do not paint the gaps between panels. Install special conductive EMC strips to ensure reliable galvanic connection. Generally, reliable conductive bars are made of flexible silicon with the surface covered by a metal mesh. Additional conductive gaskets are needed between metal surfaces to enhance the contact between them. The maximum distance between assembly screws is 100 mm.
- Install adequate high-frequency grounding network in the cabinet to eliminate voltage differences and prevent high-impedance radiators. Use short, flat low-inductance copper braids for effective high-frequency grounding. Single-point high-frequency grounding is not applicable due to the long distances inside the cabinet.
- Conductive EMC shielding gaskets are not sufficient for protective grounding. Conductive EMC shielding gaskets are inadequate for protective grounding. A robust low-frequency grounding structure is therefore required to ensure the electrical safety of components. Follow local regulations when designing protective grounding.
- Routing
  - For EMC compliance, apply 360° high-frequency grounding to inlets of the motor and control cable shields (360° grounding is also recommended for the power supply cables).
  - For the input and output shielded power cables inside the cabinet, ensure full-area contact between cable shields and cabinet shielding plates for optimal EMC performance. The following figure shows the mounting method.

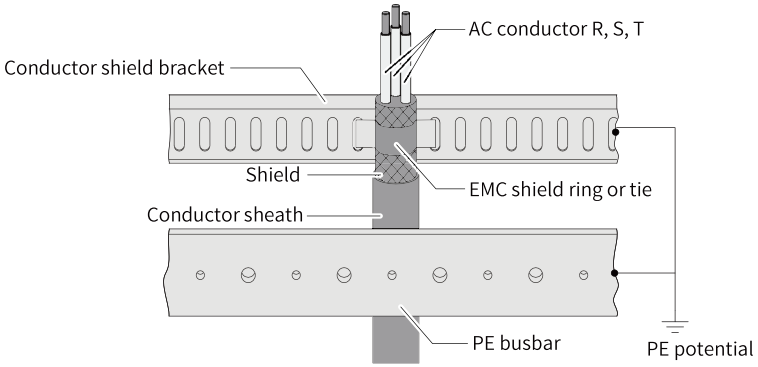


Figure 2-19 Connection of shielded power cables

3 Common Kit for Cabinets

The MD880 cabinets are assembled from common sets and dedicated sheet metal parts. The common set includes the cabinet frame, front and back door panels, and top cover. The dedicated sheet metal parts are used to hold power modules and components in the frame.

- Cabinet: Hot-dip galvanized steel sheet (coating: approx. 20 μm). Visible surfaces: Hot-pressed polyester coating (80 μm to 120 μm).
  Color: RAL 7035 (light beige, matt)
  Copper busbar: tin-plated or nickel-plated
- Inverter module: Color RAL 433U, hot-dip galvanized steel sheet (1.5–2 mm)
- Fire-resistant non-metallic thermal insulation (IEC 60332-1): generally self-extinguishing
- Packaging box: Wood/Plywood

Cabinet frame

The cabinet frames, depending on the cabinet width, can be divided into four widths, 400 mm, 500 mm, 600 mm, and 800 mm.

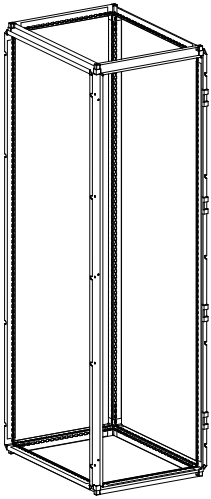


Figure 3-1 Cabinet frame

4 Cabinet Structure and Dimensions

4.1 Auxiliary cabinet

Auxiliary cabinet layout

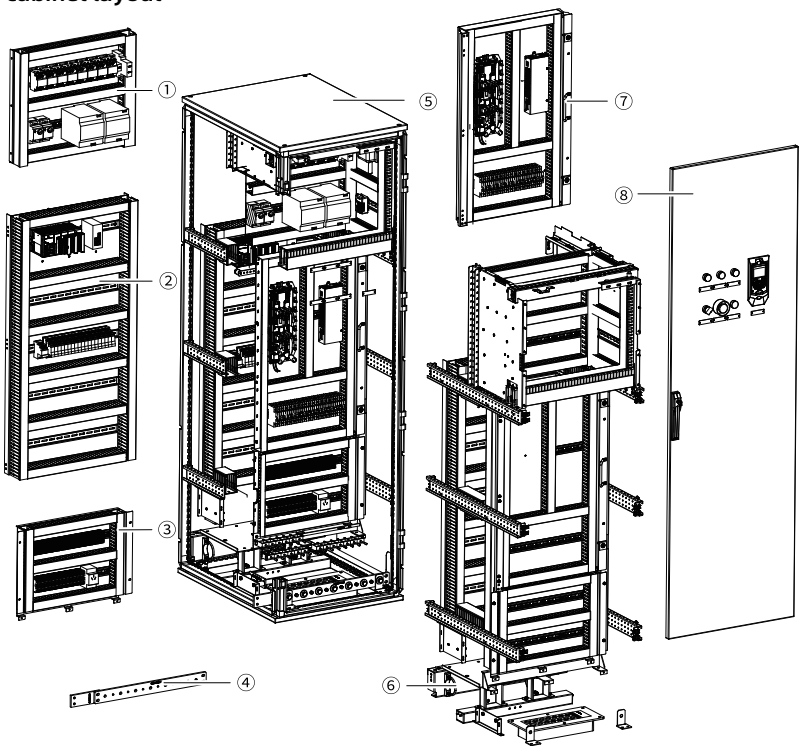


Figure 4-1 Auxiliary cabinet layout

No.	Name
①	Cabinet top terminal mounting board
②	Rear HCU mounting plate of cabinet
③	Control terminal mounting plate
④	Copper busbar kit of the auxiliary cabinet
⑤	Top cover
⑥	Water pipe clamp
⑦	Rear HCU mounting plate of cabinet
⑧	Auxiliary cabinet door plate

Dimensions of the auxiliary cabinet

The following shows the reference dimensions for designing auxiliary cabinets and the recommended instrument height.

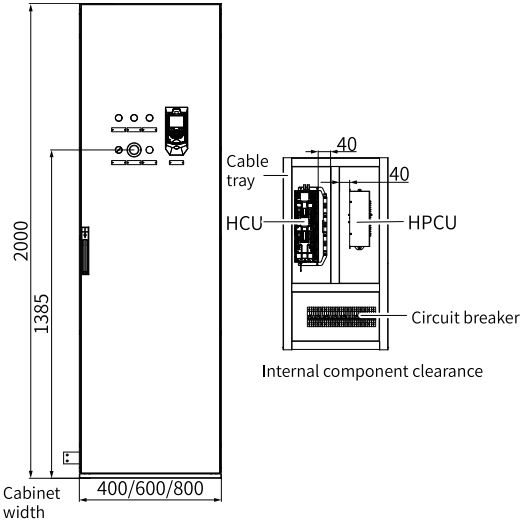


Figure 4-2 Dimensions of auxiliary cabinet (mm)

4.2 Cable Incoming Cabinet

Layout of the cable incoming cabinet

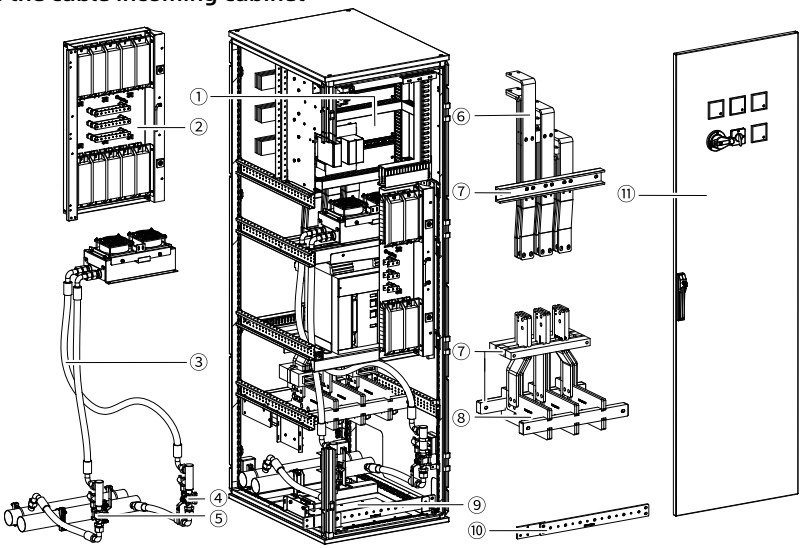


Figure 4-3 Layout of the cable incoming cabinet

No.	Name
①	Component mounting plate
②	Pre-charge resistor hinge
③	Water circuit hose
④	Water outlet valve (including drain valve)
⑤	Water inlet valve (including drain valve)
⑥	Upper copper busbar of the circuit breaker
⑦	Insulation support
⑧	Lower copper busbar of the circuit breaker
⑨	Cable inlet module
⑩	PE busbar
11	Cable incoming cabinet door plate

Dimensions of the cable incoming cabinet

The following shows the reference dimensions of the cable incoming cabinet.

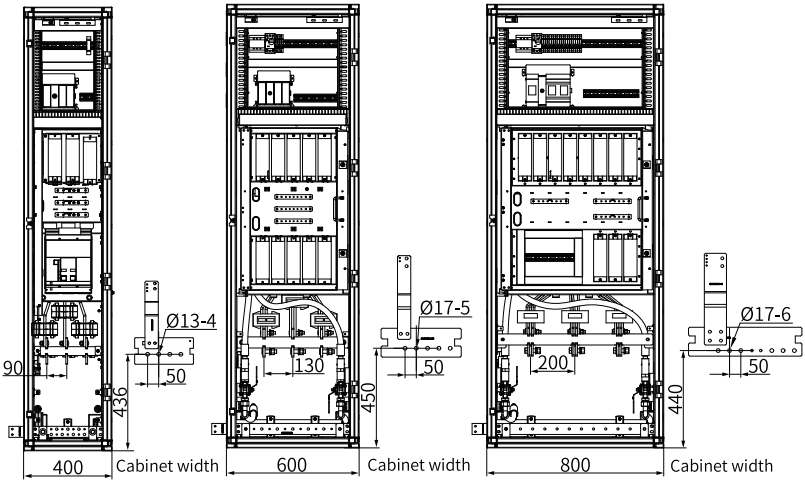


Figure 4-4 Dimensions of the cable incoming cabinet (unit: mm)

4.3 Basic Rectifier Cabinet

Layout of the basic rectifier cabinet

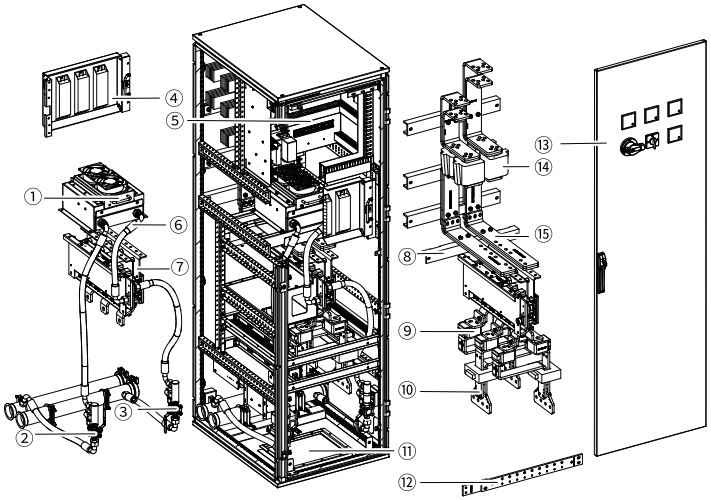


Figure 4-5 Layout of the basic rectifier cabinet

No.	Name
①	Water-to-air heat exchanger
②	Inlet valve (including drain valve)

No.	Name
③	Outlet valve (including drain valve)
④	Pre-charge resistor
⑤	Component mounting plate
⑥	Water hose
⑦	Basic rectifier module
⑧	Insulation support
⑨	AC fuse
⑩	AC input copper busbar
11	Cable inlet module
12	PE busbar
13	Door plate
14	DC fuse
15	DC copper busbar

Dimensions of basic rectifier cabinet

Reference dimensions of the basic rectifier cabinet are shown below.

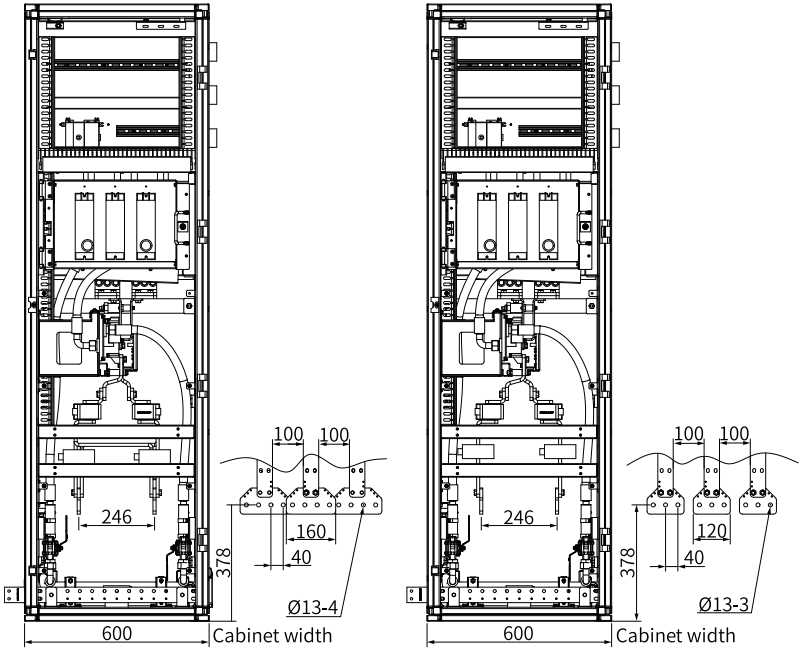


Figure 4-6 Dimensions of basic rectifier cabinet (mm)

4.4 Thyristor Rectifier Cabinet

Thyristor basic rectifier cabinet layout

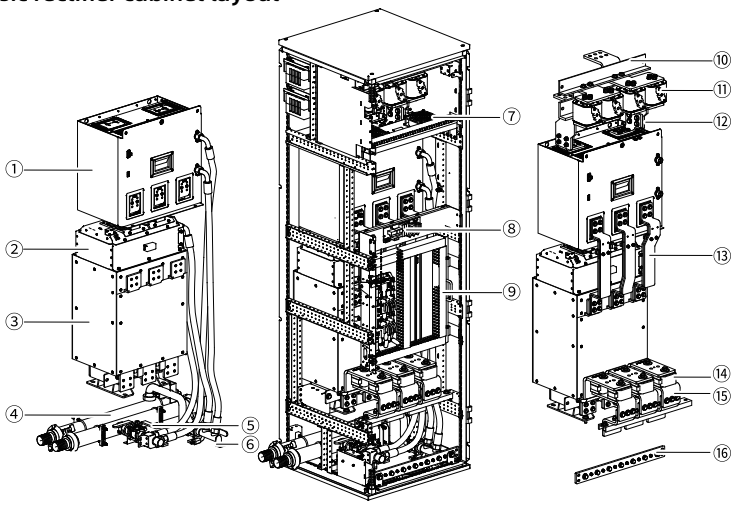


Figure 4-7 Thyristor basic rectifier cabinet layout

No.	Name
①	Rectifier module
②	Water-to-air heat exchanger module
③	AC input reactor
④	Main water pipe
⑤	Outlet valve
⑥	Inlet valve
⑦	Top-mounted DC fan
⑧	Surge protection board
⑨	Swing door
⑩	Insulation support
11	DC fuse
12	DC copper busbar
13	AC copper busbar
14	AC fuse
15	AC input copper busbar
16	AC fuse

Dimensions of thyristor rectifier cabinet

Reference dimensions of the thyristor rectifier cabinet are shown below.

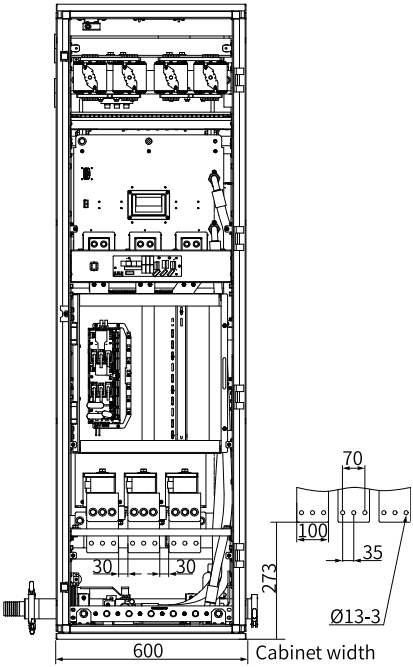


Figure 4-8 Dimensions of thyristor rectifier cabinet (mm)

4.5 Active Rectifier Cabinet

4.5.1 H6w Active Rectifier Cabinet

H6w active rectifier cabinet layout

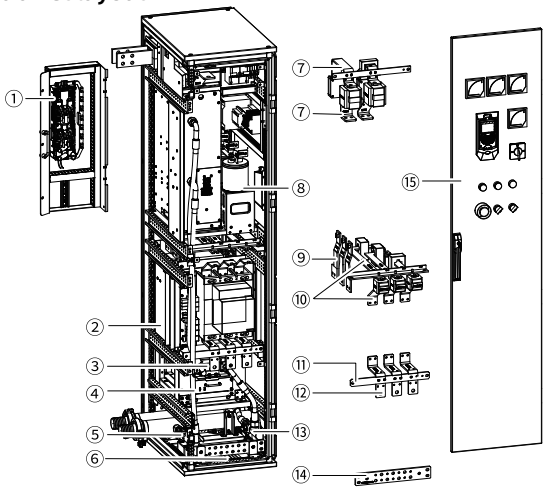


Figure 4-9 H6w active rectifier cabinet layout

No.	Name
①	HCU mounting hinge
②	Reactor module
③	Water-to-air heat exchanger
④	Water hose
⑤	Outlet valve (including drain valve)
⑥	Cable inlet module
⑦	Module output copper busbar
⑧	Capacitor module
⑨	Reactor output and unit input copper busbar
⑩	Upper copper busbar of the circuit breaker
11	Insulation support
12	Lower copper busbar of the circuit breaker
13	Inlet valve (including drain valve)
14	PE busbar
15	Front door

Dimensions of H6w active rectifier cabinet

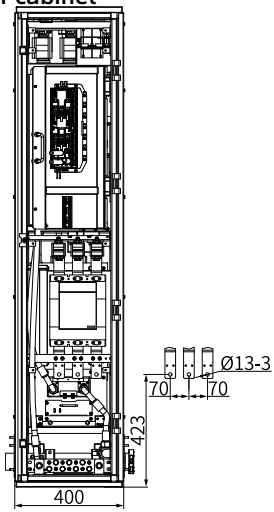


Figure 4-10 Dimensions of H6w active rectifier cabinet (unit: mm)

4.5.2 H7w Active Rectifier Cabinet

Layout of the H7w active rectifier cabinet

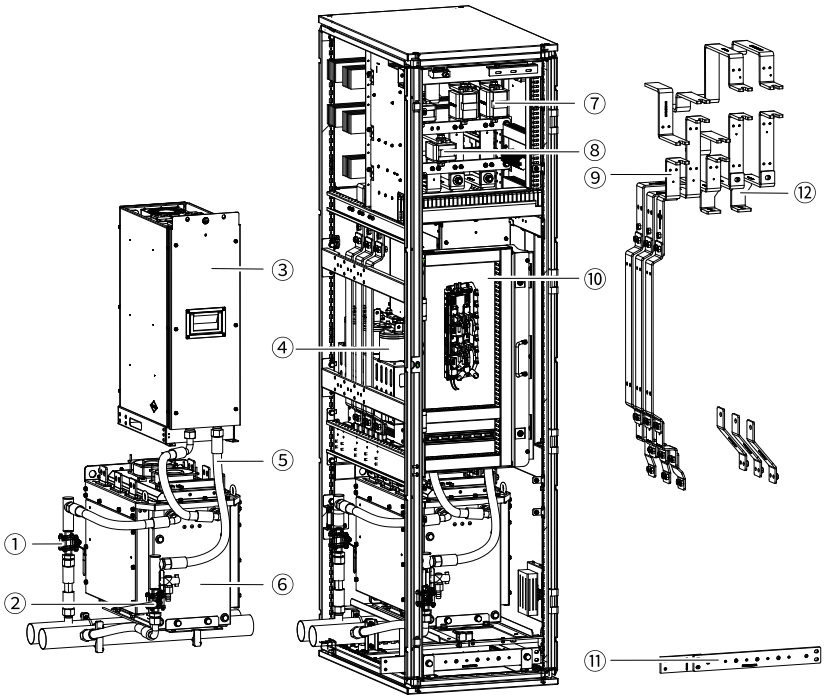


Figure 4-11 Layout of the H7w active rectifier cabinet

No.	Name
①	Inlet valve (including drain valve)
②	Outlet valve (including drain valve)
③	H7 rectifier module
④	Capacitor module
⑤	Water hose
⑥	Reactor module
⑦	DC fuse
⑧	AC fuse
⑨	AC copper busbar
⑩	Hinged control panel
11	PE busbar
12	DC copper busbar

4.5.3 H8w Active Rectifier Cabinet (820 A Cabinet Scheme)

Layout of H8w active rectifier (820 A cabinet)

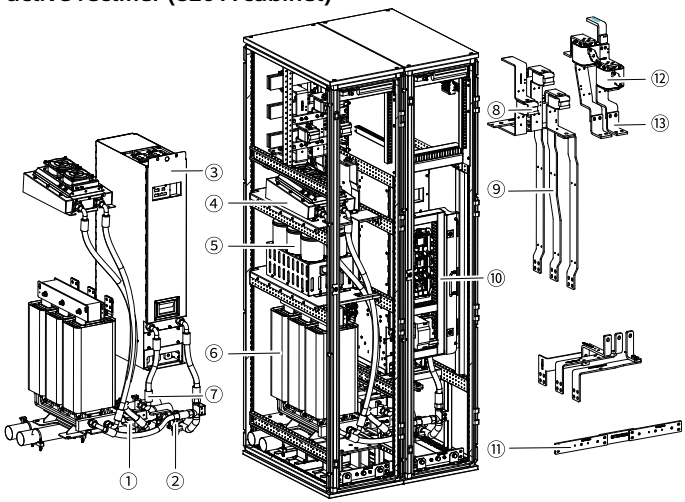


Figure 4-12 Layout of H8w active rectifier (820 A cabinet)

No.	Description
①	Inlet valve (including drain valve)
②	Outlet valve (including drain valve)
③	H8 rectifier module
④	Water-to-air heat exchanger module
⑤	Capacitor module
⑥	Reactor
⑦	Water hose
⑧	AC fuse
⑨	AC copper busbar
⑩	Hinged control panel (HCU)
11	PE busbar
12	DC fuse
13	DC copper busbar

Dimensions of H8w active rectifier 820 A cabinet

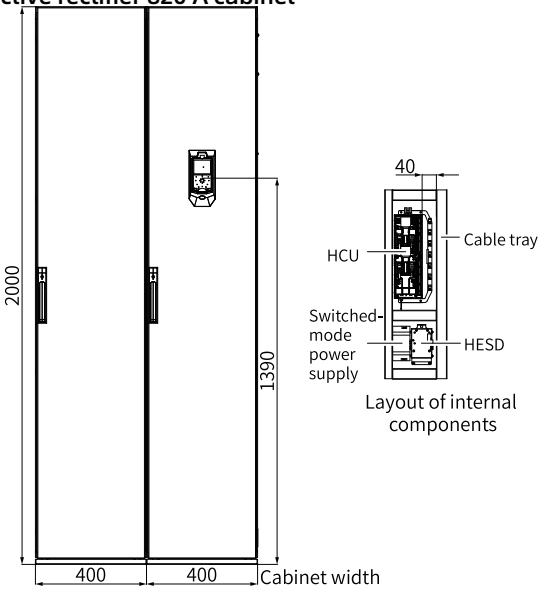


Figure 4-13 Dimensions of H8w active rectifier 820 A cabinet (unit: mm)

4.5.4 H8w Active Rectifier Cabinet (1558 A Cabinet Scheme)

Layout of H8w active rectifier (1558 A cabinet)

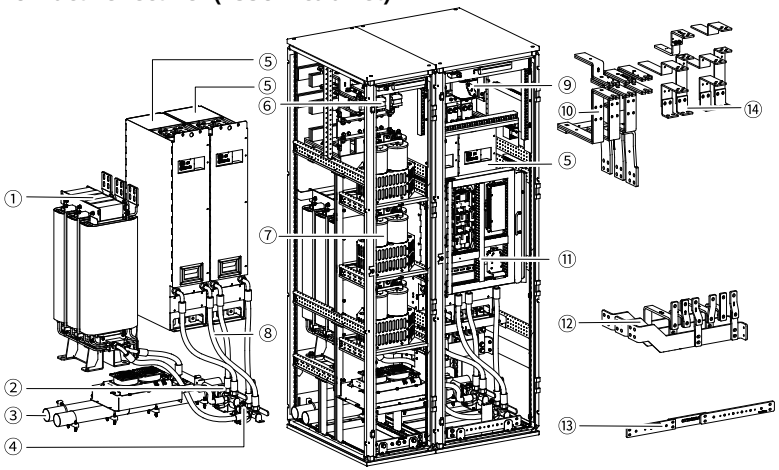


Figure 4-14 Layout of H8w active rectifier (1558 A cabinet)

No.	Description
①	Reactor
②	Inlet valve (including drain valve)
③	Main water pipe
④	Outlet valve (including drain valve)
⑤	H8 rectifier module
⑥	AC fuse
⑦	Capacitor module
⑧	Water hose
⑨	DC fuse
⑩	AC copper busbar
11	Hinged control panel
12	Bottom three-phase busbar input of H8 module
13	PE busbar
14	DC copper busbar

Dimensions of H8w active rectifier (1558 A cabinet)

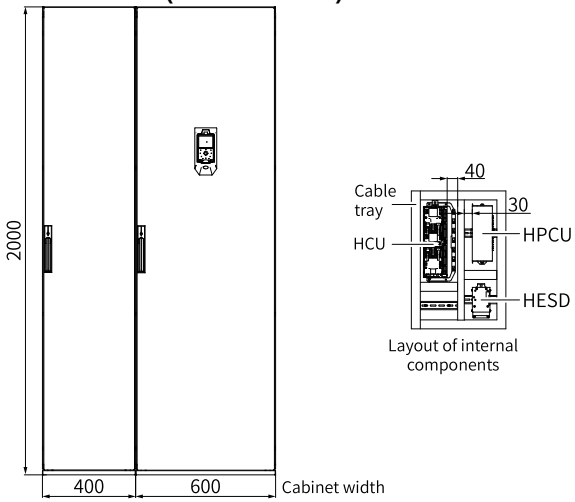


Figure 4-15 Dimensions of H8w active rectifier (1558 A cabinet) (unit: mm)

4.6 Inverter Cabinet

4.6.1 H6w Inverter Cabinet

H6w inverter cabinet layout

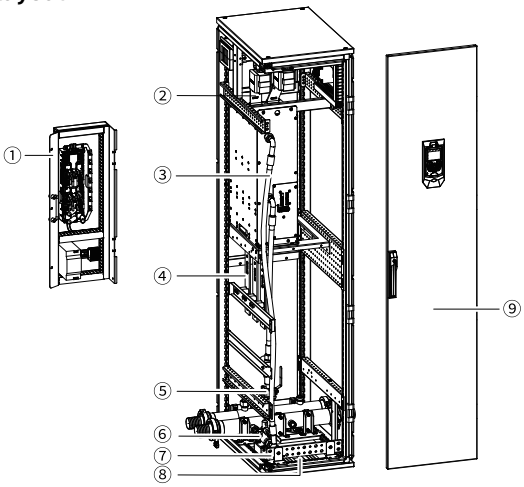


Figure 4-16 H6w inverter cabinet layout

No.	Name
①	HCU mounting hinge
②	Module input copper busbar
③	Water hose
④	Unit output copper busbar
⑤	Inlet valve (including drain valve)
⑥	Outlet valve (including drain valve)
⑦	PE busbar
⑧	Cable inlet module
⑨	Front door panel

Dimensions of H6w inverter cabinet

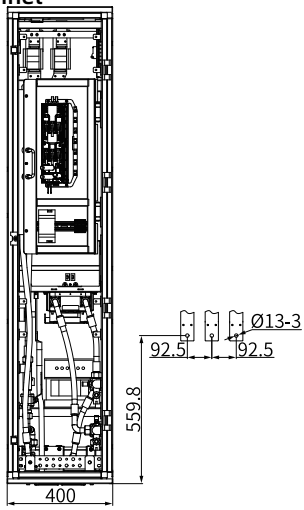


Figure 4-17 Dimensions of the H6w inverter cabinet (unit: mm)

4.6.2 H7w Inverter Cabinet

Layout of the H7w inverter cabinet

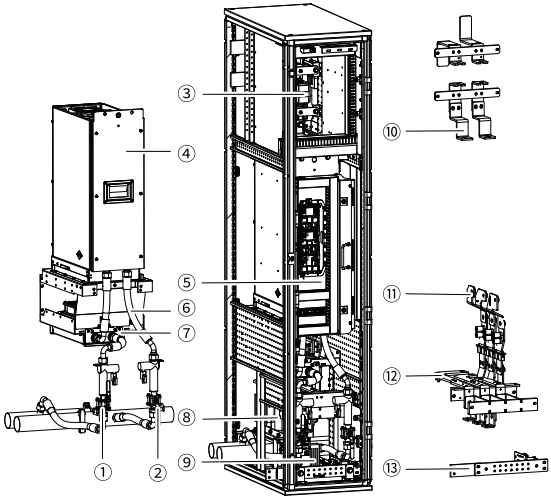


Figure 4-18 Layout of the H7w inverter cabinet

No.	Name
①	Inlet valve (including drain valve)
②	Outlet valve (including drain valve)
③	DC fuse
④	H7w inverter module
⑤	Hinged control panel (HCU)
⑥	Water hose
⑦	Water-to-air heat exchanger module
⑧	Reactor
⑨	Filter module
⑩	DC copper busbar
11	AC copper busbar
12	Reactor output copper busbar
13	PE busbar

Dimensions of H7w inverter cabinet

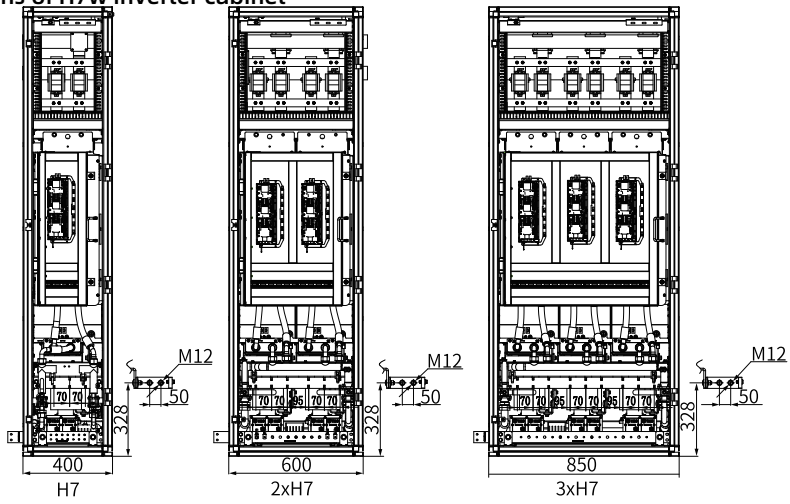


Figure 4-19 Dimensions of the H7w inverter cabinet (unit: mm)

4.6.3 H8w Inverter Cabinet

Layout of the H8w inverter cabinet

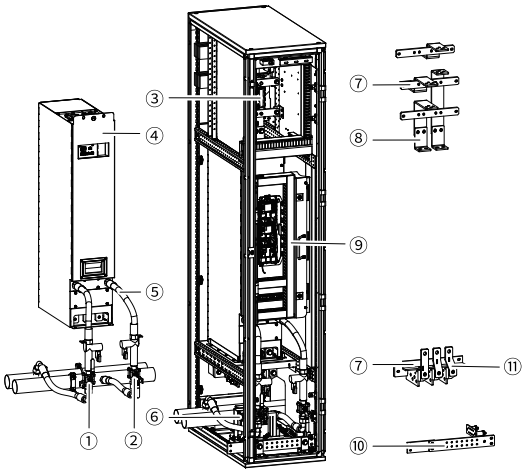


Figure 4-20 Layout of the H8w inverter cabinet

No.	Name
①	Inlet valve (including drain valve)
②	Outlet valve (including drain valve)
③	DC fuse
④	H8 inverter module
⑤	Water hose
⑥	Filter module
⑦	Insulation support
⑧	DC copper busbar
⑨	Hinged control panel (HCU)
⑩	PE busbar
11	AC copper busbar

Dimensions of H8w inverter cabinet

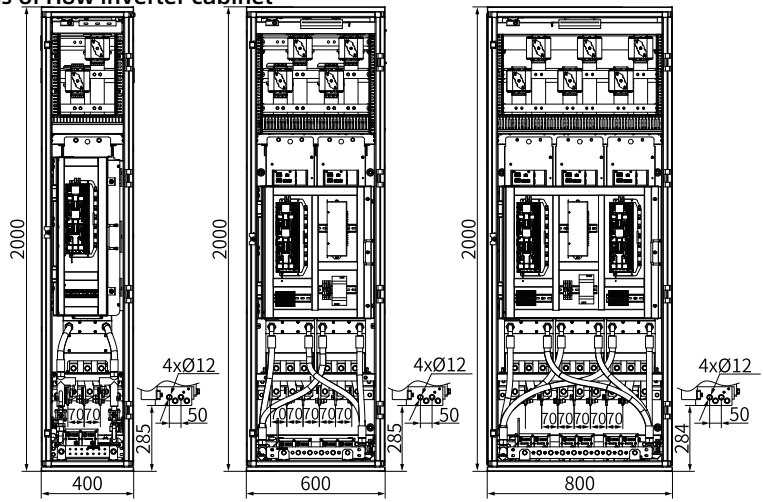


Figure 4-21 Dimensions of the H8w inverter cabinet (unit: mm)

4.7 DC Chopper Cabinet

4.7.1 H6w DC Chopper Cabinet

H6w DC chopper cabinet layout

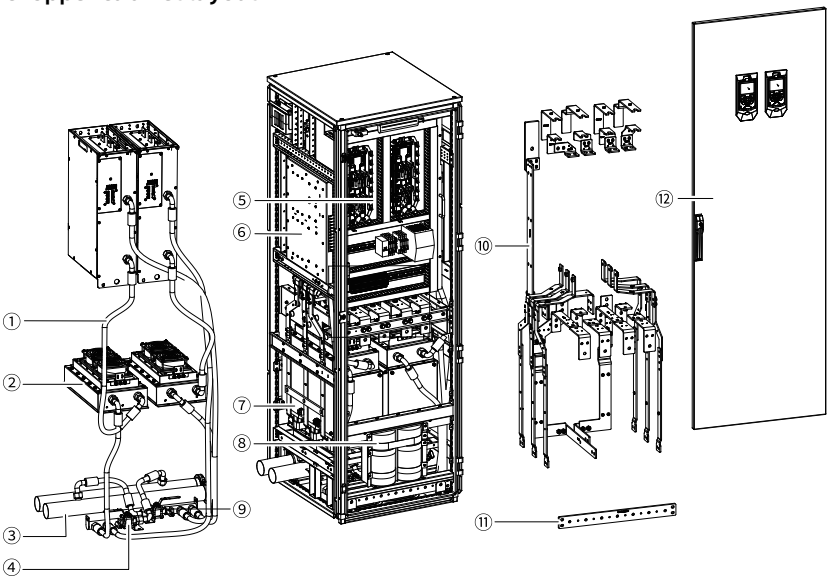


Figure 4-22 H6w DC chopper cabinet layout

No.	Name
①	Water hose
②	Water-to-air heat exchanger module
③	Main inlet and outlet water pipes
④	Inlet valve (including drain valve)
⑤	Hinged control panel
⑥	Chopper module
⑦	Reactor
⑧	Capacitor module
⑨	Outlet valve (including drain valve)
⑩	Cabinet copper busbars
11	PE busbar
12	Front door panel

Dimensions of H6w DC chopper cabinet

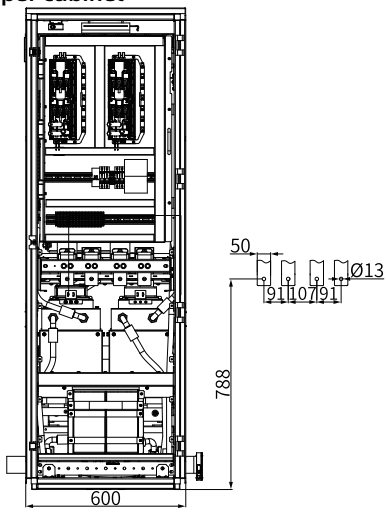


Figure 4-23 Dimensions of the H6w DC chopper cabinet (unit: mm)

4.7.2 H7w DC Chopper Cabinet

H7w DC chopper cabinet layout

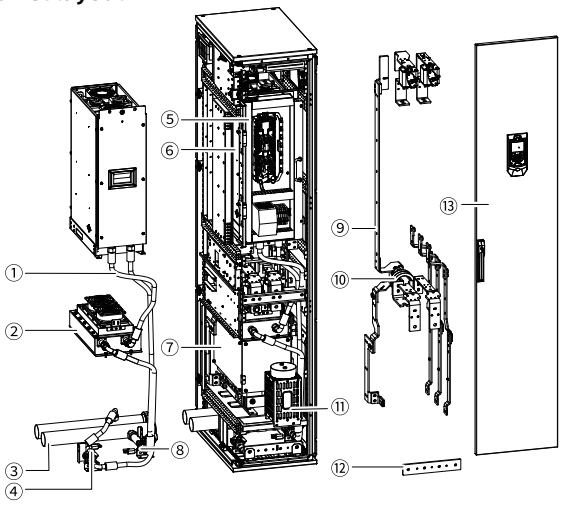


Figure 4-24 H7w DC chopper cabinet layout

No.	Name
①	Water hose
②	Water-to-air heat exchanger module
③	Main inlet and outlet water pipes
④	Inlet valve (including drain valve)
⑤	Hinged control panel
⑥	Chopper module
⑦	Reactor
⑧	Outlet valve (including drain valve)
⑨	Cabinet copper busbars
⑩	Output magnetic ring
11	Capacitor module
12	PE busbar
13	Front door

Dimensions of H7w DC chopper cabinet

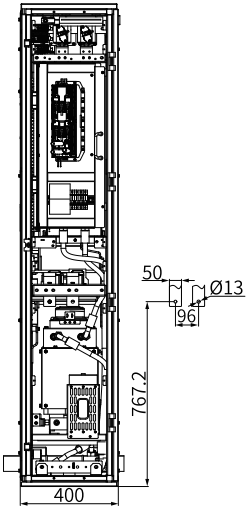


Figure 4-25 Dimensions of the H7w DC chopper cabinet (unit: mm)

4.8 Braking Cabinet

Layout of the braking cabinet

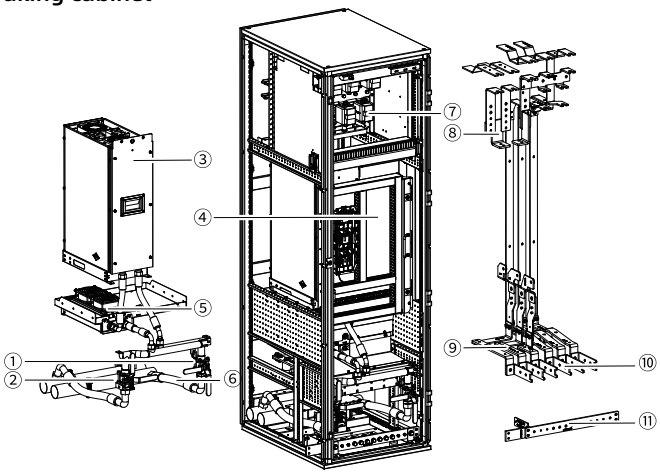


Figure 4-26 Layout of the braking cabinet

No.	Name
①	Water outlet valve (including drain valve)
②	Water inlet valve (including drain valve)
③	Braking unit
④	Control panel
⑤	Water-to-air heat exchanger
⑥	Water circuit hose
⑦	DC fuse
⑧	Copper busbar on the DC side
⑨	Interface copper busbar
⑩	Input copper busbar of the customer resistor box
11	PE busbar

Dimensions of the braking cabinet

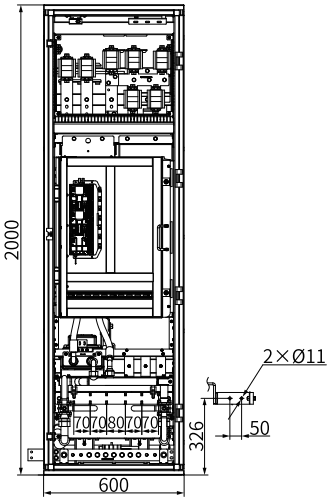


Figure 4-27 Dimensions of the braking cabinet (unit: mm)

4.9 Connection Cabinet

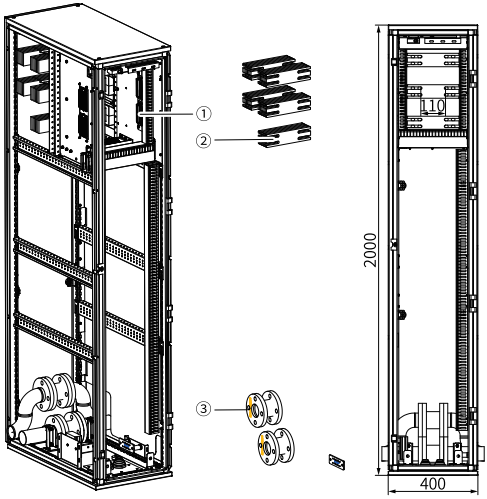


Figure 4-28 Layout and dimensions of the connection cabinet (unit: mm)

No.	Name
①	Terminal block
②	Parallel cabinet copper busbar
③	Main water pipe connector

5 Maintenance

5.1 Safety Instructions for Maintenance and Inspection



Take necessary safety measures before maintenance and inspection.

- Note that the active rectifier module operates with high voltage. All the wiring work can be done only after the active rectifier has been power off.
- Before maintenance and inspection, power off the module, wait for at least 15 minutes and confirm that the voltage of the module is lower than 36 VDC. Failure to comply can result in personal injury due to the residual voltage in the capacitor.
- When an external power supply is connected, hazardous voltage are still present in the cabinet and modules even if the main breaker is open. Ensure that no voltage is present before operation.
- Equipment installation, wiring, maintenance, inspection, or component replacement must be performed only by professionals.
- Installation and electrical wiring of the equipment must comply with national standards, industry standards, and local safety codes.
- Take cautious when handling with heavy equipment or equipment with high center of gravity. Improper lifting or handling may result in death, serious personal injury, or major property loss.
- Be aware of the possible residual rotation of the fan.

5.2 Precautions for Cleaning

To keep stable operation of the equipment, remove the dust and contamination periodically.

Pay attention to the following:

- Dust accumulation
  The dusts inside the cabinet and modules can only be removed by professionals regularly (at least once a year) according to relevant safety regulations. A brush and vacuum cleaner must be used to clean the dust. For positions that cannot be easily reached, use dry compressed air (max. 1 bar) for cleaning.
- Ventilation
  Always keep the ventilation openings of the cabinet and modules unobstructed and ensure that the cooling fan is functioning properly.

5.3 Inspection Precautions

Take proper measures to keep normal operation of the equipment and rectify the fault.

Tools needed

The following tools may be required during inspection and component replacement.

- Nut wrench or socket wrench with an opening size of 8-M5
- Nut wrench or socket wrench with an opening size of 10-M6
- Nut wrench or socket wrench with an opening size of 13-M8
- Nut wrench or socket wrench with an opening size of 16-M10
- Nut wrench or socket wrench with an opening size of 18-M12
- Torque wrench
- #1 and #2 Phillips screwdriver
- It is recommended to use a socket wrench kit with two extension rods.

Service life of components

To ensure long-term operation of cabinets, perform regular maintenance and inspection on the electronic components according to their service life. The service life of the electronic components is affected by their operating environments and conditions. The following table lists the replacement interval of these components for your reference.

Table 5–1 Replacement interval of components

Part	Standard replacement interval
DC fan	5 years
Electrolytic capacitor [1]	8 years
PCB	10 years

Note

The operation conditions for keeping the standard service life are as follows:

- Ambient temperature: Annual average 30℃
- Load coefficient: < 80%
- Operating time: 24 hours of continuous operation
- [1]: Service life of the electrolytic capacitor: > 8 years with active rectifier input or 12-pulse rectifier input under 40℃ water temperature and 50℃ ambient temperature in heavy-duty applications at rated load

Tightening torques of screws

Observe the following tightening torque when tightening the connector of conductive parts (connection among DC bus terminals, motor terminals, and busbars), non-

conductive parts (grounding terminals and protective grounding terminals), and common steel connectors.

Table 5–2 Tightening torque for current-carrying components

Screw/Bolt	Grounding terminals, protective grounding terminals, and steel connectors (N·m) (Capable of conducting fault current)	Current busbar of plastic box (N·m) (Capable of conducting operating current)
M2.5	0.3	0.3
M3	1	0.8
M4	1.2	1.2
M5	2.8	2.5
M6	4.8	4.8
M8	20	10.5
M10	40	20
M12	70	45

Cable terminals and fasteners

Check whether the cable terminals and screw terminals are secured properly. If not, re-tighten them. Check the cabling fault. If any component is damaged, replace it immediately.

Note

The actual maintenance cycle depends on the mounting environment and operating conditions of the equipment.

5.4 Components Replacement

5.4.1 Replacing DC Fan of the H6w Active Rectifier Module

For details on replacing the DC fan, See MD880LC Series AC Drive (Multi-drive System) Installation Guide.

5.4.2 Replacing DC Fan of the H7w Active Rectifier Module

For details on replacing the DC fan, See MD880LC Series AC Drive (Multi-drive System) Installation Guide.

5.4.3 Replacing DC Fan of the H8w Active Rectifier Module

For details on replacing the DC fan, See MD880LC Series AC Drive (Multi-drive System) Installation Guide.

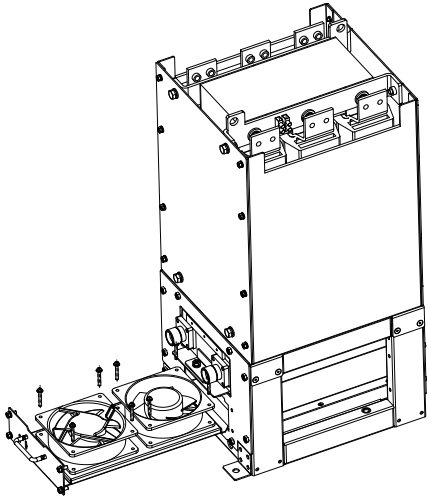
5.4.4 Replacing DC Fan of the Active Rectifier Filter Module

CAUTION

Components can be replaced by professionals only. Before maintenance and inspection, read the safety instructions in *" Fundamental Safety Instructions" on page 7* and *"5.1 Safety Instructions for Maintenance and Inspection" on page 65*. Failure to comply may result in personal injury or equipment damage.

Replacing the 395 A filter module fan

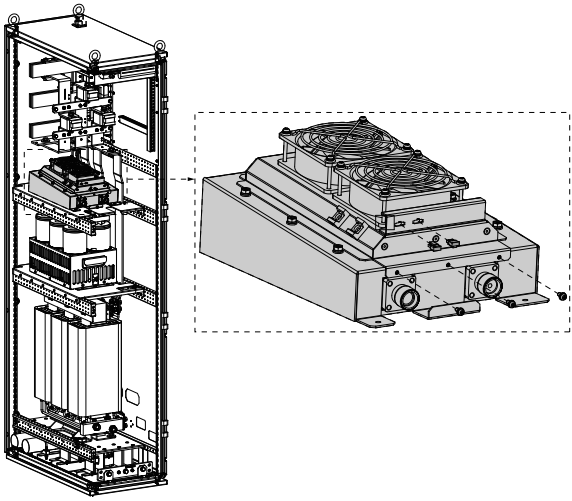
1. Disconnect the two power supply male connectors that are used to power up the fan, and remove the four M5x12 combination screws with an M5 screwdriver, as shown in the following figure.



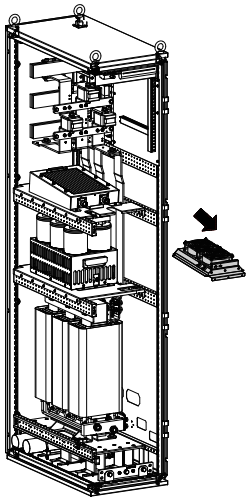
2. Remove the M4x50 combination screws (four for each fan) with an M4 screwdriver. Then pull out the fan.

Replacing the 820 A filter module fan

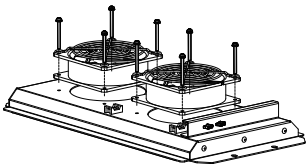
1. Disconnect the two power supply male connectors that are used to power up the fan, and remove the three M4x10 combination screws with an M4 screwdriver, as shown in the following figure.



2. Take out the sheet metal bending part, and pull the fan box assembly out of the cabinet.



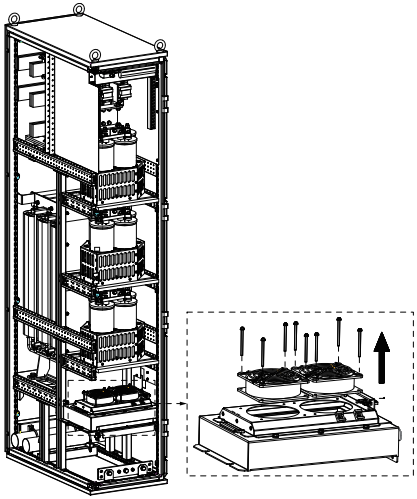
3. Remove the M4x50 combination screws (four for each fan) with an M4 screwdriver. Then pull out the fan.



4. Install a new fan of the same specifications in the reverse order.

Replacing the 1558 A filter module fan

1. The following figure shows the position of the 1558 A filter module fan. Sufficient space is revered over the fan. Therefore, there is no need to pull out the fan box assembly for replacement. Manually disconnect the male power connector (one per each group of the fan) that supplies power to the fan. Remove the M4x50 combination screws (four for each fan) with an M4 screwdriver. Then pull out the DC fan.



2. Install a new fan of the same specifications in the reverse order.

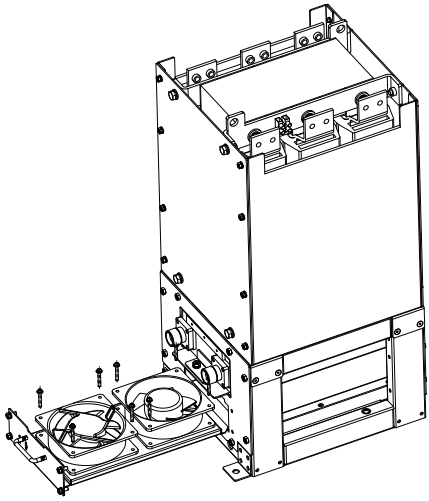
5.4.5 Replacing the HSVM-10 Module

CAUTION

Components can be replaced by professionals only. Before maintenance and inspection, read the safety instructions in *" Fundamental Safety Instructions" on page 7* and *"5.1 Safety Instructions for Maintenance and Inspection" on page 65*. Failure to comply may result in personal injury or equipment damage.

Replacing the 395 A filter module fan

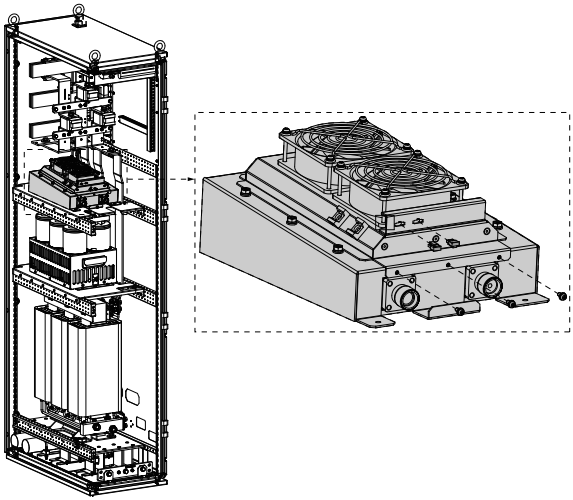
1. Disconnect the two power supply male connectors that are used to power up the fan, and remove the four M5x12 combination screws with an M5 screwdriver, as shown in the following figure.



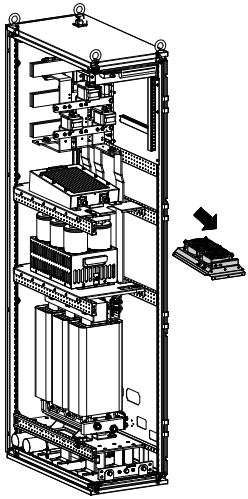
2. Remove the M4x50 combination screws (four for each fan) with an M4 screwdriver. Then pull out the fan.

Replacing the 820 A filter module fan

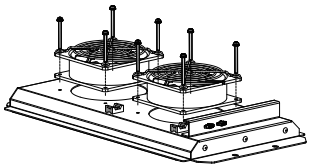
1. Disconnect the two power supply male connectors that are used to power up the fan, and remove the three M4x10 combination screws with an M4 screwdriver, as shown in the following figure.



2. Take out the sheet metal bending part, and pull the fan box assembly out of the cabinet.



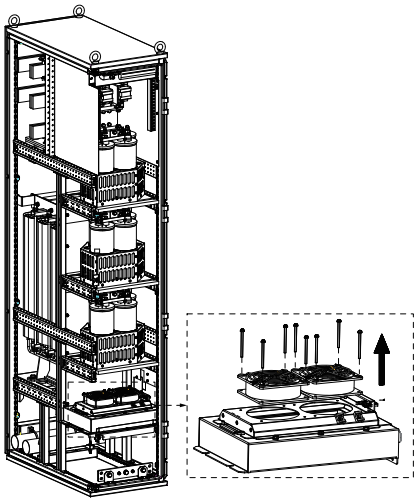
3. Remove the M4x50 combination screws (four for each fan) with an M4 screwdriver. Then pull out the fan.



4. Install a new fan of the same specifications in the reverse order.

Replacing the 1558 A filter module fan

1. The following figure shows the position of the 1558 A filter module fan. Sufficient space is reserved over the top of the fan. Therefore, there is no need to pull out the fan box assembly for replacement. Manually disconnect the male power connector (one per each group of the fan) that supplies power to the fan. Remove the M4x50 combination screws (four for each fan) with an M4 screwdriver. Then pull out the DC fan.



2. Install a new fan of the same specifications in the reverse order.

5.4.6 Replacing the HSVM-20 Module

CAUTION

Components can be replaced by professionals only. Before maintenance and inspection, read the safety instructions in *" Fundamental Safety Instructions" on page 7* and *"5.1 Safety Instructions for Maintenance and Inspection" on page 65*. Failure to comply may result in personal injury or equipment damage.

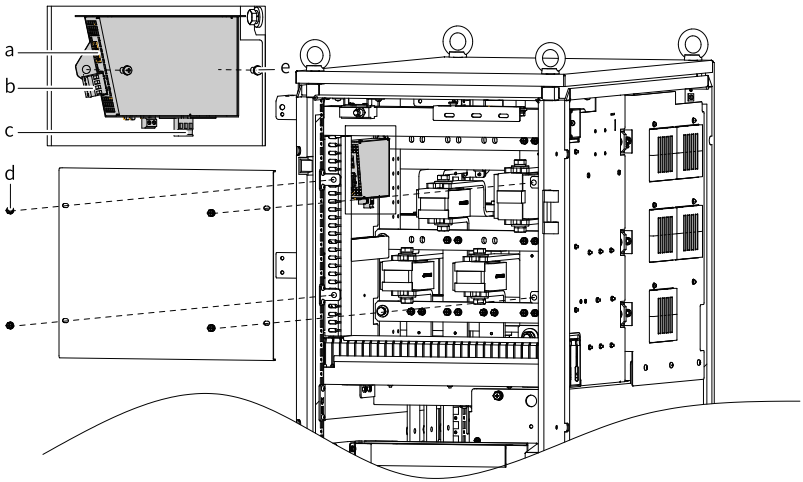


Figure 5-1 Replacing the HSVM-20 module

Procedure for replacing the module:

1. Disconnect the AC power supply of the drive cabinet, and ensure that no residual voltage exists in the equipment.
2. Open the cabinet door.
3. Loosen the M6 screw (d) on the upper cover of the cabinet and remove the cover, as shown by *"Figure 5-1 Replacing the HSVM-20 module" on page 74*.
4. Pull out the optical fiber (a) on top of HSVM-20.
5. Pull out the 24 V power supply terminal (b) on top of HSVM-20.
6. Pull out the three-phase AC voltage detection terminal (c) in the front of HSVM-20.
7. Remove the two M4 screws (e) on the HSVM-20 and take out the HSVM-20. Do not drop screws into the module.
8. Install a new HSVM-20 module based on the same procedure, but in the reverse order.
9. Tighten the cover and close the cabinet door.

Note

Do not damage the fixing screws. Tighten the M4 screws that used to fix the module with a tightening torque of 1.2 N•m. Tighten the M6 screws that used to fix the cover with a tightening torque of 4.5 N·m.

5.4.7 Replacing the Surge Protection Board

CAUTION

Components can be replaced by professionals only. Before maintenance and inspection, read the safety instructions in *" Fundamental Safety Instructions" on page 7* and *"5.1 Safety Instructions for Maintenance and Inspection" on page 65*. Failure to comply may result in personal injury or equipment damage.

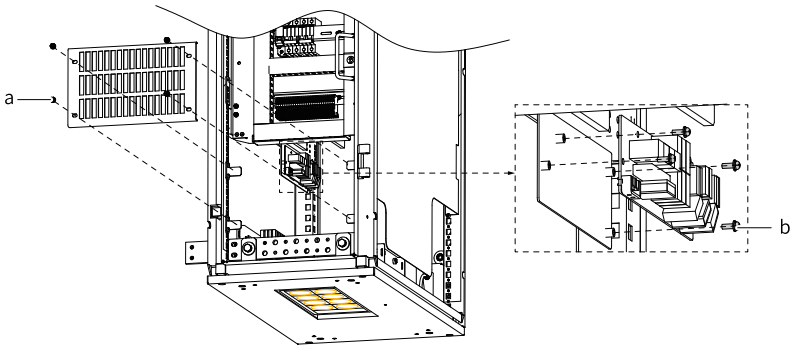


Figure 5-2 Replacing the surge protection board

1. Disconnect the AC power supply of the drive cabinet and the disconnector of the charging circuit. Ensure that no residual voltage exists in the equipment.
2. Open the cabinet door.
3. Loosen the M6 screw (a) on the lower cover of the cabinet and remove the cover, as shown by *"Figure 5-2 Replacing the surge protection board" on page 75*.
4. Remove the surge protection board terminals and the M4 fixing screw (b).
5. Replace with a new surge protection board based on the same procedure, but in the reverse order.
6. Re-connect the terminals.
7. Tighten the cover and close the cabinet door.

Note

- Do not damage the fixing screws. Tighten the M4 screws that used to fix the module with a tightening torque of 1.2 N•m. Tighten the M6 screws that used to fix the cover with a tightening torque of 45 N·m.
- When the rectifier module operates in an IT system, remove the two M4 screws on the voltage dependent resistor board.

5.4.8 Replacing the Fuse

CAUTION

Components can be replaced by professionals only. Before maintenance and inspection, read the safety instructions in *" Fundamental Safety Instructions" on page 7* and *"5.1 Safety Instructions for Maintenance and Inspection" on page 65*. Failure to comply may result in personal injury or equipment damage.

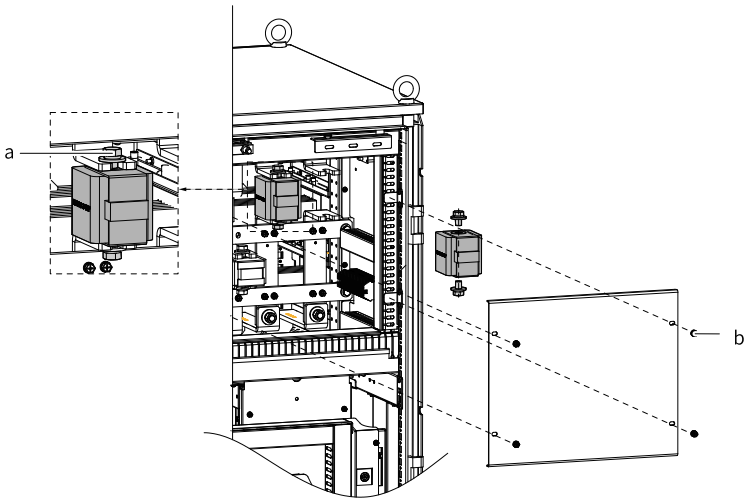


Figure 5-3 Replacing the fuse

1. Disconnect the AC power supply of the drive cabinet and the disconnector of the charging circuit. Ensure that no residual voltage exists in the equipment.
2. Open the cabinet door.
3. Loosen the M6 screw (a) on the upper cover of the cabinet and remove the cover, as shown by *"Figure 5-3 Replacing the fuse" on page 76*.
4. Remove the M12 fixing screw (b) of the fuse.
5. Replace with a new fuse in the same procedure, but in the reverse order.
6. Tighten the cover and close the cabinet door.

Note

Do not damage the fixing screws. Tighten the M12 screws that used to fix the fuse. Tighten the M6 screws that used to fix the cover with a tightening torque of 4.5 N·m.

5.4.9 Replacing the Power Module

For detailed instructions on how to replace a power module, see the user guides of MD880LC series modules.

5.5 Storage

Store the device in a clean and dry room, with temperatures between -40℃ and +70℃ and temperature variation smaller than 1°C/min. For long-term storage, cover the drive or take relevant measures to prevent contamination and environmental impact.



For storage of the equipment, observe the following requirements:

- Pack the equipment into its original packing box provided by Inovance.
- Do not expose the equipment to environments with moisture, high temperatures, or direct sunlight for a long time.

5.6 Disposal and Recycle

The raw materials contained in the drive module can be recycled to achieve energy conservation and environmental protection.

Most recyclable parts are marked with recycling symbols.

- Packaging materials can be degraded and recycled.
- All metal components can be recycled;
- Plastic parts can be recycled according to local regulations or burned under controlled conditions.

If recycling is not feasible, most components may be disposed of by landfilling. However, DC capacitors (C1-1 to C1-x) contain electrolytes, which are classified as hazardous waste in the EU standard. They can be reprocessed as necessary according to local regulations.

6 Service and Support

Should you encounter a safety accident during the use or operation of the product, or face challenges in operating and maintaining the equipment, which remain unresolved after the relevant documentation is consulted, we provide multiple channels to ensure prompt resolution:

- Channel #1: Contact service@inovance.com.
- Channel #2: Visit https://www.inovance.com/global to access document downloads, after-sales support, spare parts ordering, repair applications, and authenticity verification services.
- Channel #3: Download My Inovance app (https://zshc-eu.inovance.com/download-pc/) where you can access products info and documentation, and query product parameters.

We are committed to providing you with quick and professional technical support, and we look forward to your satisfaction and trust.

19012484A02

Copyright © Shenzhen Inovance Technology Co., Ltd.

Shenzhen Inovance Technology Co., Ltd.

www.inovance.com

Add.: Inovance Headquarters Tower, High-tech Industrial Park,
Guanlan Street, Longhua New District,
Shenzhen 518000, P.R. China
Tel: (0755) 2979 9595 Fax: (0755) 2961 9897

Suzhou Inovance Technology Co., Ltd.

www.inovance.com

Add.: No. 52, Tian E Dang Road, Wuzhong District, 215104,
Suzhou City, Jiangsu Province, P.R. China
Tel: (0512) 6637 6666 Fax: (0512) 6285 6720