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MD880LC Series AC Drive (Multi-drive System)

Hardware Guide

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

Data code 19012447A04

Legal Information

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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

The MD880LC series water-cooled AC drive (multi-drive system) is developed based on the high-end variable frequency and speed regulation technology platform of Inovance. The MD880 series drives are divided into single-drive systems and multi-drive systems, which can be air-cooled and water-cooled. Targeting at high-end transmission applications, the MD880LC series AC drive features high-performance speed and torque control, high reliability, flexible system integration, easy commissioning and maintenance, and high power density. It can be applied to a wide range of industries, including metallurgy, petroleum, papermaking, cranes, vessels, shield machines, and test benches.

This guide describes the system composition, technical specifications, components, dimensions, certifications, and standards.

More data

Name	Data code	Description
MD880LC Series AC Drive (Multi-drive System) Hardware Guide	19012447	Presents the system composition, technical data, components, dimensions, certifications, and standards.
MD880LC Series AC Drive (Multi-drive System) Installation Guide	19012448	Presents installation preparation, unpacking and transportation, mechanical installation, electrical installation, routine maintenance, and component replacement.
MD880-40 Series PCS Function Guide	19012449	Presents function applications, fault codes, and parameters of the drive.
MD880-40 Series PCS Commissioning Guide	19012450	Presents the commissioning tool, commissioning process, commissioning procedure, and parameters of the product.
MD880 Series AC Drive Communication Guide	19012451	Presents specifications, networking, and communication configuration of the product.
MD880-40 Series Active Rectifier Function Guide	19012452	Presents function applications, fault codes, and parameters of the drive.
MD880-40 Series Active Rectifier Commissioning Guide	19012453	Presents the commissioning tool, commissioning process, commissioning procedure, and parameters of the product.
MD880 Series AC Drive Function Guide (HCU-50S, HCU-51S, HCU-50S-CS, and HCU-51S-CS)	19012581	Presents function applications and troubleshooting of the product.

Name	Data code	Description
MD880 Series AC Drive Commissioning Guide (HCU-50S, HCU-51S, HCU-50S-CS, and HCU-51S-CS)	19012580	Presents the commissioning tool, commissioning process, commissioning procedure, and parameters of the product.
MD880 Series AC Drive Parameter Guide (HCU-50S, HCU-51S, HCU-50S-CS, and HCU-51S-CS)	19012699	Presents parameters and fault codes.

Revision History

Revision date	Version	Revision
July 2025	A04	**Added:** Section "Dimensions of 395 A Filter Module" (*"3.1.4 Dimensions of 395 A Filter Module" on page 99*). **Updated:** • Section "Electrical Specifications" (*"1.2 Electrical Specifications" on page 22*). • Section "Description of Main Circuit Terminals" (*"2.2.1 Main Circuit Terminals" on page 68*). • Section "Description of Control Circuit Terminals" (*"2.2.2 Description of Control Circuit Terminals" on page 72*). • Section "Outline Dimensions of the Module" (*"3.1.1 Outline Dimensions of the Module" on page 91*). • Section "Recommended Installation Method of the Module" (*"3.3.3 Installation Method" on page 117*). • Section "Recommended Cabinet Layout" (*"3.3.4 Recommended Cabinet Layout" on page 129*). • Section "Ordering Instructions" (*" Ordering Instructions" on page 168*).
December 2024	A03	• Section "Electrical Specifications" (*"1.2 Electrical Specifications" on page 22*). • Section "Components of the Active Rectifier" (*"1.4.1 Components of the Active Rectifier" on page 37*). • Section "System Wiring Topology" (*"2.1 System Topology" on page 61*). • Section "Selection of Power Cables" (*"2.3 Selecting Power Cables" on page 77*). • Section "Wiring of Grounding Cable" (*"2.6 Grounding" on page 88*). • Section "Installation Space" (*"3.2 Installation Space" on page 114*). • Section "Installation Requirements" (*"4.3.1 Installation Requirements" on page 143*). • Section "Active Rectifier Pre-charge Resistor" (*"5.7 Pre-charge Resistor of the Active Rectifier" on page 157*). • Section "Water-to-Air Heat Exchanger" (*"5.10 Water-to-Air Heat Exchanger of the Module" on page 160*).

Revision date	Version	Revision
January 2024	A02	**Added:** • Section "Multi-drive Module Selection" (*"1.6.1 Selection Flow" on page 57*). • Added "Tooling" (*"5.4 Tooling" on page 155*). • Added "Filter of the Inverter Module" *"5.11 Inverter Module Filter" on page 163*. **Updated:** • Guide name "MD880LC Series AC Drive (Multi-drive System) Hardware Guide". • Section "Model and Nameplate" (*"1.1.1 Model and Nameplate of the Active Rectifier" on page 18*). • Section "Electrical Specifications" *"1.2 Electrical Specifications" on page 22*. • Section "Technical Data" *"1.3.1 Technical Data" on page 28*. • Section "Components of Active Rectifier Module" (*"1.4.1 Components of the Active Rectifier" on page 37*). In the last version, the H7w module has the 2-pin HCU redundant power supply output terminal. In this version, the H7w module has the 5-pin DC pre-charge control terminal. • Section "Components of the Inverter" (*"1.4.2 Components of the Inverter Module" on page 50*). In the last version, the H7w module has the 2-pin HCU redundant power supply output terminal. In this version, the H7w module has the 5-pin DC pre-charge control terminal. • Section "System Wiring Topology" (*"2.1 System Topology" on page 61*). • Section "Terminals of Control Circuit Terminals" (*"2.2.2 Description of Control Circuit Terminals" on page 72*). In the last version, the H7w module has the 2-pin HCU redundant power supply output terminal. In this version, the H7w module has the 5-pin DC pre-charge control terminal. • Section "Structural Dimensions" (*"3.1.1 Outline Dimensions of the Module" on page 91*). • Section "Ordering Instructions" (*" Ordering Instructions" on page 168*).
December 2022	A01	Made minor corrections.
May 2022	A00	Initial release.

Access to the Guide

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

- Do keyword search under Service and Support at *www.inovance.com*.
- Scan the QR code on the product with your smart phone.

- Scan the QR code below to install My Inovance app, where you can search for and download user guides.



Warranty Disclaimer

Inovance provides warranty service within the warranty period (as specified in your order) for any fault or damage that is not caused by improper operation of the user. Maintenance will be charged after the warranty period expires.

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

- Damage caused by operations not following the instructions in the user guide
- Damage caused by fire, flood, or unusual voltage
- Damage caused by unintended use of the product
- Damage caused by use beyond the specified scope of application of the product
- Damage or secondary damage caused by force majeure (natural disaster, earthquake, and lightning strike)

The maintenance is charged according to the latest Price List of Inovance. If otherwise agreed upon, the terms and conditions in the agreement shall prevail.

For details, see Product Warranty Card.

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Fundamental Safety Instructions

Safety Precautions

- 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
WARNING • 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 Product Information

1.1 Model Nameplate

1.1.1 Model and Nameplate of the Active Rectifier

MD880LC-40M-0650-7
① ② ③ ④

①	**Product series** MD880LC: MD880 water-cooled engineering AC drive series	③	**Rated current** 0650: 650 A
②	**Product type** 40M: Active rectifier module	④	**Voltage class** 5: 500 VAC 7: 690 VAC

MD880LC-40F-0650-7
① ② ③ ④

①	**Product series** MD880LC: MD880 water-cooled engineering AC drive series	③	**Rated current** 0650: 650 A
②	**Product type** 40F: Active rectifier filter module	④	**Voltage class** 5: 500 VAC 7: 690 VAC

Note

- In ③, only one current rating is listed.
- This product must be used together with the filter module.
- The active rectifier module and active rectifier filter module are compatible with the power conversion system applications.

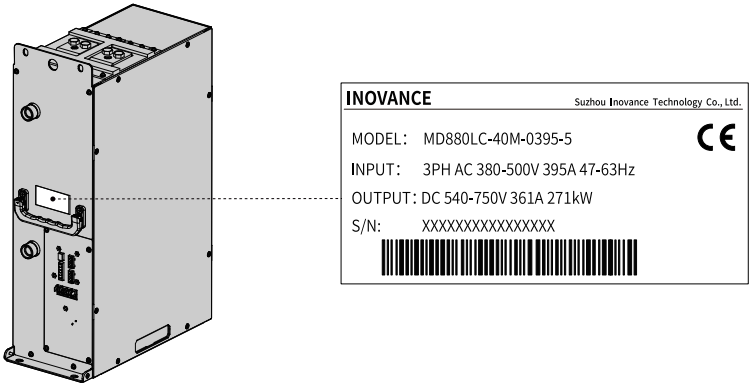


Figure 1-1 Nameplate of the H6w active rectifier

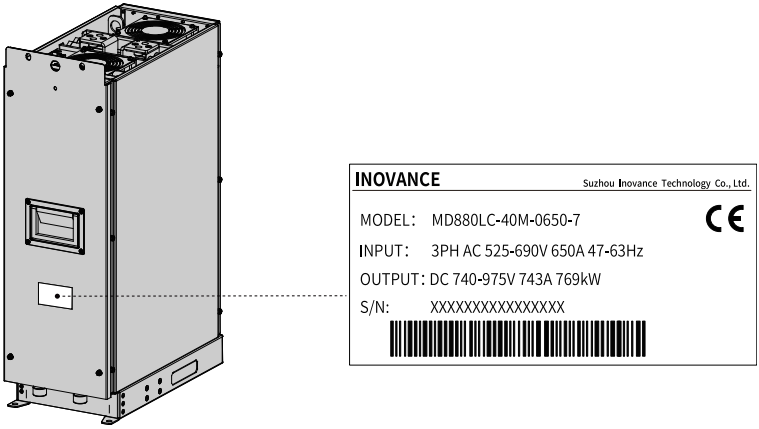


Figure 1-2 Nameplate of the H7w active rectifier

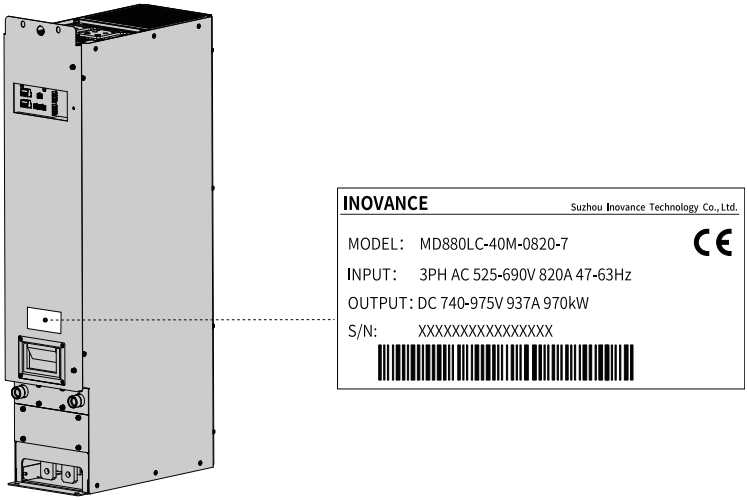


Figure 1-3 Nameplate of the H8w active rectifier

1.1.2 Model and Nameplate of the Inverter Module

MD880LC-50M-0530-7
① ② ③ ④

①	**Product series** MD880LC: MD880 water-cooled AC drive series	③	**Rated current** 0530: 530 A
②	**Product type** 50M: Inverter module	④	**Voltage class** 5: 500 VAC 7: 690 VAC

Note

In ③, only one current rating is listed.

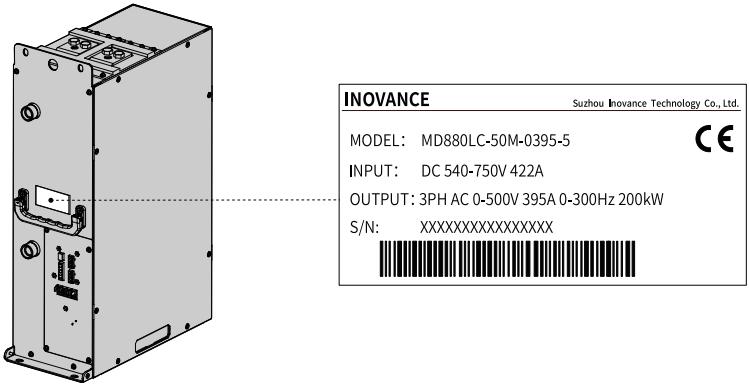


Figure 1-4 Nameplate of the H6w inverter module

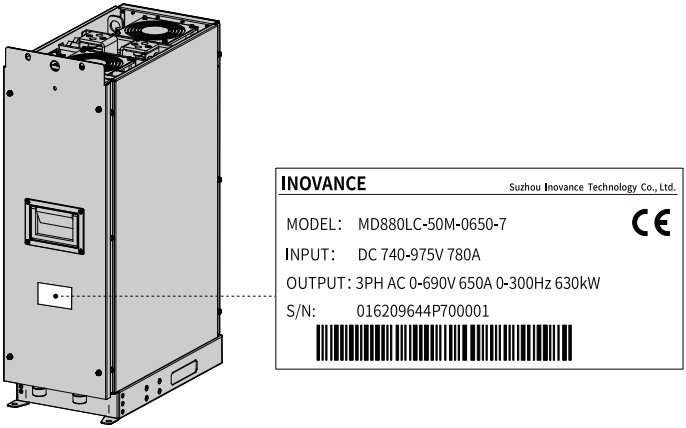


Figure 1-5 Nameplate of the H7w inverter module

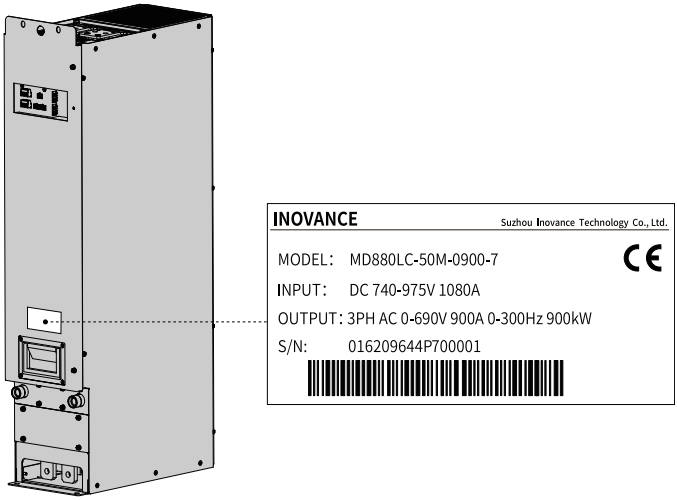


Figure 1-6 Nameplate of the H8w inverter module

1.2 Electrical Specifications

Table 1–1 Electrical specifications of MD880LC series 500 V active rectifier module

Item		Specification					
Model: MD880LC-40M-xxxx-5		0299	0395	0530	0650	0820	1558
Frame size		H6w		H7w		H8w	H8w x 2
DC side	DC bus voltage (VDC)	540 to 750		600 to 850			
	Rated current (A)	342	452	606	743	937	1781
AC side	Rated current (A)	299	395	530	650	820	1558
	Allowable voltage fluctuation range (VAC)	500 V system: 380 to 500; permissible deviation: ±10% (-15%, 1 min)					
	400 VAC apparent power (kVA)	207	274	367	451	568	1080
	400 VAC power (kW)	205	271	364	446	562	1068
	500 VAC apparent power (kW)	259	342	459	563	710	1349
	500 VAC power (kW)	256	338	454	557	703	1336
	Power (kW) in low overload applications at 400 VAC	197	260	349	428	540	1026
	Power (kW) in low overload applications at 500 VAC	246	325	436	535	675	1282

Item		Specification					
Model: MD880LC-40M-xxxx-5		0299	0395	0530	0650	0820	1558
AC side	Current in low overload applications (A)	287	379	509	624	787	1496
	Power (kW) in high overload applications at 400 VAC	154	203	291	357	422	802
	Power (kW) in high overload applications at 500 VAC	192	254	364	446	527	1002
	Current in high overload applications (A)	224	296	424	520	615	1169
	Overload capacity	Low overload: 110%I_{LD}, continuous operation for 1 min allowed per every 5 min High overload: 150%I_{HD}, continuous operation for 1 min allowed per every 5 min					
Power loss c/a/T [1] (kW)		2.4/0.2/2.6	3.4/0.4/3.8	7/0.5/7.5	8.3/0.6/8.9	8.8/1.8/10.6	16.7/3.4/20.1
Weight (kg)		35		49		88	176
Rated water flow (L/min)		16					32
Rated flow resistance (kPa)		30				180	
Dimensions (W x H x D) (mm)		174.5 x 590 x 369.5		230 x 720 x 456		210 x 980 x 450	(2 x) 210 x 980 x 450
Power consumption of auxiliary power supply		Power supply input: 24 VDC/2 A. The system achieves power redundancy by combining an external power supply with backup power drawn from the internal DC bus.					

Note

When the rated power of the MD880LC-40M-0299-5 and MD880LC-40M-0395-5 active rectifier modules is calibrated according to the AC-side voltage of 400 VAC, the actual power can be increased as the AC-side voltage increases as long as the rated current is not exceeded during operation within the permissible voltage range.

Table 1–2 Electrical specifications of MD880LC series 690 V active rectifier module

Item		Specification			
Model: MD880LC-40M-xxxx-7		0530	0650	0820	1558
Frame size		H7w		H8w	H8w x 2
DC side	DC bus voltage (VDC)	740 to 975			
	Rated current (A)	606	743	937	1781

Item		Specification			
Model: MD880LC-40M-xxxx-7		0530	0650	0820	1558
AC side	Rated current (A)	530	650	820	1558
	Allowable voltage fluctuation range (VAC)	690 V system: 525 VDC to 690 VDC, allowable deviation: ±10% (-15%, 1 min)			
	Apparent power (kVA)	633	777	980	1862
	Power (kW)	627	769	970	1843
	Power in low overload applications (kW)	602	738	931	1770
	Current in low overload applications (A)	509	624	787	1496
	Power in high overload applications (kW)	502	615	728	1382
	Current in high overload applications (A)	424	520	615	1169
	Overload capacity	Low overload: 110%I_{LD}, continuous operation for 1 min allowed per every 5 min High overload: 150%I_{HD}, continuous operation for 1 min allowed per every 5 min			
Power loss c/a/T [1] (kW)		8.0/0.5/8.5	9.8/0.6/10.4	10.3/1.8/12.1	19.6/3.4/23
Weight (kg)		49		88	176
Rated water flow (L/min)		16			32
Rated flow resistance (kPa)		30		180	
Dimensions (W x H x D) (mm)		230 x 720 x 456		210 x 980 x 450	(2 x) 210 x 980 x 450
Power consumption of auxiliary power supply		Power supply input: 24 VDC/2 A. The system achieves power redundancy by combining an external power supply with backup power drawn from the internal DC bus.			

Table 1–3 MD880 series water-cooled active rectifier filter module

Model	Rated current	Reactor loss	Capacitor loss	Air volume	Power consumption of auxiliary power supply	Rated water flow	Net weight	Noise
	(A)	(W)	(W)	(CFM)	(W)	L/min	(kg)	(dB)
MD880LC-40F-0395-5	395	1500	20	280	24 V, 100 W	16	121	< 68
MD880LC-40F-0650-7	650	1900	70	360	24 V, 100 W	16	160	< 68

Model	Rated current	Reactor loss	Capacitor loss	Air volume	Power consumption of auxiliary power supply	Rated water flow	Net weight	Noise
	(A)	(W)	(W)	(CFM)	(W)	L/min	(kg)	(dB)
MD880LC-40F-0820-7	820	2560	86.4	423	24 V, 100 W	16	184	< 68
MD880LC-40F-1558-7	1558	3120	182.8	423	24 V, 100 W	16	302	< 68

Note

- Noise test conditions: IP54-rated cabinet, one meter away from the front of the cabinet, dark room, and operating at rated conditions
- The following table describes the relationship between the active rectifier module and the filter module.

Active rectifier module	Filter module
MD880LC-40M-0299-5	MD880LC-40F-0395-5
MD880LC-40M-0395-5	
MD880LC-40M-0530-5	MD880LC-40F-0650-7
MD880LC-40M-0650-5	
MD880LC-40M-0820-5	MD880LC-40F-0820-7
MD880LC-40M-1558-5	MD880LC-40F-1558-7
MD880LC-40M-0530-7	MD880LC-40F-0650-7
MD880LC-40M-0650-7	
MD880LC-40M-0820-7	MD880LC-40F-0820-7
MD880LC-40M-1558-7	MD880LC-40F-1558-7

It is recommended that the water circuits of 299 A, 395 A, 530 A, and 650 A reactor modules be connected in series to the front end of the active rectifier module. It is recommended that the water circuits of 820 A and 1558 A reactor modules be connected to the active rectifier module in parallel. For technical parameters of the cooling circuit, see *"4.3.1 Installation Requirements" on page 143*.

Table 1–4 Selection of MD880 series water-cooled active rectifier filter module cable

Model	Effective value of total current of capacitor branch per phase (A)	Recommended cable quantity and cross-sectional area (mm^2)	Terminal
MD880LC-40F-0395-5	30	10	OT/10-10
MD880LC-40F-0650-7	66	16	OT/16-8
MD880LC-40F-0820-7	82.6	25	OT/25-6
MD880LC-40F-1558-7	165.2	70	OT/70-8

Table 1–5 Electrical specifications of MD880LC series 500 V inverter module

Item		Specification								
Model: MD880LC-50M-0xxx-5		149	183	245	299	349	395	530	650	900
Frame size		H6w						H7w		H8w
Input	DC bus voltage (VDC)	540 to 750						740 to 975		
Output	400 VAC power (kW)	75	90	110	132	160	200	250	355	500
	500 VAC power (kW)	90	110	160	200	200	250	355	400	560
	Rated output current (A)	149	183	245	299	349	395	530	650	900
	Power (kW) in low overload applications at 400 VAC	75	90	110	132	160	200	250	315	450
	Power (kW) in low overload applications at 500 VAC	90	110	132	160	200	250	315	400	560
	Output current in low overload applications (A)	143	176	236	287	335	380	509	624	864
	Power (kW) in high overload applications at 400 VAC	55	75	90	110	132	160	200	250	355
	Power (kW) in high overload applications at 500 VAC	75	90	110	132	160	200	250	315	450
	Output current in high overload applications (A)	112	150	184	224	262	296	424	520	675
	Output voltage (VAC)	0 to 500								
	Output frequency (Hz)	0 to 300								
	Overload capacity	Low overload: 110%I_{LD}, continuous operation for 1 min allowed per every 5 min High overload: 150%I_{HD}, continuous operation for 1 min allowed per every 5 min								
Power loss c/a/T[1] (kW)		1.2/0.2/1.4	1.4/0.2/1.6	1.9/0.2/2.1	2.4/0.2/2.6	2.8/0.3/3.1	3.4/0.4/3.8	8/0.5/8.5	9.2/0.6/9.8	14.3/0.9/15.2
Weight (kg)		35						49		88

Item	Specification								
Model: MD880LC-50M-0xxx-5	149	183	245	299	349	395	530	650	900
Rated water flow (L/min)	16						16		
Rated flow resistance (kPa)	30						30		180
Dimensions (W x H x D) (mm)	174.5 x 590 x 369.5						230 x 720 x 456		210 x 980 x 450
Power consumption of auxiliary power supply	Power supply input: 24 VDC/2 A. The system achieves power redundancy by combining an external power supply with backup power drawn from the internal DC bus.								

Note

When the rated power of the MD880LC series 500 V inverter module is calibrated based on an output voltage of 400 VAC, the actual power can be increased as the output voltage increases when the rated current is not exceeded during operation within the permissible voltage range.

Table 1–6 Electrical specifications of MD880LC series 690 V inverter module

Item		Specification		
Model: MD880LC-50M-0xxx-7		530	650	900
Frame size		H7w		H8w
Input	DC bus voltage (VDC)	740 to 975		
Output	Power (kW)	500	630	900
	Rated output current (A)	530	650	900
	Power in low overload applications (kW)	500	630	860
	Output current in low overload applications (A)	509	624	864
	Power in high overload applications (kW)	400	500	630
	Output current at heavy overload (A)	424	520	675
	Output voltage (VAC)	0 to 690		
	Output frequency (Hz)	0 to 300		
	Overload capacity	Low overload: 110%I_{LD}, continuous operation for 1 min allowed per every 5 min High overload: 150%I_{HD}, continuous operation for 1 min allowed per every 5 min		
Power loss c/a/T[1] (kW)		9.0/0.5/9.5	10.7/0.6/11.3	16.2/0.9/17.1
Weight (kg)		49		88
Rated water flow (L/min)		16		
Rated flow resistance (kPa)		30		180

Item	Specification		
Model: MD880LC-50M-0xxx-7	530	650	900
Dimensions (W x H x D) (mm)	230 x 720 x 456		210 x 980 x 450
Power consumption of auxiliary power supply	Power supply input: 24 VDC/2 A. The system achieves power redundancy by combining an external power supply with backup power drawn from the internal DC bus.		

Note

[1]: "c" indicates the power loss dissipated in the coolant. "a" indicates the power loss dissipated in the air. "T" indicates the total power loss excluding the power loss of the input reactor.

1.3 Technical Indicators

1.3.1 Technical Data

Table 1–7 Technical data of the MD880 series water-cooled active rectifier module

Item		Technical data
Basic performance	AC input voltage	500 V system: 380 VAC to 500 VAC, ±10% (-15%, < 1 min) 690 V model: 525 VAC to 690 VAC, ±10% (-15%, < 1 min)
	Input frequency	47 Hz to 63 Hz
	Unbalance degree	Maximum value ⩽ (±3% of rated line voltage)
	Output voltage	500 V system (H6w): 540 VDC to 750 VDC 500 V system (H7w and H8w): 600 VDC to 850 VDC 690 V system: 740 VDC to 975 VDC
	Overload capacity	Low overload: Continuous operation at 110% of the low overload base load allowed for 1 min per every 5 min High overload: Continuous operation at 150% of the high overload base load for 1 min per every 5 min
	Operating efficiency	> 97% (rated operating conditions)
	Power factor	> 0.99 (rated operating conditions)
	Total harmonic distortion of current	Total harmonic distortion of current < 3% (residual smoothing current < 40, used together with the filter module, compliant with IEEE 519 harmonics standard)
Water-cooled system	Coolant composition	Purified water or mixture of purified water and ethylene glycol + preservative. For use in ambient temperatures below 5℃, add antifreeze.
	Maximum pressure	6 bar
	Flow requirements	• 100% water: ⩾ 16 L/min • 80% water and 20% ethylene glycol: ⩾ 18 L/min • 60% water and 40% ethylene glycol: ⩾ 21 L/min

Item		Technical data
Mechanical data	Vibration resistance	Compliant with vibration level 3M4 in GB/T4798.3 Steady-state sinusoidal vibration: 2–9 Hz, 3 mm 9 Hz to 200 Hz, 10 m/s^2 Shock: 100 m/s^2; time: 11 ms
	Safety performance	Compliant with EN 61800-5-1
Protective functions	Protective functions	Short circuit, overcurrent, overvoltage, undervoltage, phase loss, three-phase unbalance, and overtemperature
Environment requirements	Cooling method	Water-cooled
	Operating location	Indoors without direct sunlight, dust, corrosive gas, combustible gas, oil mist, water vapor, drip, or salty elements
	Altitude	1000 m to 4000 m (Derating is required for altitudes above 1000 m. Install an isolation transformer for altitudes above 2000 m.)
	Ambient temperature	0°C to 55°C (Derating is required for temperatures above 45°C.)
	Coolant temperature	0°C to 50°C (Derating is required for temperatures above 40°C.)
	Storage temperature	-40°C to +70°C (Empty the coolant of the module for storage temperatures below 0°C.)
	Ambient humidity	5% to 95% RH (without condensation). For condensation-proof water temperature, see *"4.3.3 Temperature Limit" on page 146*
	Pollution degree	PD2
	Power grid system	IT TT/TN (Voltage dependent resistors and EMC screws needed)
	Overvoltage category	OVCIII
	Degree of protection	IP00
Water quality requirements	Cycle requirement	Closed cycle mode. The coolant is isolated from the outside.
	Water	Deionized water or distilled water (antifreeze can be added)
	PH value	6–8
	Hardness	< 10 dH
	Conductivity	< 300 µs/cm
	Chloride content	< 10 mg/L
	Iron content	< 0.1 mg/L
	Sulfate content	< 100 mg/L
	Total dissolved solids	< 200 mg/L
	Maximum particle size	300 µm

Note

Water quality requirements are necessary for normal operation of equipment.

Table 1–8 Technical data of the power conversion system function of the MD880 series water-cooled active rectifier module

Item		Technical data
DC side	Voltage range	500 V system (H6w): 540 VDC to 750 VDC 500 V system (H7w and H8w): 600 VDC to 850 VDC 690 V system: 740 VDC to 975 VDC
AC parameters (on-grid)	AC voltage	500 V system: 380 VAC to 500 VAC, ±10% (-15%, < 1 min) 690 V system: 525 VAC to 690 VAC, ±10% (-15%, < 1 min)
	Frequency	47 Hz to 63 Hz
	Unbalance degree	⩽ 3% of the rated line voltage
	Total harmonic distortion (rated operating conditions)	Total harmonic distortion of current < 5% (residual smoothing current < 40, compliant with IEEE 519 harmonics standard) Total harmonic distortion of voltage < 5% (residual smoothing current > 20)
	Power factor	> 0.99 (not involved in reactive adjustment of the system in on-grid mode under rated operating conditions)
AC parameters (off-grid)	AC output voltage	500 V model: 380 VAC to 500 VAC 690 V model: 525 VAC to 690 VAC
	Rated AC output frequency	50 Hz/60 Hz
	Output voltage accuracy	< 1% U_N (linear balanced load)
	Output frequency accuracy	< 0.5%
	Degree of voltage unbalance	< 2% or < 4% (short time) (three-phase symmetrical load)
	Total harmonic distortion of voltage	< 5% (linear balanced load)
System	Overload capacity	Low overload: Operating at 110% of the low overload base load for 1 minute per every 5 minutes High overload: Operating at 150% of the high overload base load for 1 minute per every 5 minutes
	Operating efficiency	> 97% (rated operating conditions)
Protective functions	Protective functions	Short circuit, overcurrent, overvoltage, undervoltage, phase loss, three-phase unbalance, and overtemperature
Operating environment	Ambient temperature	0°C to 55°C. For temperatures above 45°C, derate the current by 0.5% for every additional 1°C.
	Coolant temperature	0°C to 50°C. For temperatures above 40°C, derate the current by 2% for every additional 1°C.
	Ambient humidity	5% to 95% (without condensation)
	Altitude	⩽ 1000 m: Derating is not required. > 1000 m: Derate by 1% for every additional 100 m. > 2000 m: Install an isolation transformer. Maximum altitude: 4000 m
	Ambient condition	Chemical gas: 3C2 (operation) Solid particle: 3S1 (operation)
Storage environment	Storage temperature	-40°C to +70°C
	Storage humidity	5% to 95% RH (without condensation)

Item		Technical data
Mechanical data	Vibration resistance	Compliant with vibration level 3M4 in GB/T4798.3 • Steady-state sinusoidal vibration: 2–9 Hz, 3 mm • 9 Hz to 200 Hz, 10 m/s^2 • Shock: 100 m/s^2; time: 11 ms
	Degree of protection	IP00 (module)
	Safety performance	Compliant with EN 61800-5-1
	Cooling method	Water-cooled (power module coolant flow: 16 L/min)

Table 1–9 Technical data of MD880 series water-cooled inverter module

Item		Technical data
Basic performance	Rated input voltage	500 V system (H6w): 540 VDC to 750 VDC 500 V system (H7w and H8w): 600 VDC to 850 VDC 690 V model: 740 VDC to 975 VDC
	Allowable voltage fluctuation range	±10% (-15%, < 1 min)
	Output voltage	500 V model: 0 VAC to 500 V 690 V model: 0 VAC to 690 V
	Output frequency	0 Hz to 300 Hz
	Overload capacity	Low overload: Operating at 110% of the low overload base load for 1 minute per every 5 minutes High overload: Operating at 150% of the high overload base load for 1 minute per every 5 minutes
	Operating efficiency	> 98%
Control characteristics	Motor control method	V/f control Sensorless vector control (SVC) Feedback vector control (FVC)
	Carrier frequency	Default carrier frequency: 2.5 kHz; maximum carrier frequency: 8 kHz
	Speed regulation range	V/f control: 1:50
		SVC control: 1:200
		FVC control: 1:1000
	Speed control accuracy	SVC control: ±10% FsL
		FVC control: ±0.01%
	Torque control accuracy	SVC control: ±5% (above 5 Hz)
		FVC control: ±3%
	Torque response	SVC control: ⩽ 5 ms
		FVC control: ⩽ 3 ms
	Starting torque	SVC control: 0.5 Hz/150%
		FVC control: 0 Hz/200%

Item		Technical data
Water-cooled system	Coolant composition	Purified water or mixture of purified water and ethylene glycol + preservative. For use in ambient temperatures below 5°C, add antifreeze.
	Maximum pressure	6 bar
	Flow requirements	• 100% water: ⩾ 16 L/min • 80% water and 20% ethylene glycol: ⩾ 18 L/min • 60% water and 40% ethylene glycol: ⩾ 21 L/min
Mechanical data	Vibration resistance	Compliant with GB/T4798.3 - Mechanical conditions Frequency: 2 Hz to 9 Hz; vibration amplitude: 3 mm Frequency: 9 Hz to 200 Hz; gravitational acceleration: 9.8 m/s^2 (1 g) Shock: 100 m/s^2; time: 11 ms
	Safety performance	Compliant with EN 61800-5-1
Protective functions	Phase loss protection	Provides output phase loss protection.
	Overtemperature protection	Protection is triggered when the inverter module is overheated.
	Overload protection	High overload protection: The module stops after operating at 150% of the high overload base load for 60s. Low overload protection: The drive stops after operating at 110% of the low overload base load for 60s.
	Overcurrent protection	The module stops when the current exceeds 250% of the high overload rated current.
Environment require ments	Cooling method	Water-cooled
	Operating location	Indoors without direct sunlight, dust, corrosive gas, and flammable gas, oil mist, water vapor, water drip, or salty element
	Altitude	1000 to 4000 m (Derating is required for altitudes above 1000 m. Install an isolation transformer for altitudes above 2000 m.)
	Ambient temperature	0°C to 55°C (Derating is required for temperatures above 45°C.)
	Coolant temperature	0°C to 50°C (Derating is required for temperatures above 40°C.)
	Storage temperature	-40°C to +70°C (Empty the coolant of the module for storage temperatures below 0°C.)
	Ambient humidity	5% to 95% RH (without condensation). For condensation-proof water temperature, see *"4.3.3 Temperature Limit" on page 146*
	Pollution degree	PD2
	Power grid system	IT TT/TN (Voltage dependent resistors and EMC screws needed)
	Overvoltage category	OVCIII
	Degree of protection	IP00

Item		Technical data
Water quality requirements	Cycle requirement	Closed cycle mode. The coolant is isolated from the outside.
	Water	Deionized water, distilled water, or antifreeze
	PH value	6–8
	Hardness	< 10 dH
	Conductivity	< 300 μs/cm
	Chloride content	< 10 mg/L
	Iron content	< 0.1 mg/L
	Sulfate content	< 100 mg/L
	Total dissolved solids	< 200 mg/L
	Maximum particle size	300 μm

Note

Water quality requirements are necessary for normal operation of equipment.

1.3.2 Derating

Active rectifier

Ambient temperature-based derating

For ambient temperatures above 45°C (not higher than 55°C), the rated output current of the active rectifier must be derated by 0.5% for every additional 1°C. Output current = Rated current x Derating coefficient (k).

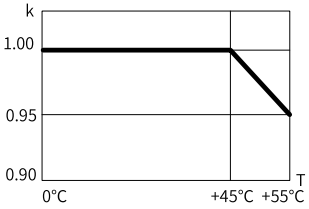


Figure 1-7 Ambient temperature-based derating

Altitude-based derating

For altitudes above 1000 m (not higher than 4000 m), the output current of the active rectifier must be derated by 1% for every additional 100 m. Output current = Rated current x Derating coefficient (k).

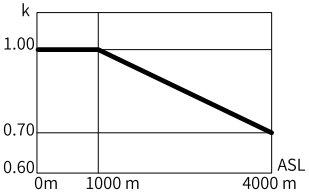


Figure 1-8 Altitude-based derating

Coolant temperature-based derating

For coolant temperatures above 40°C (not higher than 50°C), the rated output current of the active rectifier must be derated by 2% for every additional 1°C. Output current = Rated current x Derating coefficient (k).

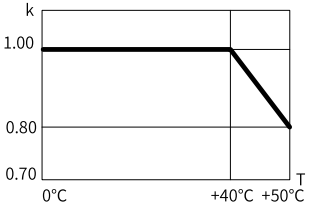


Figure 1-9 Coolant temperature-based derating

Inverter module

Derating of 6-pulse basic rectifier of H6w inverter module

The bus capacitance of the H6w water-cooled inverter module is designed with the active rectifier module as the upstream device. When the bus voltage is provided by the 6-pulse rectifier module, the bus capacitance is low. You need to choose between the following two options.

- No additional bus capacitance applies. In this case, the rated output current is derated by 20%, and the output current = rated current x 0.8.
- Add an additional 20% capacitance on the DC bus. In this case, the H6w inverter module does not need to be derated.

Ambient temperature-based derating

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

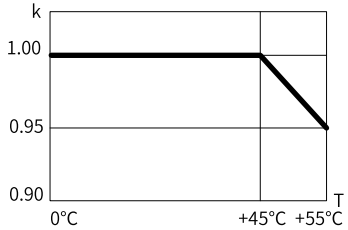


Figure 1-10 Ambient temperature-based derating

Altitude-based derating

For altitudes of 1000 m to 4000 m, the output current of the inverter module must be derated by 1% for every additional 100 m.

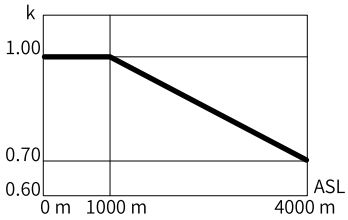


Figure 1-11 Altitude-based derating

Coolant temperature-based derating

For coolant temperatures above 40°C (not higher than 50°C), the rated output current must be derated by 2% for every additional 1°C. Output current = Rated current x Derating coefficient (k).

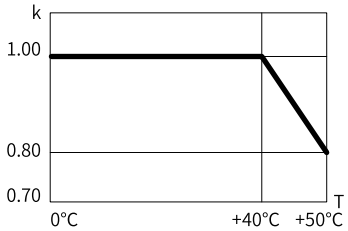


Figure 1-12 Coolant temperature-based derating

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.

1.3.3 Overload Capacity

For some drive systems where overload may occur, a proper base load current is necessary for the MD880LC series AC drive. The criterion for overload is that the drive is operated with its base load current before and after the overload occurs in a cycle of 300s.

The following sections describe two typical overload conditions. Other conditions must be compliant with the overload curve.

Curve in the low overload mode

In the low overload mode, the base load current I_{LD} is based on a 60s operation cycle at 110% of low overload base load.

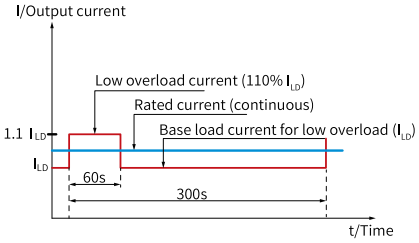


Figure 1-13 Curve in the low overload mode

Curve in the high overload mode

In the high overload mode, the base load current I_{HD} is based on a 60s operation cycle at 150% of high overload base load.

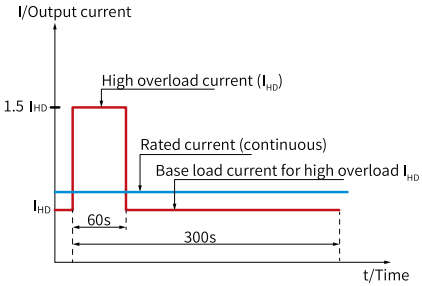


Figure 1-14 Curve in the high overload mode

1.4 Components

1.4.1 Components of the Active Rectifier

Layout of the active rectifier

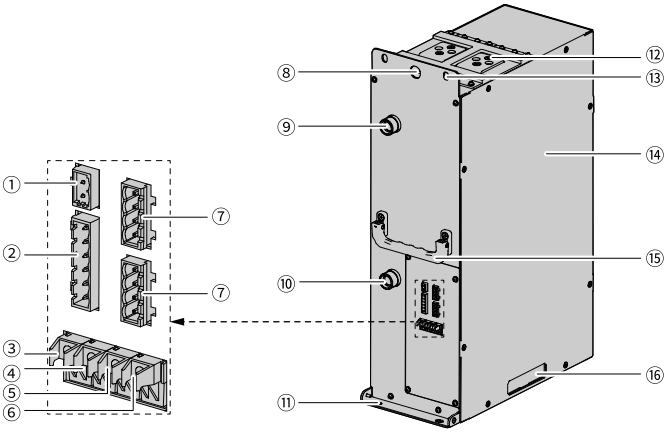


Figure 1-15 Component layout 1 of the H6w active rectifier module

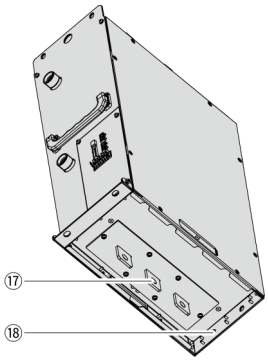


Figure 1-16 Component layout 2 of the H6w active rectifier module

No.	Name
①	Input terminal for 24 VDC external power supply
②	DC pre-charge control terminal
③	VR optical fiber reception terminal
④	VT optical fiber transmission terminal
⑤	CBC-VR optical fiber reception terminal
⑥	CBC-VT optical fiber transmission terminal
⑦	STO wiring terminal
⑧	Eyebolt
⑨	Water outlet fitting, M26x1.5 metric external thread, 24-degree internal taper
⑩	Water inlet fitting, M26x1.5 metric external thread, 24-degree internal taper
⑪	Lower fixing hole
⑫	DC bus wiring terminal
⑬	Upper fixing hole
⑭	Side plate (control chamber inside)
⑮	Front handle
⑯	Bottom handle
⑰	AC input terminal (U/V/W)
⑱	Rear fixing hole

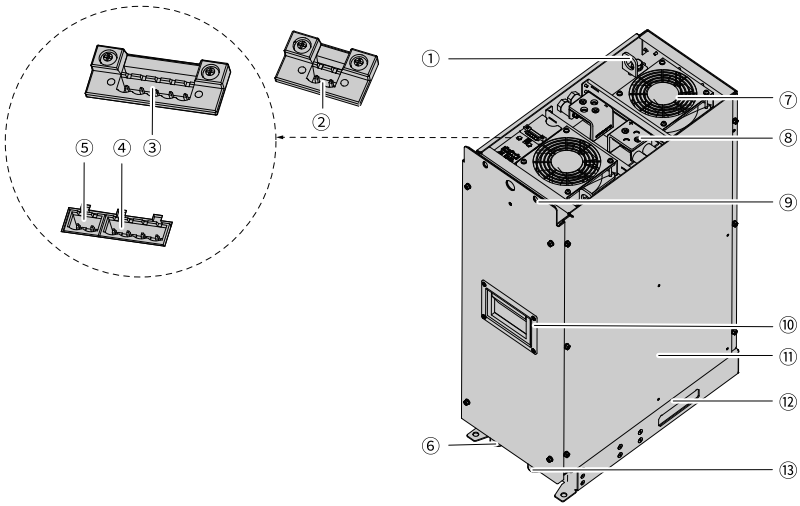


Figure 1-17 Component diagram 1 of the H7w active rectifier module

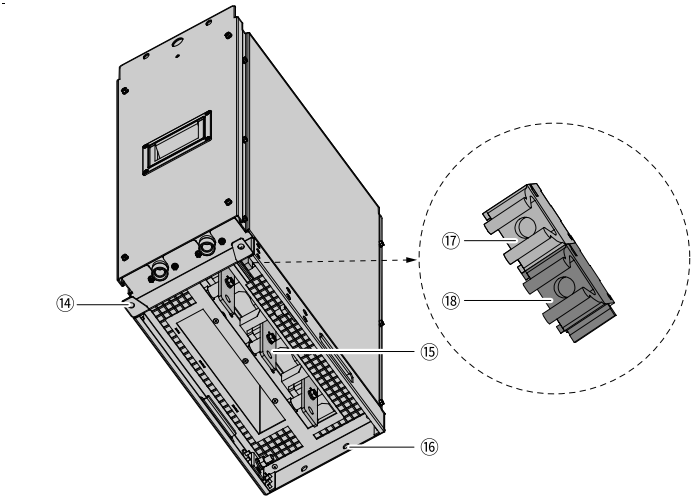


Figure 1-18 Component diagram 2 of the H7w active rectifier module

No.	Name	Description
①	Eyebolt	-
②	HCU redundant power supply output terminal[1]	-
③	DC pre-charge control terminal (KINOUT)[2]	-
④	STO wiring terminal	-

No.	Name	Description
⑤	24 VDC external power supply input terminal[3]	-
⑥	Water inlet fitting, M26x1.5 metric external thread, 24-degree internal taper	-
⑦	Auxiliary fan	-
⑧	DC bus wiring terminal	Locates on the upper part of the module.
⑨	Upper fixing hole	-
⑩	Front handle	You can push the cabinet in or out from the front.
⑪	Side plate	The control chamber locates inside the closure plate on the right side of the module.
⑫	Bottom handle	-
⑬	Water outlet fitting, M26x1.5 metric external thread, 24-degree internal taper	-
⑭	Lower fixing hole	-
⑮	AC input terminal (U/V/W)	Locates at the bottom of the module.
⑯	Rear fixing hole (optional)	-
⑰	VR optical fiber reception terminal	-
⑱	VT optical fiber transmission terminal	-

Note

- [1]: The old version of the H7w module provides the 2-pin HCU redundant power supply output terminal.
- [2]: The new version of the H7w module provides the 5-pin DC pre-charge control terminal.
- [3]: The external 24 VDC/2 A power supply can power up the active rectifier module control system for commissioning. After the mains power is connected, the active rectifier module is powered by the internal auxiliary power supply, which makes the external 24 V power supply redundant.

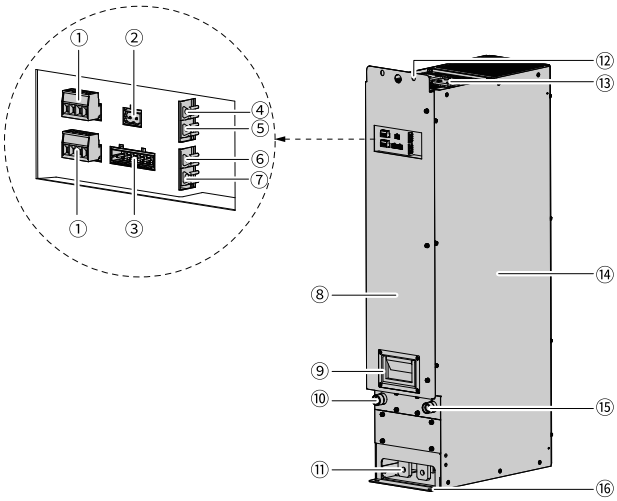


Figure 1-19 Component diagram 1 of the H8w active rectifier module

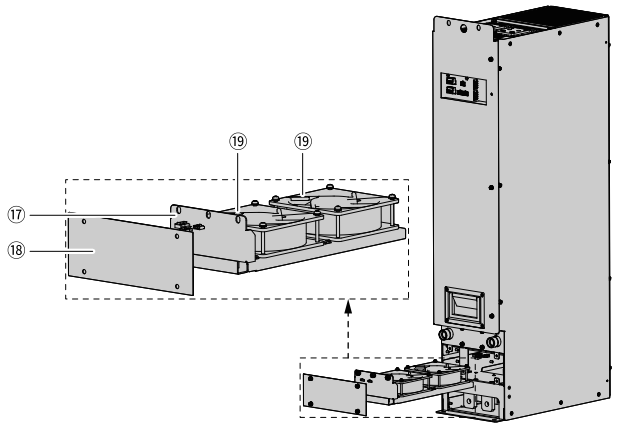


Figure 1-20 Component diagram 2 of the H8w active rectifier module

No.	Name
①	STO wiring terminal
②	Input terminal for 24 VDC external power supply
③	DC pre-charge control terminal (KINOUT)
④	CBC-VT
⑤	CBC-VR
⑥	Transmission terminal during optical fiber communication of the drive (VT)

No.	Name
⑦	Reception terminal during optical fiber communication of the drive (VT)
⑧	Front panel (control chamber inside)
⑨	Handle
⑩	Water inlet fitting, M26x1.5 metric external thread, 24-degree internal taper
⑪	AC input terminal (U/V/W)
⑫	Top fixing hole
⑬	DC output terminal (-/+)
⑭	Side plate
⑮	Water outlet fitting, M26x1.5 metric external thread, 24-degree internal taper
⑯	Bottom fixing hole
⑰	Sheet metal of the fan module
⑱	Fan cover
⑲	Fan

Layout of the 395 A filter module

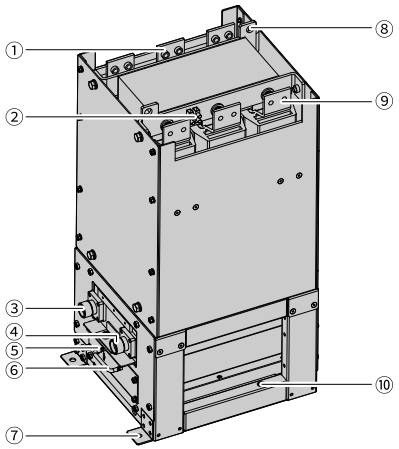


Figure 1-21 395 A reactor module

No.	Description
①	Reactor output copper busbar
②	Reactor temperature switch cable connector
③	A/L, water inlet fitting of the water-to-air heat exchanger, M26x1.5 metric external thread, 24-degree internal taper
④	A/L, water outlet fitting of the water-to-air heat exchanger, M26x1.5 metric external thread, 24-degree internal taper

No.	Description
⑤	Fan cable connector
⑥	Fan handle
⑦	Bottom front fixing hole
⑧	Eyebolt
⑨	Reactor input copper busbar
⑩	Bottom rear fixing hole

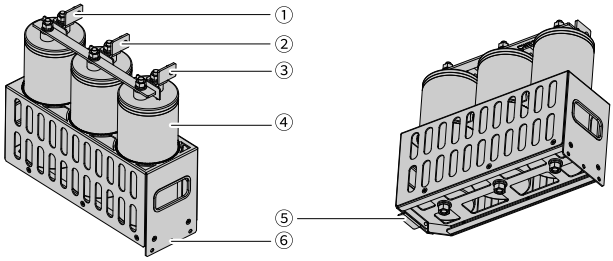


Figure 1-22 395 A capacitor module

No.	Description
①	Phase T copper busbar
②	Phase S copper busbar
③	Phase R copper busbar
④	Capacitor
⑤	Rear protruding sheet metal (used to fix the capacitor module)
⑥	Front fixing hole

Layout of the 650 A filter module

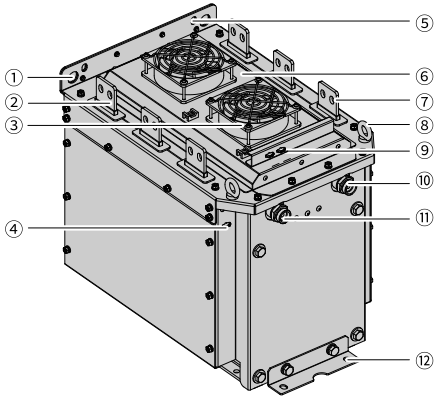


Figure 1-23 Layout of the 650 A reactor module

No.	Description
①	Eyebolt
②	Incoming copper busbar connector
③	Fan
④	Reactor temperature switch cable connector
⑤	Top fixing hole
⑥	Fan box assembly
⑦	Outcoming copper busbar connector
⑧	Eyebolt
⑨	Fan cable connector
⑩	A/L, water outlet fitting of the water-to-air heat exchanger, M26x1.5 metric external thread, 24-degree internal taper
⑪	A/L, water inlet fitting of the water-to-air heat exchanger, M26x1.5 metric external thread, 24-degree internal taper
⑫	Bottom fixing hole

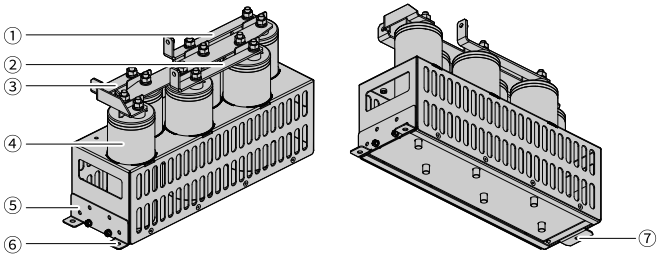


Figure 1-24 Layout of the 650 A capacitor module

No.	Description
①	Phase T copper busbar
②	Phase S copper busbar
③	Phase R copper busbar
④	Capacitor
⑤	Variable mounting bracket
⑥	Front fixing hole
⑦	Rear fixing hole

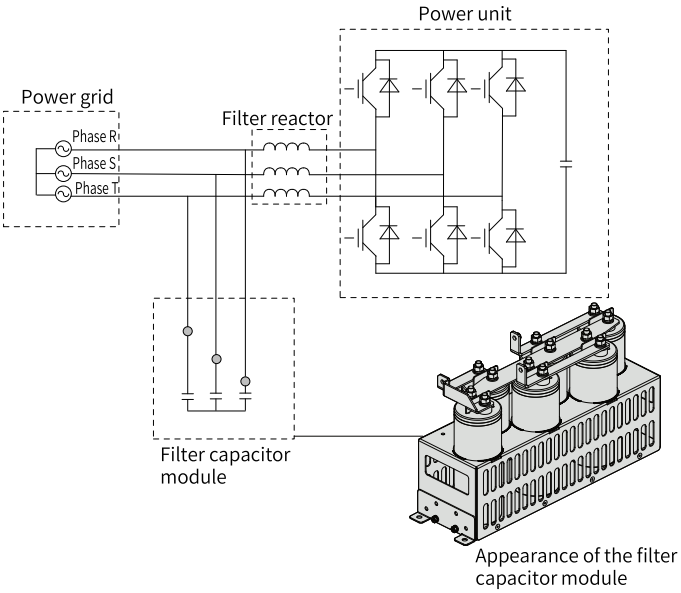


Figure 1-25 Wiring of the 650 A capacitor module

Layout of the 820 A filter module

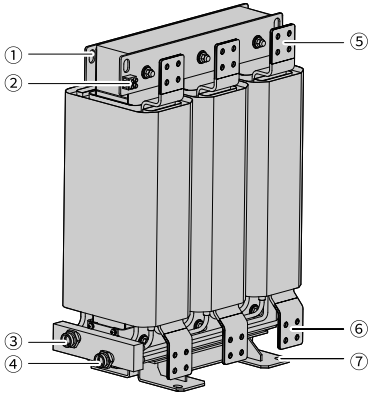


Figure 1-26 Layout of the 820 A reactor module

No.	Description
①	Eyebolts (x 4)
②	Reactor temperature switch terminal
③	Water outlet fitting, M26x1.5 metric external thread, 24-degree internal taper

No.	Description
④	Water inlet fitting, M26x1.5 metric external thread, 24-degree internal taper
⑤	Three-phase incoming copper busbar connector
⑥	Three-phase outcoming copper busbar connector
⑦	Base fixing holes (x 4)

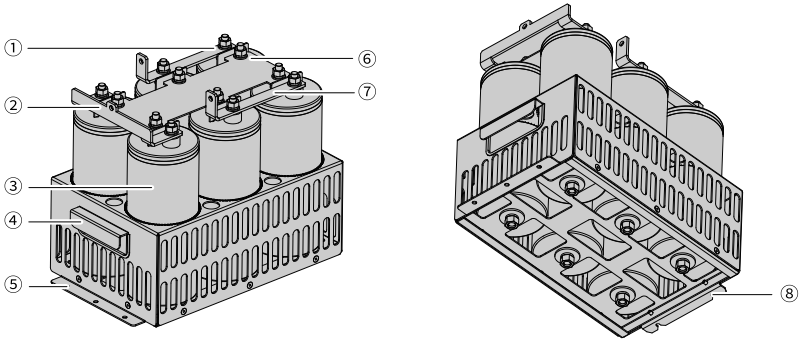


Figure 1-27 Layout of the 820 A capacitor module

No.	Description
①	Phase R copper busbar
②	Phase T copper busbar
③	Dry-type single-phase AC filter capacitor
④	Capacitor module sheet metal frame assembly
⑤	Front fixing holes (x 3)
⑥	Three-phase star connection copper busbar
⑦	Phase S copper busbar
⑧	Rear fixing holes (x 2)

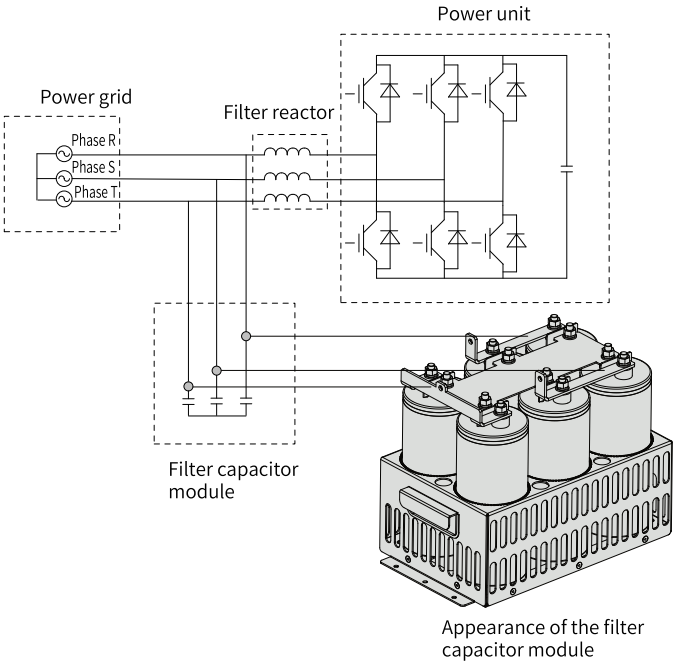


Figure 1-28 Wiring of the 820 A capacitor module

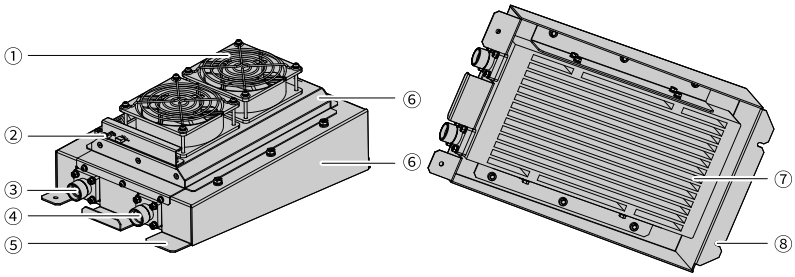


Figure 1-29 Layout of the 820 A water-to-air heat exchanger and fan module

No.	Description
①	DC fans (x 2)
②	Fan cable connectors (x 2)
③	A/L, water inlet fitting of the water-to-air heat exchanger, M26x1.5 metric external thread, 24-degree internal taper
④	A/L, water outlet fitting of the water-to-air heat exchanger, M26x1.5 metric external thread, 24-degree internal taper
⑤	Front fixing hole (x 2)

No.	Description
⑥	Water-to-air heat exchanger and fan box assembly
⑦	3.2 kW water-to-air heat exchanger
⑧	Rear fixing holes (x 2)

Components of the 1558 A filter module

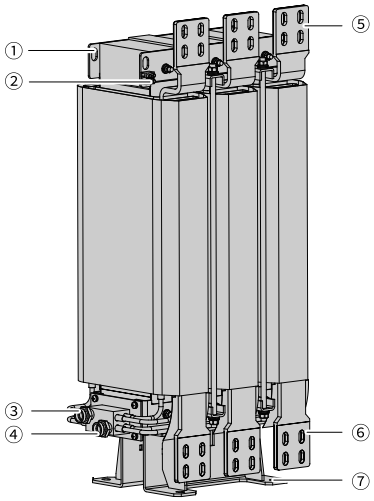


Figure 1-30 Components of the 1558 A reactor module

No.	Description
①	Eyebolts (x 4)
②	Reactor temperature switch terminal
③	Water outlet fitting, M26x1.5 metric external thread, 24-degree internal taper
④	Water inlet fitting, M26x1.5 metric external thread, 24-degree internal taper
⑤	Three-phase incoming copper busbar connector
⑥	Three-phase outcoming copper busbar connector
⑦	Base fixing holes (x 4)

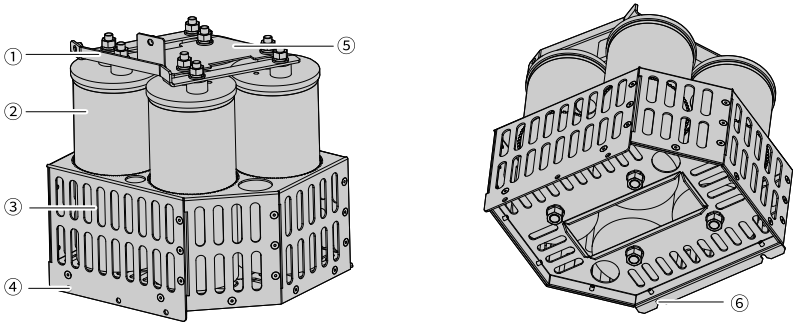


Figure 1-31 Components of the 1558 A capacitor module

No.	Description
①	Phase (R, S, or T) copper busbar
②	Dry-type single-phase AC filter capacitor
③	Capacitor module sheet metal frame assembly
④	Front fixing holes (x 3)
⑤	Star connection copper busbar for phase R, S, or T, which is connected to the other two start connection busbars through cables.
⑥	Rear fixing holes (x 2)

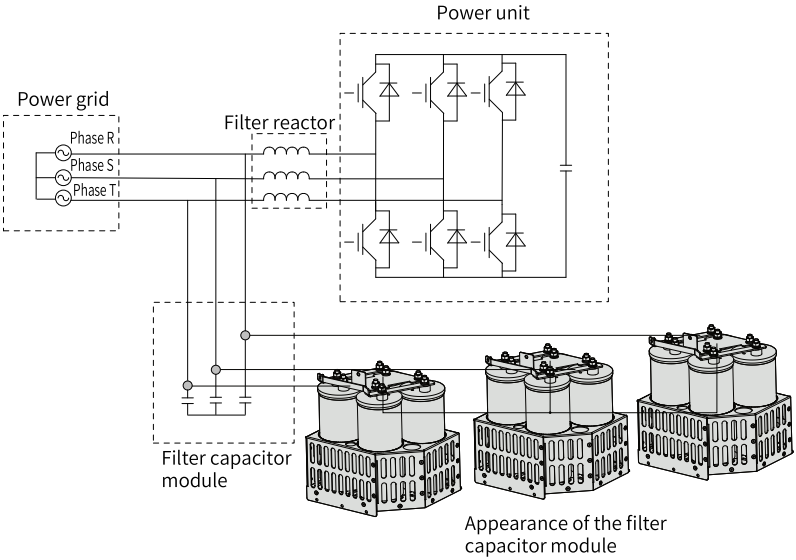


Figure 1-32 Wiring of the 1558 A capacitor module

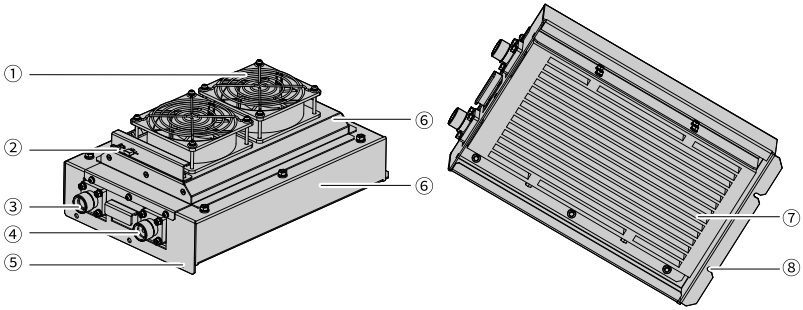


Figure 1-33 Layout of the 1558 A water-to-air heat exchanger and fan module

No.	Description
①	DC fans (x 2)
②	Fan cable connectors (x 2)
③	A/L, water inlet fitting of the water-to-air heat exchanger, M26x1.5 metric external thread, 24-degree internal taper
④	A/L, water outlet fitting of the water-to-air heat exchanger, M26x1.5 metric external thread, 24-degree internal taper
⑤	Front fixing holes (x 3)
⑥	Water-to-air heat exchanger and fan box assembly
⑦	3.2 kW water-to-air heat exchanger
⑧	Rear fixing holes (x 2)

1.4.2 Components of the Inverter Module

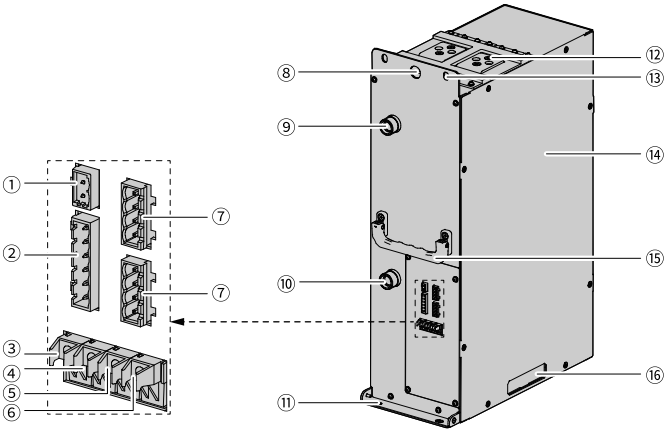


Figure 1-34 Component diagram 1 of the H6w inverter module

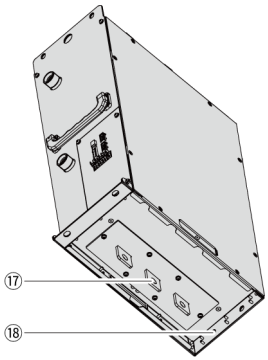


Figure 1-35 Component diagram 2 of the H6w inverter module

No.	Name
①	Input terminal for 24 VDC external power supply
②	DC pre-charge control terminal
③	VR optical fiber reception terminal
④	VT optical fiber transmission terminal
⑤	CBC-VR optical fiber reception terminal
⑥	CBC-VT optical fiber transmission terminal
⑦	STO wiring terminal
⑧	Eyebolt
⑨	Water outlet fitting, M26x1.5 metric external thread, 24-degree internal taper
⑩	Water inlet fitting, M26x1.5 metric external thread, 24-degree internal taper
⑪	Lower fixing hole
⑫	DC bus wiring terminal
⑬	Upper fixing hole
⑭	Side plate (control chamber inside)
⑮	Front handle
⑯	Bottom handle
⑰	AC output terminals (U/V/W)
⑱	Rear fixing hole

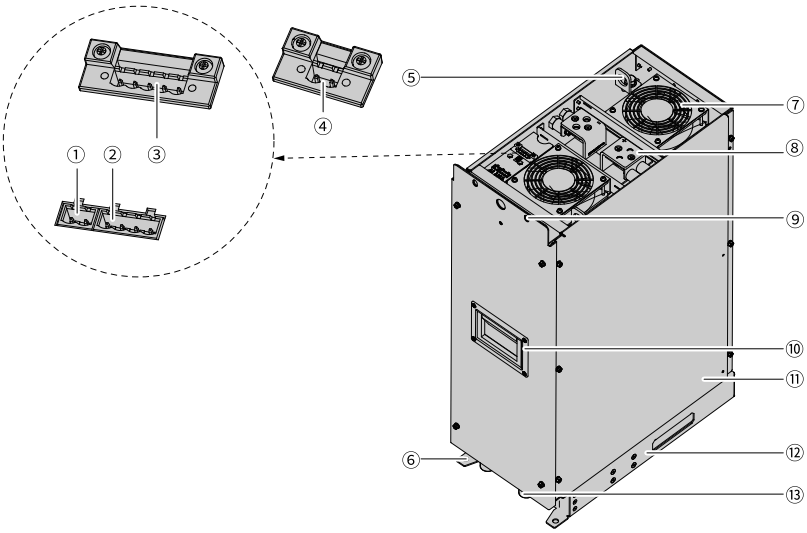


Figure 1-36 Component diagram 1 of the H7w inverter module

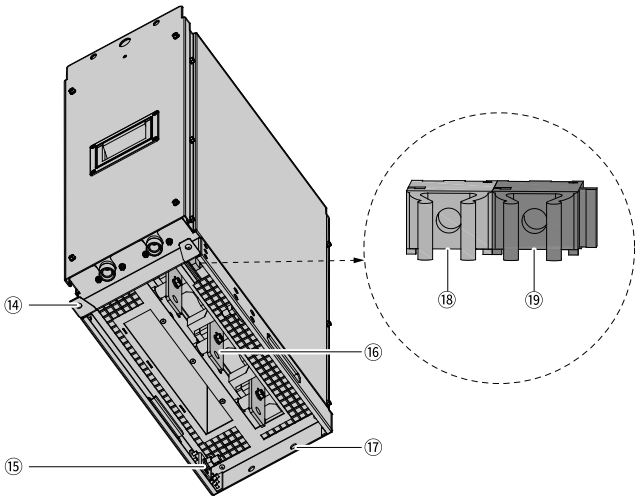


Figure 1-37 Component diagram 2 of the H7w inverter module

No.	Name
①	Input terminal for 24 VDC external power supply
②	STO wiring terminal
③	DC pre-charge control terminal (KINOUT)[1]
④	HCU redundant power supply output terminal [2]

No.	Name
⑤	Eyebolt
⑥	Water inlet fitting, M26x1.5 metric external thread, 24-degree internal taper
⑦	Auxiliary fan
⑧	DC bus wiring terminal
⑨	Upper fixing hole
⑩	Front handle
⑪	Side plate (control chamber inside)
⑫	Bottom handle
⑬	Water outlet fitting, M26x1.5 metric external thread, 24-degree internal taper
⑭	Lower fixing hole
⑮	Grounding terminal
⑯	AC output terminals (U/V/W)
⑰	Rear fixing hole (optional)
⑱	VR optical fiber reception terminal
⑲	VT optical fiber transmission terminal

Note

- [1]: The new version of the H7w module provides the 5-pin DC pre-charge control terminal.
- [2]: The old version of the H7w module provides the 2-pin HCU redundant power supply output terminal.

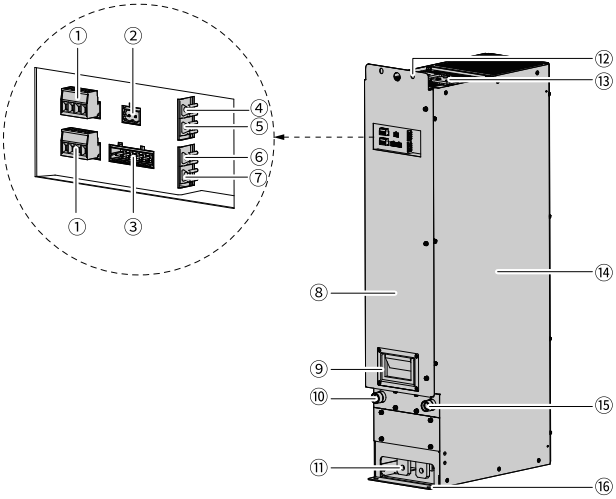


Figure 1-38 Layout 1 of the H8w water-cooled inverter module

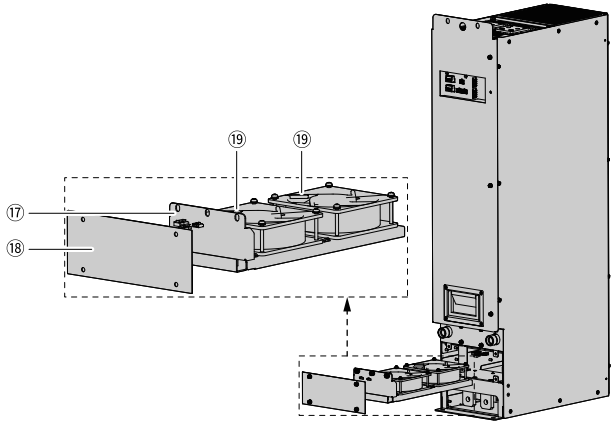


Figure 1-39 Layout 2 of the H8w water-cooled inverter module

No.	Name
①	STO wiring terminal
②	Input terminal for 24 VDC external power supply
③	DC pre-charge control terminal (KINOUT)
④	CBC-VT
⑤	CBC-VR
⑥	VT
⑦	VR

No.	Name
⑧	Front panel (control chamber inside)
⑨	Handle
⑩	Water inlet fitting, M26x1.5 metric external thread, 24-degree internal taper
⑪	AC output terminals (U/V/W)
⑫	Top fixing hole
⑬	DC input terminal (-/+)
⑭	Side plate
⑮	Water outlet fitting, M26x1.5 metric external thread, 24-degree internal taper
⑯	Bottom fixing hole
⑰	Sheet metal of the fan module
⑱	Fan cover
⑲	Fan

1.5 Selecting a Power Transformer for the Active Rectifier

The active rectifier module must be used together with the filter module. To meet the harmonics requirements, determine the short circuit impedance Z_k of the power transformer based on the apparent power S_N (AFE) of the active rectifier module and the capacity S_N (trafo) of the power transformer.

The rated impedance calculated using the rated apparent power of the active rectifier module must be at least 2.5%. The rated short circuit impedance of the transformer must comply with the following formula.

Note

If the generator is used as the power supply, the same impedance requirements also apply to the generator.

$$Z_k \geqslant 2.5\% \times \frac{S_N(\text{trafo})}{S_N(\text{AFE})}$$

Definition:

- S_N (trafo): Apparent power of the transformer or generator
- S_N (AFE): Apparent power of the active rectifier module
- Z_K : Rated short circuit impedance of the transformer or generator

For example, if the apparent power S_N (AFE) of the active rectifier module MD880LC-40M-0650-7 is 777 kVA, and the apparent power S_N (trafo) of the transformer is 2500 kVA, then the following formula applies:

$$Z_k \geqslant 2.5\% \times \frac{2500}{777} = 8.04\%$$

In the preceding example, the rated short circuit impedance of the transformer winding is 8.04%.

For example, if the apparent power S_N (AFE) of the active rectifier module MD880LC-40M-0820-7 is 980 kVA, and the apparent power S_N (trafo) of the transformer is 2500 kVA, then the following formula applies:

$$Z_k \geqslant 2.5\% \times \frac{2500}{980} = 6.38\%$$

In the preceding example, the rated short circuit impedance of the transformer winding is 6.38%.

Note

If the short circuit impedance requirements are not met and the short circuit ratio (SCR) of the grid exceeds 40, excessive harmonics can be generated on the grid side. Therefore, in applications where the harmonic current on the grid side must meet specified requirements, install an input reactor to allow an equivalent short circuit impedance that higher than 2.5%.

1.6 Selecting the Multi-drive Module Model

1.6.1 Selection Flow

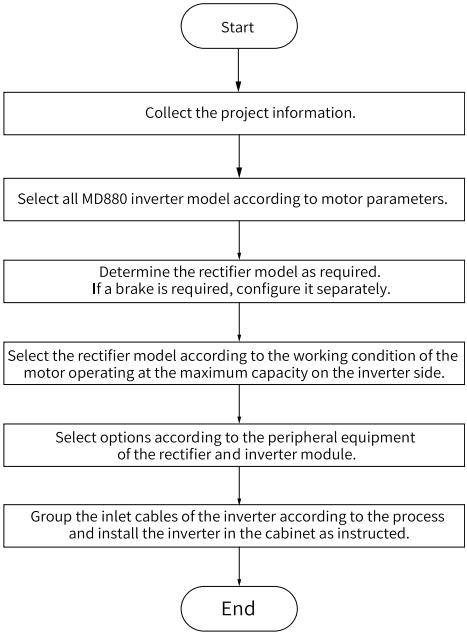


Figure 1-40 Selection flow

1.6.2 Selecting the Inverter Module

Select the MD880 inverter model that matches every motor according to the motor parameters.

1. Collect the load information on site.

   a. Overload requirement: It depends mainly on the application conditions of the motor and the process requirements on site.

   b. Derating requirement: Derating factors include ambient temperature, altitude, carrier frequency, low frequency output, parallel connection, cyclic load fluctuation, and high IP rating.

   c. Overload capacity: The criterion for overload is that the drive operates at its base load current (I_{LD} /I_{HD}) before and after the overload occurs in a cycle of 300s.

      - Low overload: The base load current (I_{LD}) is based on operation at 110% of low overload base load for 60s.

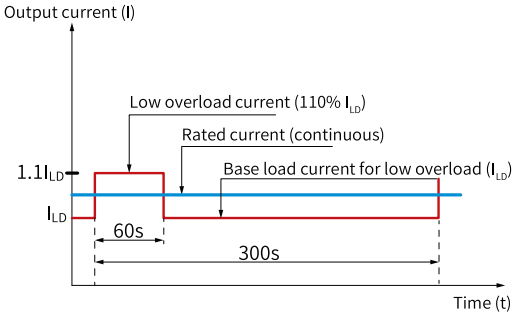


Figure 1-41 Curve in the low overload mode

- High overload: The base load current (I_{HD}) is based on operation at 150% of the high overload base load for 60s.

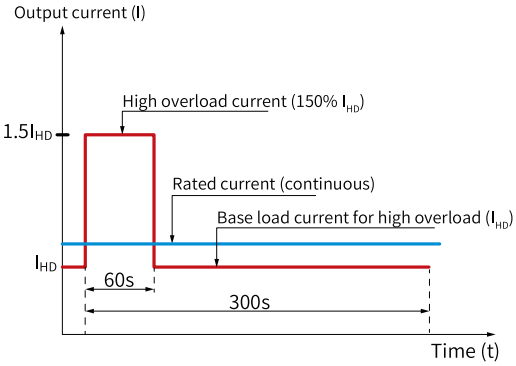


Figure 1-42 Curve in the high overload mode

2. After obtaining the preceding information, use the **current** as the main basis and select the model based on the following conditions.

   a. Use the base current on the motor nameplate during calculation.

   - Applications without overload:
     $I_N = I_E$

Note

- I_N: Rated current
- I_E: Rated motor current

   - Applications with overload:
     $I_N \times K = I_E \times N$

Note

- I_N : Base current for overload
- K: Overload factor (110% for low overload and 150% for high overload)
- I_E : Rated motor current
- N: Overload multiplier

b. After I_N is known, compare the I_N value with the rated current of the drive and select the inverter module accordingly.
c. After selecting the inverter module model, compare the power of the corresponding overload class with the rated motor power to ensure that the power meets requirements.

Note

Select the module model based on current (preferred) or power.

3. In addition to the current-based selection, if the motor load selected is standard without special or non-standard operating conditions, you can use **power** as the main basis for selection, as shown below.
   a. Compare the rated motor power on the nameplate with the power of the inverter module. Select the no-overload power, low-overload power, or high-overload power of the inverter module based on the load type. The following procedure takes the high-overload power of the inverter module as an example.
   b. Select an inverter module whose high-overload power is equal to the rated motor power on the nameplate, or the module whose high-overload power is greater than the rated motor power and is closest to the rated motor power.
   c. After the selection is done, compare the rated motor current with the high-overload current of the inverter module to ensure that the high-overload current covers the rated motor current.

1.6.3 Selecting the Rectifier Module

Determine the rectification mode before selecting the rectifier model.

Determining the rectification mode

The rectification mode is determined based on the configuration on the user side, such as the power grid capacity, phase shifting transformer, power transformer, and quick braking.

Configuration or requirement on the user end	Rectification mode
High requirements on harmonics suppression	• Select multi-pulse rectifier or active rectifier. • The harmonics rate of the active rectifier is 5%.
No specific requirements for harmonics suppression on the grid side, and energy feedback to the grid side not needed	Basic rectifier, operating at rated conditions, current harmonics on the rectifier side being 30% to 45%

Selecting the rectifier model

Calculate the power or current required on the inverter side when load motors are operating simultaneously at the maximum load. The calculated value is the minimum specification of the rectifier module.

2 Electrical Design

2.1 System Topology

The typical topology of the MD880 AC drive (multi-drive system) is shown in the following figure. It is comprised of rectification part (power conversion system module or active rectifier module) and inverter part. Expansion of the power conversion system module or active rectifier module and the inverter can be achieved through the HPCU. The HCUs of the power conversion system and the inverter are connected to the PLC through fieldbus for centralized control. Centralized commissioning and monitoring of the HCUs can be achieved through the RS485 bus.

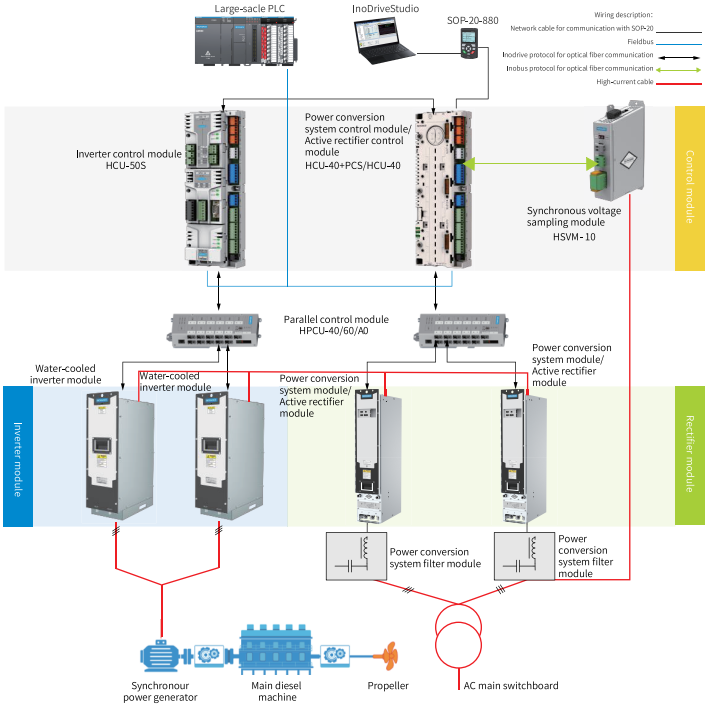


Figure 2-1 Typical topology of the MD880 AC drive (multi-drive system)

Relationship and use of the inverter, active rectifier, and filter module

The active rectifier is comprised of the power module and the filter module, together with the voltage/current detection circuit, power-on circuit, main controller HCU, and accessory card. The active rectifier converts the AC input to adjustable DC output that used as the DC bus input of the inverter. When regenerative energy feedback is needed on the DC side of the inverter, the energy can be fed back to the AC side through the active rectifier.

Power conversion system

Note

PCS: Power conversion system

The power conversion system is mainly comprised of the power module and the filter module, and is used together with the voltage/current detection circuit, power-on circuit, main controller HCU, and accessory card. The power conversion system can convert the AC input to adjustable DC output or convert the DC input to adjustable AC output. When DC-side input is used, the DC input can be converted to AC output by the power conversion system. The converted AC output is then tied to the power grid or provides energy for the AC load. When the AC side is connected to the power grid, the AC input can be converted to DC output by the power conversion system to provide energy for the load on the DC side.

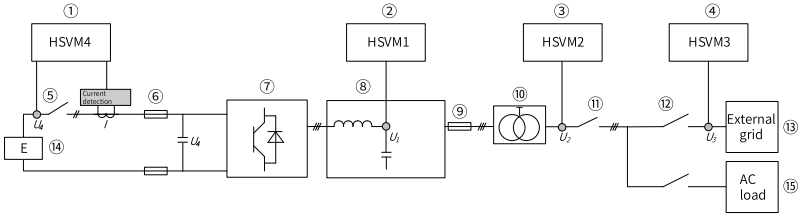


Figure 2-2 Sampling topology of power conversion system

No.	Description
①	The HSVM-20 synchronous voltage detection module is used to detect the load voltage and sample the load current on the DC side. The load voltage on the DC side is used for pre-charge logic judgment and voltage error detection on the DC side. The load current on the DC side is used for sampling the feedback value in the current mode (DC side) and detecting current error on the DC side [1]. Current sampling channel A must be used.
②	HSVM-10: Filter capacitor voltage sampling for the power conversion system control function
③	HSVM-10: Output load voltage sampling for AC output accuracy compensation and AC output sampling of the power conversion system in the automatic on-grid function
④	HSVM-10: On-grid point voltage sampling in the automatic on-grid function
⑤	If the DC contactor is installed (whether it is installed depends on the system application mode), switch on the DC contactor only after the DC side has been pre-charged properly.
⑥	Fuse on the DC side
⑦	Power module for the power conversion system
⑧	Filter module for the power conversion system
⑨	Fuse on the AC side

No.	Description
⑩	Power grid transformer (whether it is installed depends on the system application mode)
⑪	Output contactor
⑫	On-grid circuit breaker (whether it is installed depends on the system application mode)
⑬	External power grid (whether it is installed depends on the system application mode). Off-grid applications do not involve an external power grid, while on-grid applications involve an external power grid.
⑭	Battery or DC source
⑮	AC electrical equipment

Note

- *"Figure 2–2 Sampling topology of power conversion system" on page 62* shows the complete topology of the power conversion system system. The actual application may be simplified to exclude the DC contactor, power transformer, grid interconnection circuit breaker, or external power grid.
- [1]: The Hall component on the DC side can be used with HSVM-20 to sample the load current on the DC side. For details, see *" Ordering Instructions" on page 168*.

Active rectifier

The active rectifier is mainly composed of the power module and the filter module, together with the voltage/current detection circuit, power-on circuit, main controller HCU, and accessory card. The active rectifier can convert AC input to adjustable DC output, which is used as the DC power supply for the load. When regenerative energy feedback is needed by the voltage or current on the DC side, the active rectifier can feed the energy on the DC side back to the AC side (usually the power grid).

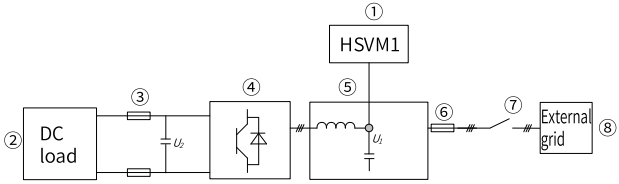


Figure 2-3 Sampling topology of the active rectifier

No.	Note
①	HSVM-10: Filter capacitor voltage sampling for the active rectifier control function
②	Electrical equipment: DC electrical equipment
③	Fuse on the DC side

No.	Note
④	Power module for the active rectifier
⑤	Filter module for the active rectifier
⑥	Fuse on the AC side
⑦	AC contactor
⑧	External power grid

The active rectifier module converts AC voltage to DC voltage, which is then distributed to all inverter modules through the DC bus. Then the inverter module converts the DC voltage to AC voltage to drive the motor.

Select the pre-charge circuit components of the H6w rectifier unit based on the number of parallel modules. See details in *"Table 2–1 H6w pre-charge circuit configuration" on page 64*.

Table 2–1 H6w pre-charge circuit configuration

Name	Current rating
	299 A/395 A
Fuse of the disconnecter	690 VAC/40 A
Disconnector	690 VAC/63 A
Contactor	690 VAC/38 A (Rated short-time withstand current [Icw] 430 A < 40°C-1s)
Resistor (single resistor)	5 Ω
	0.01s pulse power
	16.67 kW
	10s pulse power
	4.5 kW
Standard model and quantity	MD880LC-SR-7, 1

The number of the H7w rectifier units depends on actual requirements. Up to 6 units can be configured typically, which can be expanded to more. The higher the number of parallel units, the greater the current during soft start can be. Therefore, select proper pre-charge circuit components based on the number of parallel units. See details in *"Table 2–2 H7w pre-charge circuit configuration" on page 64*.

Table 2–2 H7w pre-charge circuit configuration

Name	Current rating					
	530/650 A	1007/1235 A	1501/1852 A	2014/2470 A	2517/3087 A	3021/3707 A
Fuse of the disconnecter	690 VAC/40 A	690 VAC/80 A	690 VAC/125 A	690 VAC/160 A	690 VAC/200 A	690 VAC/250 A
Disconnector	690 VAC/63 A	690 VAC/63 A	690 VAC/160 A	690 VAC/160 A	690 VAC/160 A	690 VAC/160 A

Name	Current rating					
	530/650 A	1007/1235 A	1501/1852 A	2014/2470 A	2517/3087 A	3021/3707 A
Contactor	690 VAC/38 A (Rated short-time withstand current [Icw] 430 A < 40°C-1s)	690 VAC/38 A (Rated short-time withstand current [Icw] 430 A < 40°C-1s)	690 VAC/38 A (Rated short-time withstand current [Icw] 430 A < 40°C-1s)	690 VAC/50 A (Rated short-time withstand current [Icw] 430 A < 40°C-1s)	690 VAC/50 A (Rated short-time withstand current [Icw] 430 A < 40°C-1s)	690 VAC/50 A (Rated short-time withstand current [Icw] 430 A < 40°C-1s)
Resistor (single resistor)	5 Ω	5 Ω	5 Ω	5 Ω	5 Ω	5 Ω
	0.01s pulse power	0.01s pulse power	0.01s pulse power	0.01s pulse power	0.01s pulse power	0.01s pulse power
	29.3 kW	29.8 kW	29.6 kW	29.8 kW	29.6 kW	29.8 kW
	10s pulse power	10s pulse power	10s pulse power	10s pulse power	10s pulse power	10s pulse power
	3.1 kW	5 kW	4.2 kW	5 kW	4.5 kW	5 kW
Parallel method	Two parallel 5 Ω resistors	Three parallel 5 Ω resistors	Five parallel 5 Ω resistors	Six parallel 5 Ω resistors	Eight parallel 5 Ω resistors	Nine parallel 5 Ω resistors
Parallel resistors	2.5 Ω	1.67 Ω	1 Ω	0.83 Ω	0.625 Ω	0.56 Ω
	0.01s pulse power	0.01s pulse power	0.01s pulse power	0.01s pulse power	0.01s pulse power	0.01s pulse power
	58.6 kW	89.4 kW	148 kW	178.8 kW	236.8 kW	268.2 kW
	10s pulse power	10s pulse power	10s pulse power	10s pulse power	10s pulse power	10s pulse power
	6.2 kW	15 kW	21 kW	30 kW	36 kW	45 kW
Standard model and quantity	MD880LC-SR-7, 2	MD880LC-SR-7, 3	MD880LC-SR-7, 5	MD880LC-SR-7, 6	MD880LC-SR-7, 8	MD880LC-SR-7, 9

The number of the H8w rectifier units depends on actual requirements. Up to 4 units can be configured typically, which can be expanded to more. The higher the number of parallel units, the greater the current during soft start can be. Therefore, select proper pre-charge circuit components based on the number of parallel units. See details in *"Table 2–2 H7w pre-charge circuit configuration" on page 64*.

Table 2–3 H8w pre-charge circuit configuration

Name	Current rating			
	820 A	1558 A	2337 A	3116 A
Fuse of the disconnecter	690 VAC/80 A	690 VAC/125 A	690 VAC/160 A	690 VAC/160 A
Disconnector	690 VAC/63 A	690 VAC/160 A	690 VAC/160 A	690 VAC/160 A
Contactor	690 VAC/38 A (Withstand the current of at least 430 A within 1s at temperatures below 40°C)	690 VAC/38 A (Withstand the current of at least 430 A within 1s at temperatures below 40°C)	690 VAC/50 A (Withstand the current of at least 810 A within 1s at temperatures below 40°C)	690 VAC/50 A (Withstand the current of at least 810 A within 1s at temperatures below 40°C)

Name	Current rating			
	820 A	1558 A	2337 A	3116 A
Resistor (single resistor)	5 Ω	5 Ω	5 Ω	5 Ω
	0.01s pulse power	0.01s pulse power	0.01s pulse power	0.01s pulse power
	30.5 kW	25.4 kW	25.6 kW	26.1 kW
	10s pulse power	10s pulse power	10s pulse power	10s pulse power
	4.4 kW	4.8 kW	4.1 kW	4.9 kW
Parallel method	Three parallel 5 Ω resistors	Five parallel 5 Ω resistors	Eight parallel 5 Ω resistors	Nine parallel 5 Ω resistors
Resistor (parallel resistors)	1.67 Ω	1 Ω	0.625 Ω	0.556 Ω
	0.01s pulse power	0.01s pulse power	0.01s pulse power	0.01s pulse power
	91.5 kW	127 kW	204.8 kW	234.9 kW
	10s pulse power	10s pulse power	10s pulse power	10s pulse power
	13.2 kW	24 kW	32.8 kW	44.1 kW
Standard model and quantity	MD880LC-SR-7, 3	MD880LC-SR-7, 5	MD880LC-SR-7, 8	MD880LC-SR-7, 9

Caution

- In the preceding table, the resistor power is the power loss generated on the resistor during pre-charge. It is recommended to refer to the pulse power curve of the resistor during model selection. A margin of more than 70% must be reserved.
- The phase sequence of the pre-charge circuit must be correct. Incorrect phase sequence can directly damage the device.

Note

- Schneider contactors are recommended.
- For pre-charge resistor models, see *"5.7 Pre-charge Resistor of the Active Rectifier" on page 157*. For problems concerning the braking resistor model selection, contact Inovance technical support.

Table 2–4 Resistor configurations for black start

Type	Capacitance on the DC side (uF)	Number of resistors (PCS)	Resistor connection method	Inter-connection method	Equivalent resistance (Ω)
Capacitance x 1	9333	2	In series	Two resistors in series	20.0
Capacitance x 2	18666	2	In series	Two resistors in series	20.0

Type	Capacitance on the DC side (uF)	Number of resistors (PCS)	Resistor connection method	Inter-connection method	Equivalent resistance (Ω)
Capacitance x 4	37332	4	In series and parallel	Two resistors in series and two in parallel	10.0
Capacitance x 6	55998	4	In series and parallel	Two resistors in series and two in parallel	10.0
Capacitance x 8	74664	8	In series and parallel	Two resistors in series and four in parallel	5.0
Capacitance x 10	93330	8	In series and parallel	Two resistors in series and four in parallel	5.0
Capacitance x 12	111996	8	In series and parallel	Two resistors in series and four in parallel	5.0

Input conditions:

- The 10 R/300 W pre-charge resistor is selected for the 690 V model.
- The 690 V model is designed with a rated voltage of 976 V on the DC side.

Inverter

The inverter is mainly comprised of the inverter power module together with the voltage/current detection circuit, power-on circuit, main controller HCU, and accessory card. The DC source on the input side of the inverter provides energy for the inverter. The inverter converts DC input to AC output that used to drive AC electrical devices such as motors.

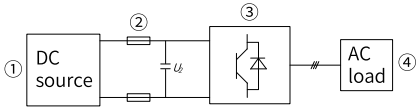


Figure 2-4 Sampling topology of the inverter

No.	Description
①	DC power supply
②	Fuse on the DC side
③	Inverter power module
④	AC electrical equipment

2.2 Layout of Wiring Terminals

2.2.1 Main Circuit Terminals

H6w module

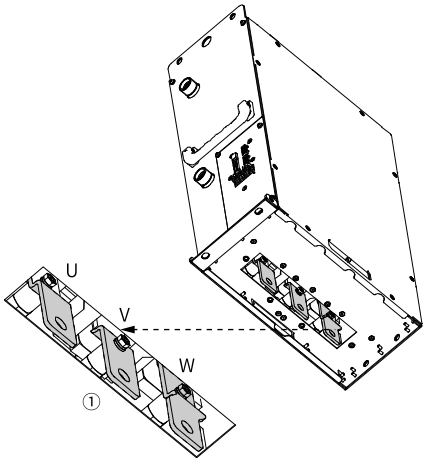


Figure 2-5 Terminals at the bottom of the H6w module

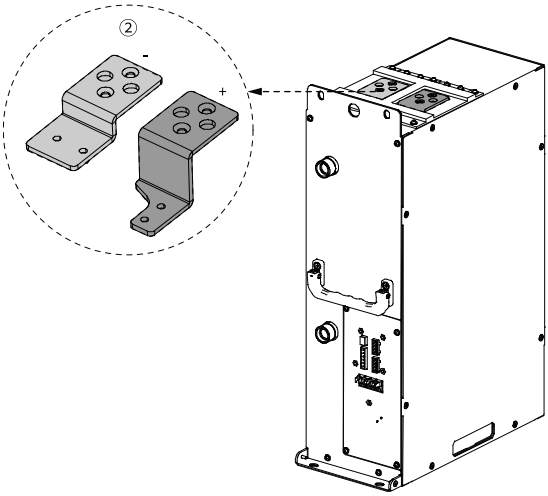


Figure 2-6 Terminals on the top of the H6w module

Table 2–5 Description of H6w active rectifier module terminals

No.	Name	Description
①	AC input terminals U, V, W	Use proper cables and tightening torque to connect U, V, and W terminals.
②	Bus terminals (+) and (-)	Use proper cables and tightening torque to connect bus terminals.

Table 2–6 Description of H6w inverter module terminals

No.	Name	Description
①	AC output terminals U, V, and W	Use proper cables and tightening torque to connect U, V, and W terminals.
②	Bus terminals (+) and (-)	Use proper cables and tightening torque to connect bus terminals.

H7w module

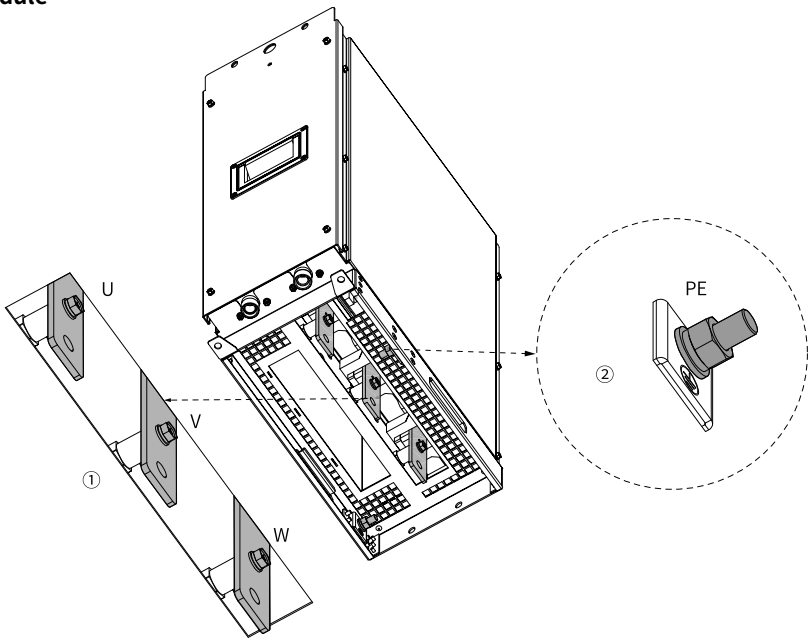


Figure 2-7 Terminals at the bottom of the H7w module

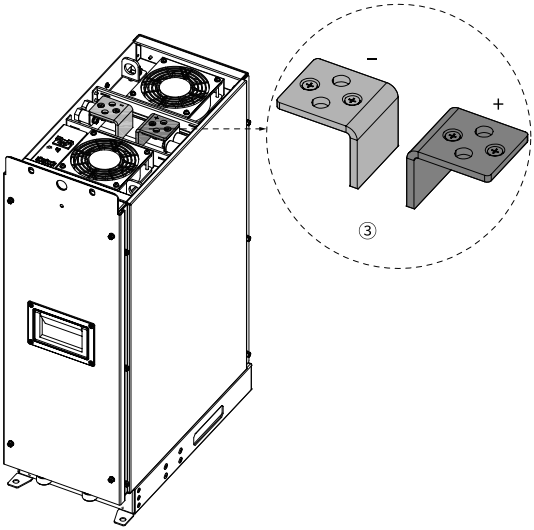


Figure 2-8 Terminals on the top of the H7w module

Table 2–7 Description of H7w active rectifier module terminals

No.	Name	Description
①	AC input terminals U, V, W	Use proper cables and tightening torque to connect U, V, and W terminals.
②	PE grounding terminal	Use proper cables and tightening torque to connect the PE grounding terminal.
③	Bus terminals (+) and (-)	Use proper cables and tightening torque to connect bus terminals.

Table 2–8 Description of H7w inverter module terminals

No.	Name	Description
①	AC output terminals U, V, and W	Use proper cables and tightening torque to connect U, V, and W terminals.
②	PE grounding terminal	Use proper cables and tightening torque to connect the PE grounding terminal.
③	Bus terminals (+) and (-)	Use proper cables and tightening torque to connect bus terminals.

H8w module

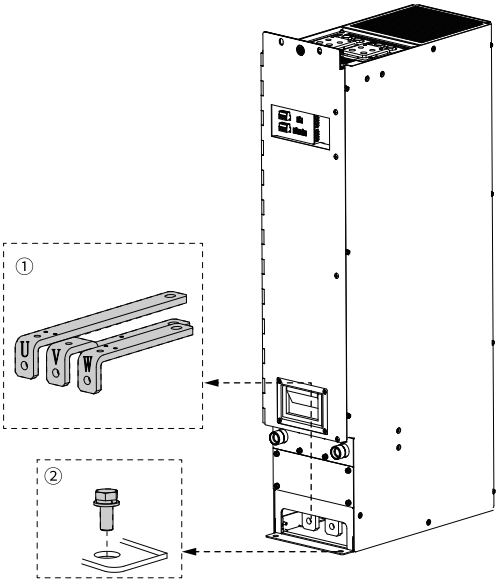


Figure 2-9 Terminals at the bottom of the H8w module

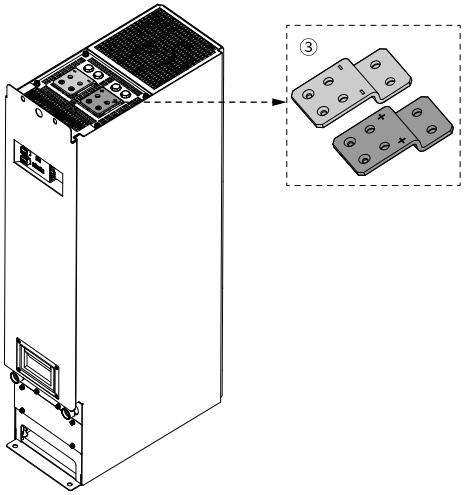


Figure 2-10 Terminals on the top of the H8w module

Table 2–9 Description of H8w active rectifier module terminals

No.	Name	Description
①	AC input terminals U, V, W	Use proper cables and tightening torque to connect U, V, and W terminals.
②	PE grounding terminal	Use proper cables and tightening torque to connect the PE grounding terminal.
③	Bus terminals (+) and (-)	Use proper cables and tightening torque to connect bus terminals.

Table 2–10 Description of H8w inverter module terminals

No.	Name	Description
①	AC output terminals U, V, and W	Use proper cables and tightening torque to connect U, V, and W terminals.
②	PE grounding terminal	Use proper cables and tightening torque to connect the PE grounding terminal.
③	Bus terminals (+) and (-)	Use proper cables and tightening torque to connect bus terminals.

2.2.2 Description of Control Circuit Terminals

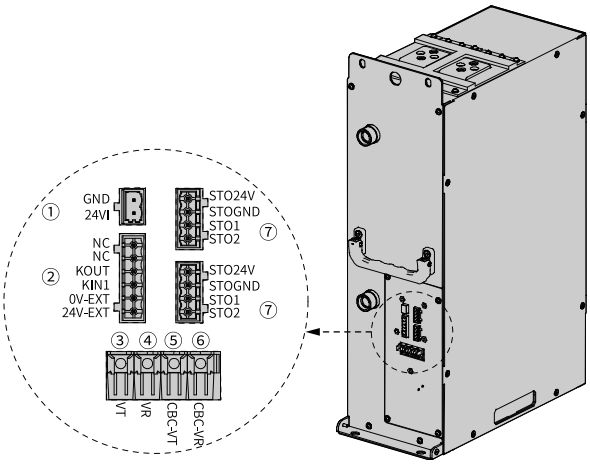


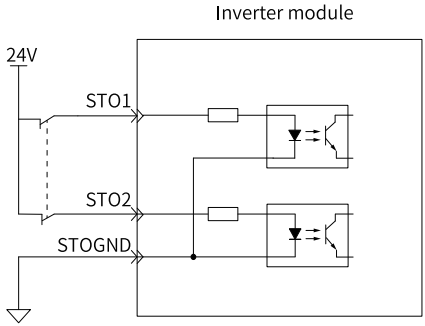
Figure 2-11 Control circuit terminal layout of H6w module

Table 2–11 Description of control circuit terminals of H6w module

No.	Name	Description
①	2-pin power supply terminal	Input terminal for 24 VDC external power supply, 2-conductor twisted pair cable, single-conductor cable, cross-sectional area: 0.5–2.5 mm^2
②	6-pin control terminal	DC pre-charge module control terminal
③	VT optical fiber transmission terminal	Optical fiber connection terminal 1, which is connected to HCU or HPCU through the optical fiber
④	VR optical fiber reception terminal	
⑤	CBC-VT	Optical fiber connection terminal 2, which is used in pulse-by-pulse current limit
⑥	CBC-VR	
⑦	STO wiring terminal	STO terminal, 4-conductor shielded cable, cross–sectional area: 0.5–2.5 mm^2

Note

- If you need to use the STO terminal, remove the jumper bar of the STO terminal.
- When the STO function is used, an internal power supply is required. The following figures shows an example of connection.



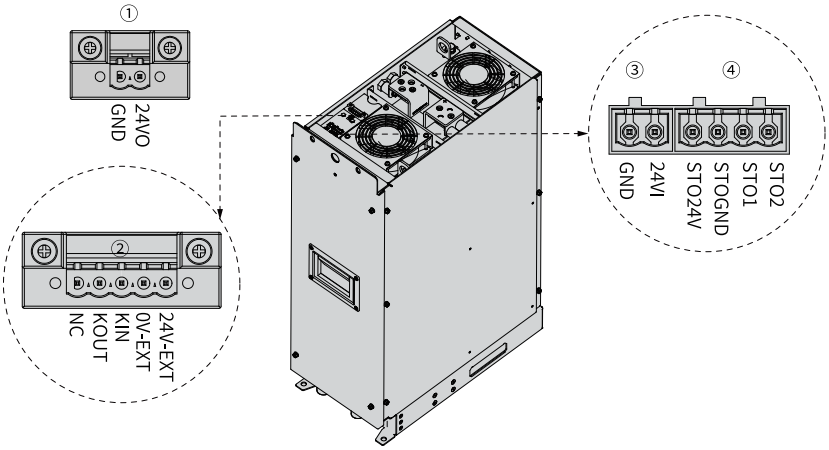


Figure 2-12 Control circuit terminal layout 1 of H7w module

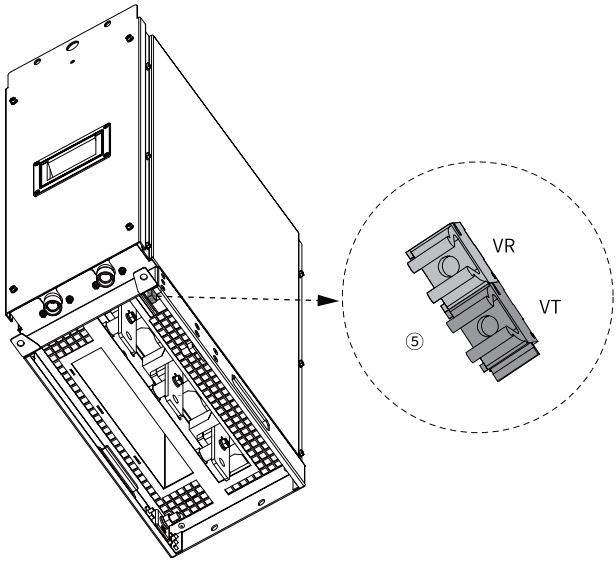


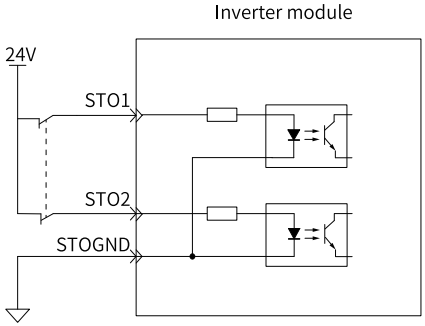
Figure 2-13 Control circuit terminal layout 2 of H7w module

Table 2–12 Description of control circuit terminals of H7w module

No.	Name	Description
①	2-pin power supply terminal [1]	HCU redundant power supply output terminal
②	5-pin DC pre-charge module control terminal [2]	Used to connect the DC pre-charge module.
③	2-pin power supply terminal	Input terminal for 24 VDC external power supply, 2-conductor twisted pair cable, single-conductor cable, cross-sectional area: 0.5–2.5 mm^2
④	4-pin STO terminal	STO terminal, 4-conductor shielded cable, cross–sectional area: 0.5–2.5 mm^2 The STO terminal is shorted to 24V by default. It must be installed according to the default mode for proper operation.
⑤	VR optical fiber reception terminal/ VT optical fiber transmission terminal	Connected to HCU or HPCU through the optical fiber.

Note

- [1]: The old version of the H7w module provides the 2-pin HCU redundant power supply output terminal.
- [2]: The new version of the H7w module provides the 5-pin DC pre-charge control terminal.
- If you need to use the STO terminal, remove the jumper bar of the STO terminal.
- When the STO function is used, an internal power supply is required. The following figure shows an example of connection.



To connect the normally-closed temperature switch of the reactor/braking resistor to HCU input terminal HDI1 for overtemperature detection, see the connection method in *HCU Control Module User Guide*. The setting method for your reference is shown in the following table.

Table 2–13 Setting the normally-closed temperature switch of H7w inverter module

Step	Param.	Value	Action
1	B6-04	9	Set
2	F4-04	Set the ones to 1.	Set
3	A2-51	4668	Set
4	A2-52	1	Check; otherwise, repeat step 3.
5	A2-51	52568	Set
6	A2-54	1	Check; otherwise, repeat steps 3 to 6.

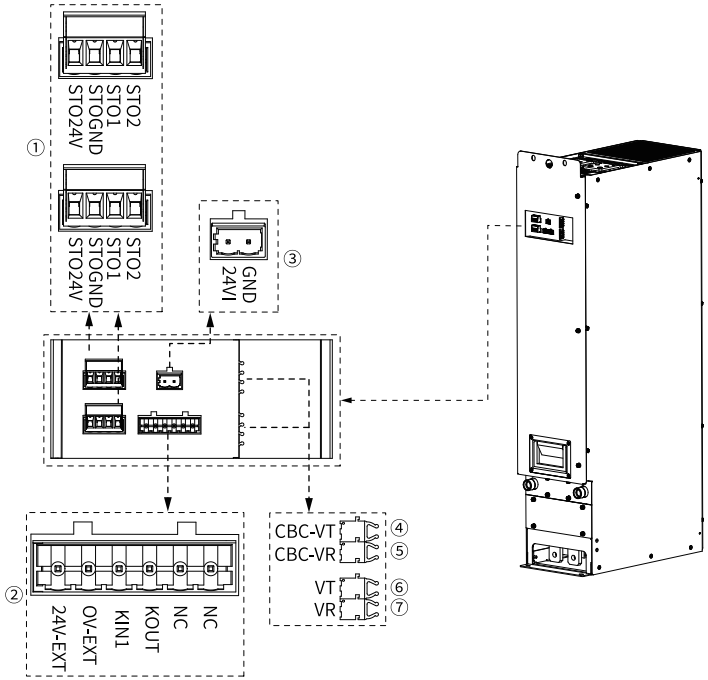


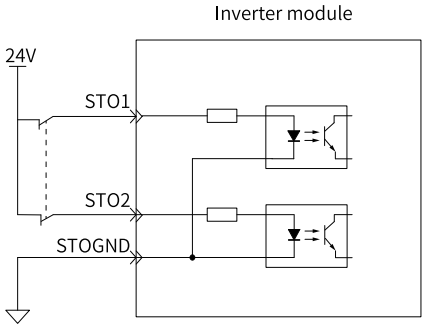
Figure 2-14 Control circuit terminal layout of H8w module

Table 2–14 Description of H8w module terminals

No.	Name	Description
①	STO wiring terminal	STO terminal, 4-conductor shielded cable, cross–sectional area: 0.5–2.5 mm^2
②	KINOUT	DC pre-charge module control terminal
③	Input terminal for 24 VDC external power supply	Input terminal for 24 VDC external power supply, 2-conductor twisted pair cable, single-conductor cable, cross-sectional area: 0.5–2.5 mm^2
④	CBC-VT	Optical fiber connection terminal (used for pulse-by-pulse current limit)
⑤	CBC-VR	
⑥	VT optical fiber transmission terminal	Connected to HCU or HPCU through the optical fiber.
⑦	VR optical fiber reception terminal	

Note

- If you need to use the STO terminal, remove the jumper bar of the STO terminal.
- When the STO function is used, an internal power supply is required. The following figures shows an example of connection.



2.3 Selecting Power Cables

Precautions

- Select a cable that can carry the rated current of the active rectifier module.
- Select a cable whose maximum rated temperature is higher than or equal to 70°C (158° F) under continuous operation.

- For a maximum voltage of 500 VAC, select a cable rated at 600 VAC. For a maximum voltage of 600 VAC, select a cable rated at 750 VAC. For devices rated at 690 VAC, the rated voltage between cable conductors must be at least 1 kV.
- The specifications and installation method of external main circuit cables must comply with local regulations and related IEC standards. Use proper copper conductors for main circuit cables according to the recommended values.
- Do not solder the twisted conductors.

Power cable types

Use symmetrical three-conductor shielded cables, which are connected to the three phases of the AC copper busbars at the bottom. The PE cable must be wired separately.

Power cable specifications

Table 2–15 Selection of power cables for the active rectifier

Module model	Rated output current (A)	Recommended cable quantity and cross-sectional area	Terminal
UN: Three-phase 500 V (range: 380 V to 500 V)			
MD880LC-40M-0299-5	299	2 x 70	OT/70-12
MD880LC-40M-0395-5	395	2 x 95	OT/95-12
MD880LC-40M-0530-5	530	2 x 150	OT/150-12
MD880LC-40M-0650-5	650	2 x 185	OT/185-12
MD880LC-40M-0820-5	820	2 x 185	OT/185-12
MD880LC-40M-1558-5	1558	4 x 185	OT/185-12
UN: Three-phase 690 V (range: 525 V to 690 V)			
MD880LC-40M-0530-7	530	2 x 150	OT/150-12
MD880LC-40M-0650-7	650	2 x 185	OT/185-12
MD880LC-40M-0820-7	820	2 x 185	OT/185-12
MD880LC-40M-1558-7	1558	4 x 185	OT/185-12

Table 2–16 Selection of power cables for the inverter module

Module model	Rated output current (A)	Recommended cable quantity and cross-sectional area (mm^2)	Terminal
UN: Three-phase 500 V (range: 380 V to 500 V)			
MD880LC-50M-0149-5	149	70	OT/70-12
MD880LC-50M-0183-5	183	95	OT/95-12
MD880LC-50M-0245-5	245	2 x 50	OT/50-12
MD880LC-50M-0299-5	299	2 x 70	OT/70-12
MD880LC-50M-0349-5	349	2 x 95	OT/95-12
MD880LC-50M-0395-5	395	2 x 95	OT/95-12

Module model	Rated output current (A)	Recommended cable quantity and cross-sectional area (mm^2)	Terminal
MD880LC-50M-0530-5	530	2 x 150	OT/150-12
MD880LC-50M-0650-5	650	2 x 185	OT/185-16
MD880LC-50M-0900-5	900	2 x 185	OT/185-16
UN: Three-phase 690 V (range: 525 V to 690 V)			
MD880LC-50M-0530-7	530	2 x 150	OT/150-12
MD880LC-50M-0650-7	650	2 x 185	OT/185-16
MD880LC-50M-0900-7	900	2 x 185	OT/185-16

Note

- Cables recommended in the table are shielded cables with three conductors and one PE conductor. The three power cables are connected to the three phases of the AC copper busbar at the bottom, and the PE conductor is connected to the grounding copper busbar. If a three-conductor shielded cable without a PE conductor is used, the PE conductor needs to be wired separately. Requirements on the PE conductor cross-sectional area are as follows.
  - When the cross-sectional area S ⩽ 16 mm^2 , the cross-sectional area of the PE conductor = S.
  - When 16 mm^2 < cross-sectional area S ⩽ 35 mm^2 , the cross-sectional area of the PE conductor = 16 mm^2.
  - When the cross-sectional area S > 35 mm^2, the cross sectional area of the PE conductor = S/2.
- 2x150 mm^2 indicates that each phase requires two cables and the cross sectional area is 150 mm^2.
- OT/150-12 indicates that the cable is crimped to the OT terminal, the cable cross-sectional area is 150 mm^2, and the screw hole is M12.
- The maximum size of the wiring terminal listed in the following table cannot be exceeded. Use terminals within the maximum size. Failure to comply can result in mechanical instability and insufficient electrical clearance.
- Derating is required when multiple cables of the same specifications are connected in parallel.

Power cable shield

To ensure a proper EMC performance, keep the shields of the input and output shielded power cables inside the active rectifier module in extensive contact with the shielding plate in the cabinet. See the figure below for the connection method.

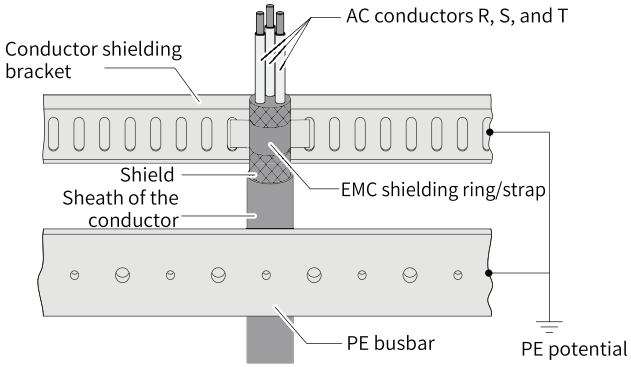


Figure 2-15 Connection of shielded power cables

2.4 Selecting Control Cables

Precautions

Use shielded twisted pair cables as analog control signal cables. When stripping the sheath of the cable, keep the stripped part as short as possible (5 mm to 7 mm), and wrap the stripped shield with the insulating tape to prevent the shielded cable from touching other devices, which may result in interference.

Control cable types

To prevent the control circuit from being affected by strong external interference, it is recommended to use shielded cables as signal cables. Use a signal shielding bracket to achieve a 360° reliable bonding connection between both ends of the shield and the equipment. Use separate shielded cables for different analog signals. It is recommended to use shielded twisted pair (STP) cables for digital signals.

Control cable specifications

Note

For details on specifications of all control terminal cables of the MD880-40 series active rectifier module, see *"Table 2–17 " on page 81*. The control terminal cable refers to the control cables of relays, contactors, and circuit breakers, including the 24 VDC power supply cable.

Table 2–17 Recommended control cables

Module model	IEC cable (mm^2)	NEC cable (AWG)	Cable spec.
MD880LC-40M-0299-5	0.5	20	Tubular terminal
MD880LC-40M-0395-5			
MD880LC-40M-0530-5			
MD880LC-40M-0650-5			
MD880LC-40M-0820-5			
MD880LC-40M-1558-5			
MD880LC-40M-0530-7			
MD880LC-40M-0650-7			
MD880LC-40M-0820-7			
MD880LC-40M-1558-7			

Module model	Terminal type	IEC cable (mm^2)	NEC cable (AWG)	Cable spec.
MD880LC-50M-0149-5	STO terminal (optional)	0.5	20	Tubular terminal
MD880LC-50M-0183-5				
MD880LC-50M-0245-5				
MD880LC-50M-0299-5				
MD880LC-50M-0349-5				
MD880LC-50M-0395-5				
MD880LC-50M-0530-5				
MD880LC-50M-0650-5				
MD880LC-50M-0900-5				
MD880LC-50M-0530-7				
MD880LC-50M-0650-7				
MD880LC-50M-0900-7				

Control cable shield

Minimize the length of the unshielded part of a shielded cable, and connect the shield to the nearest PE terminal. If the non-shielded part is excessively long, the cable conductor may be easily disturbed by signals.

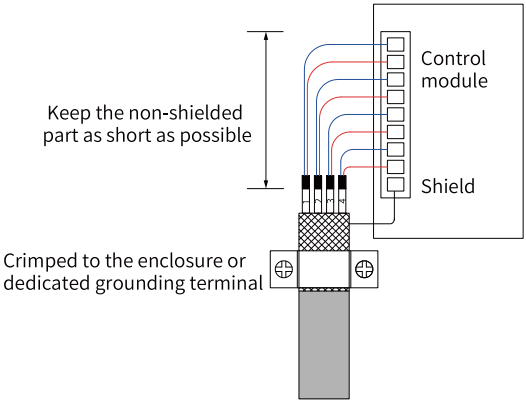


Figure 2-16 Handling shielded cables

2.5 Routing

2.5.1 Routing Requirements

Routing signal cables and power cables separately

When analog signals are used to control the active rectifier module remotely, route signal cables and high-voltage circuit cables (power supply input, AC-DC output, and braking resistor connection cables) through different routes with a clearance of at least 30 cm. This is to reduce interference generated by the active rectifier and other devices. This rule also applies to routing inside the control cabinet.

Requirements on analog control signal cables

Use shielded twisted pair cables as the analog control signal cables. When stripping the sheath of the cable, keep the stripped part as short as possible (5 mm to 7 mm), and wrap the stripped shield with the insulating tape to prevent the shielded cable from coming into contact with other devices.

Power cable requirements

Use shielded cables as the power cables, or shield all the cables with cable ducts.

Requirements on control cables and power supply cables

If the power supply cables and control cables must be cross-connected, cross-connect them at an angle of 90 degrees.

2.5.2 Routing Recommendations

Disturbing cables

Route cables that transmit different types of signals through different routes. Separate disturbing cables from sensitive cables with a minimum clearance of 30 cm wherever possible. When such cables must be cross-connected, make sure they are cross-connected at an angle as close to 90° as possible to prevent interference.

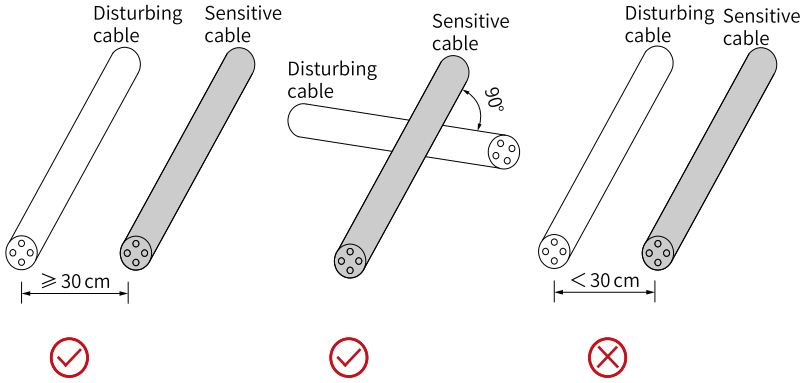


Figure 2-17 Routing of disturbing cables and sensitive cables

Signal cables

It is recommended to route different types of signal cables through different routes and separate different types of signals with equipotential signals. When routing signal cables of the same type, the equipotential signal cable stays in the outer layer and equipotential signals should stay in the middle if possible, as shown below.

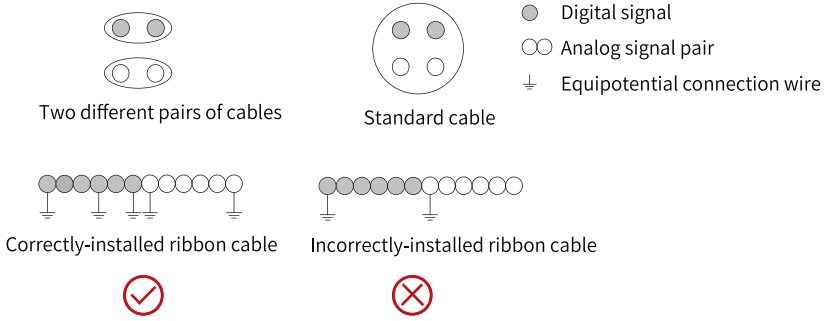


Figure 2-18 Routing cables that used to transmit different types of signals

Multi-conductor cables

For multi-conductor cables, it is recommended that one cable transmits one type of signals. If one cable is used to transmit different types of signals, use cables with conductors shielded, as shown in the following figure.

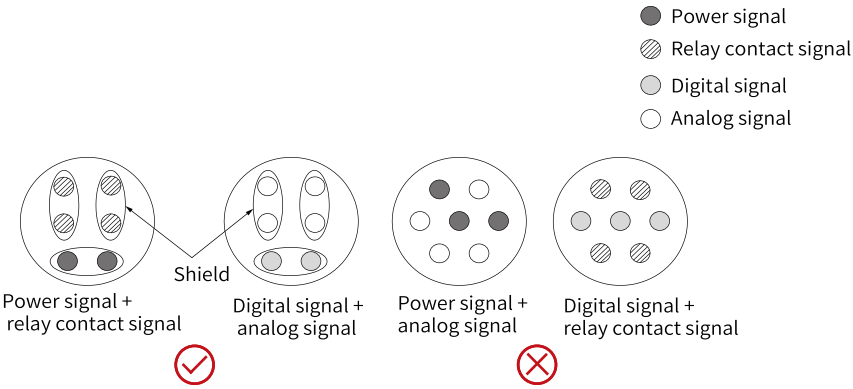


Figure 2-19 Routing of multi-conductor cables

For spare conductors in a multi-conductor cable, connect the spare (or reserved) conductors to the equipotential connection point.

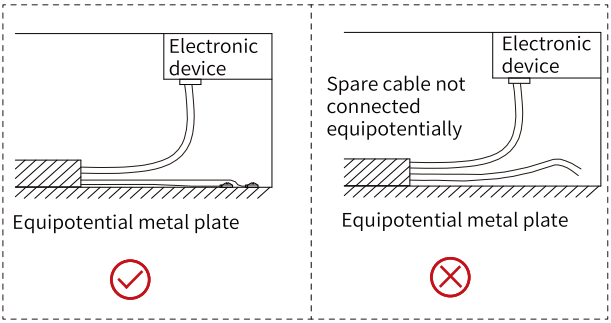


Figure 2-20 Handling reserved or unused conductors

Wiring loop

For cables that transmit low-level sensor signals and shared cables that transmit relay signals, lay them close to each other to avoid a large loop area. Use twisted pair cables for analog signals. Lay digital signal cables close to each other.

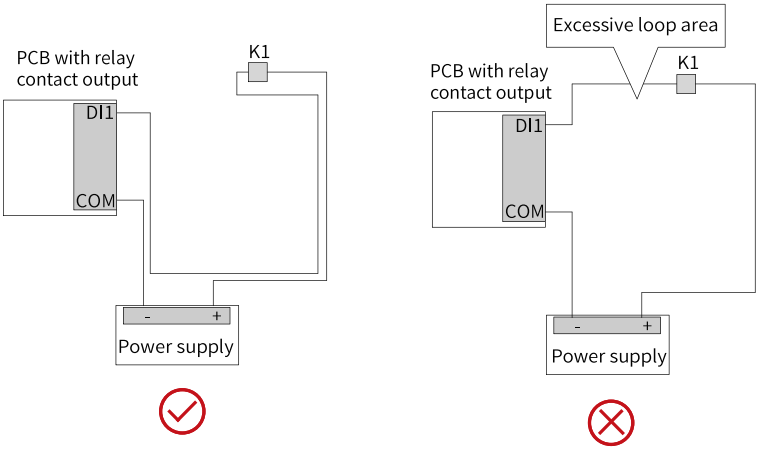


Figure 2-21 Recommended wiring loop area

Multiple types of cables

For cables of different types, route the cables along the equipotential metal plate. To enhance the internal EMC performance, separate different types of cables or separate cables with metal separators (recommended) in the same metal (zinc-iron or stainless steel) duct.

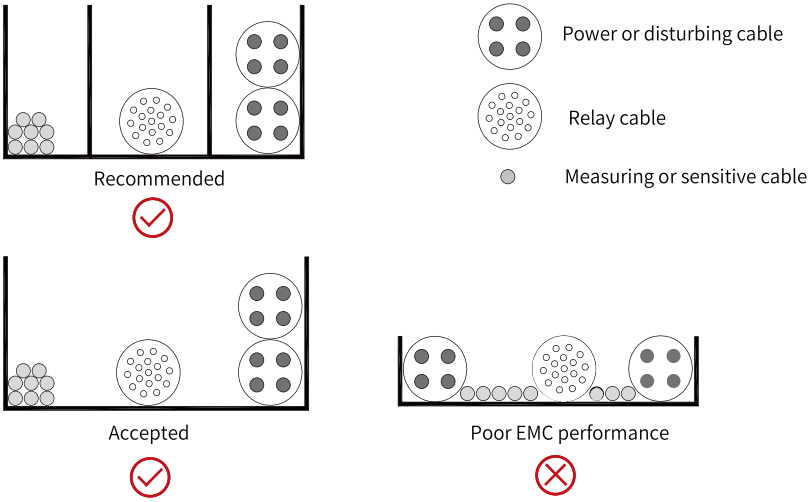


Figure 2-22 Laying multiple types of cables

2.5.3 Grounding

To properly ground the product, observe the following requirements.



- Ground the grounding terminal to prevent electric shock. Follow related electrical regulations of specific countries or regions on the grounding method.
- To prevent electric shock, ensure the protective grounding conductor complies with technical specifications and local safety standards. Keep the grounding cable as short as possible. The leakage current of the product can exceed 3.5 mA. Therefore, the cross-sectional area of the protective grounding conductor must be at least 10 mm^2 or two protective grounding conductors of the same specification must be connected according to EN 61800-5-1.
- When using multiple devices, follow the instructions for grounding all devices. Incorrect grounding can result in misoperation of devices.

Grounding requirements

- Use a yellow-green cable with copper conductors for protective grounding. Do not connect the protective grounding conductor to switching devices such as circuit breakers in series.
- Ground the grounding terminal properly. Improper grounding can result in device malfunction or damage.
- Do not connect the grounding terminal to the N terminal of the neutral wire of the power supply.
- Install the device on a conductive metal surface. Ensure that the whole conductive bottom of the drive is bonded properly to the mounting surface.
- Fasten the grounding screws using the recommended tightening torque.

Grounding of the module

The active rectifier module must be grounded properly. The active rectifier module, inverter module, input reactor, and filter module can be connected to the grounding copper busbar of the cabinet in the star connection mode.

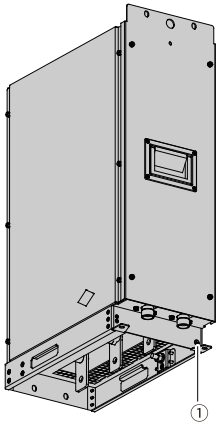


Figure 2-23 Grounding of the H7w module

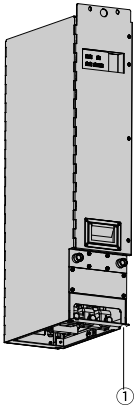


Figure 2-24 Grounding of the H8w module

Table 2–18 Description of the grounding terminal

No.	Description
①	The enclosure of the active rectifier module is grounded through the sheet metal of the cabinet.

Recommended grounding of the cabinet system

To suppress interference in a cabinet, isolate the interference source from the equipment that may be disturbed during installation. It is necessary to divide the cabinet into multiple EMC areas or sub-cabinets based on the interference intensity of the interference source. Install devices in the corresponding areas according to the following table.

No.	Wiring requirement
1	In the case of multiple cabinets, use grounding cables for connection to achieve equipotentiality.
2	Place devices in different areas in the cabinet according to the device signal intensity.
3	Perform equipotential bonding for devices in different areas of the cabinet.
4	Shield all communication (for example, RS485) and signal cables routed out from the electrical cabinet.
5	Install the power supply input filter inside the cabinet to a place near the input interface of the cabinet.
6	Apply spray coating to all grounding points in the cabinet for protection.

2.6 Grounding



- Ground the grounding terminal to prevent electric shock. Follow related electrical regulations of specific countries or regions on the grounding method.
- To prevent electric shock, ensure the protective grounding conductor complies with technical specifications and local safety standards. Keep the grounding cable as short as possible. The leakage current of the product can exceed 3.5 mA. Therefore, the cross-sectional area of the protective grounding conductor must be at least 10 mm^2 or two protective grounding conductors of the same specification must be connected according to EN 61800-5-1.
- When using multiple devices, follow the instructions for grounding all devices. Incorrect grounding can result in misoperation of devices.

Main circuit grounding requirements:

- Use a yellow-green cable with copper conductors for protective grounding. Do not connect the protective grounding conductor to switching devices such as circuit breakers in series.
- Ground the grounding terminal properly. Improper grounding can result in device malfunction or damage.
- Do not connect the grounding terminal to the N terminal of the neutral wire of the power supply.
- Install the device on a conductive metal surface. Ensure that the whole conductive bottom of the drive is bonded properly to the mounting surface.
- Fasten the grounding screws using the recommended tightening torque.

Ground the H7w/H8w module properly.

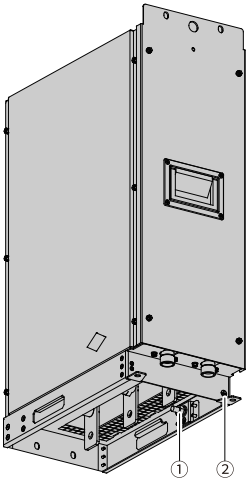


Figure 2-25 Grounding of the H7w module

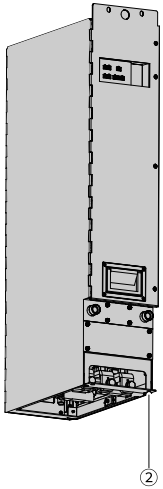


Figure 2-26 Grounding of the H8w module

Table 2–19 Description of the grounding terminal

No.	Description
①	Connect the module grounding cable to the module grounding screw.
②	Ground the enclosure of the module through the sheet metal of the cabinet.

2.7 Anti-interference Design

The cost-effective method of suppressing interference in a cabinet is to isolate the interference source from the equipment that may be disturbed. It is necessary to divide the cabinet into multiple EMC areas or multiple sub-cabinets based on the interference intensity of the interference source. Install devices in the corresponding areas according to the following table.

Table 2–20 Recommended grounding of cabinet system

No.	Wiring Requirement
1	In the case of multiple cabinets, connect cabinets through grounding cables to achieve equipotentiality among the cabinets.
2	Place devices in different areas in the cabinet according to the device signal intensity.
3	Perform equipotential bonding for devices in different areas of the cabinet.
4	Shield all communication (for example, RS485) and signal cables that routed out from the electrical cabinet.
5	Install the power supply input filter inside the cabinet to a place near the input interface of the cabinet.
6	Apply spray coating on each grounding point in the cabinet.

3 Mechanical Design

3.1 Structural Dimensions

3.1.1 Outline Dimensions of the Module

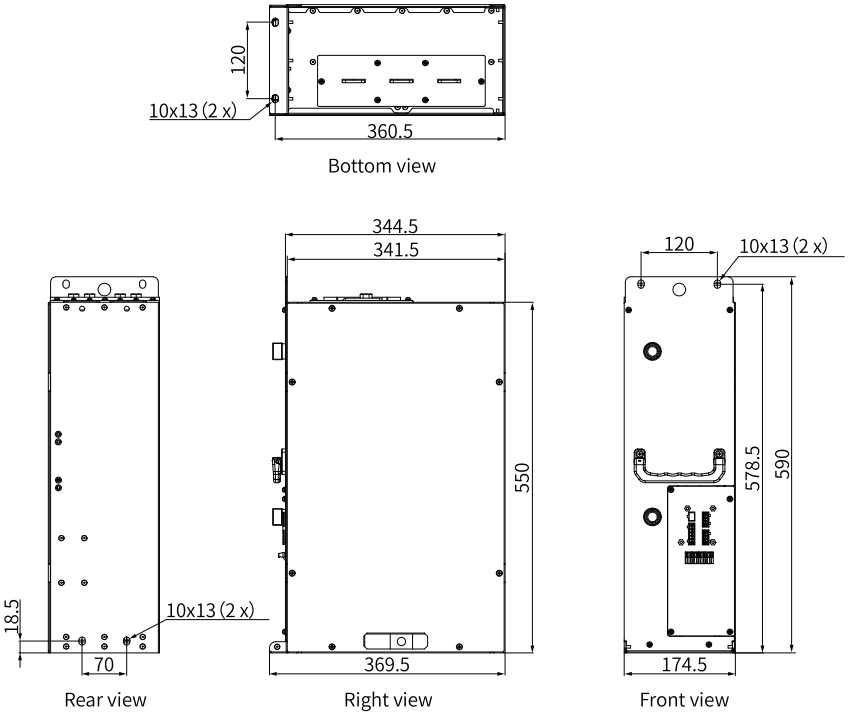


Figure 3-1 Outline dimensions of H6w module (mm)

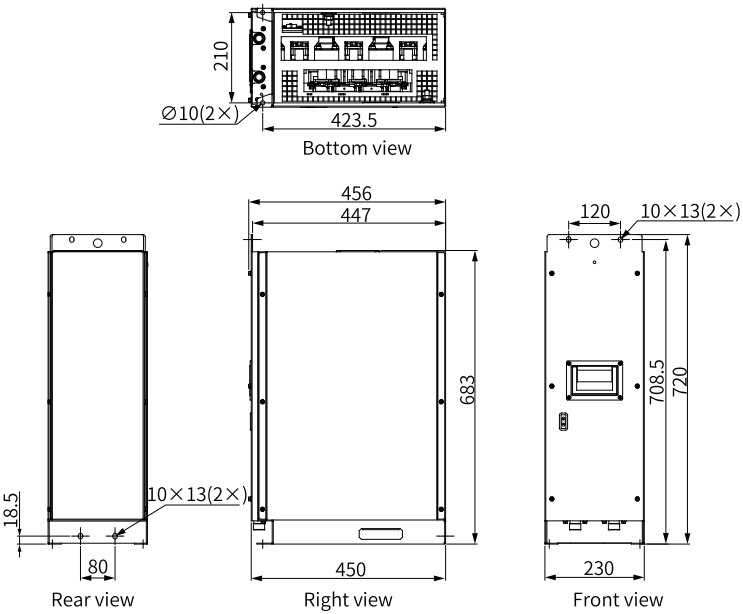


Figure 3-2 Outline dimensions of H7w module (mm)

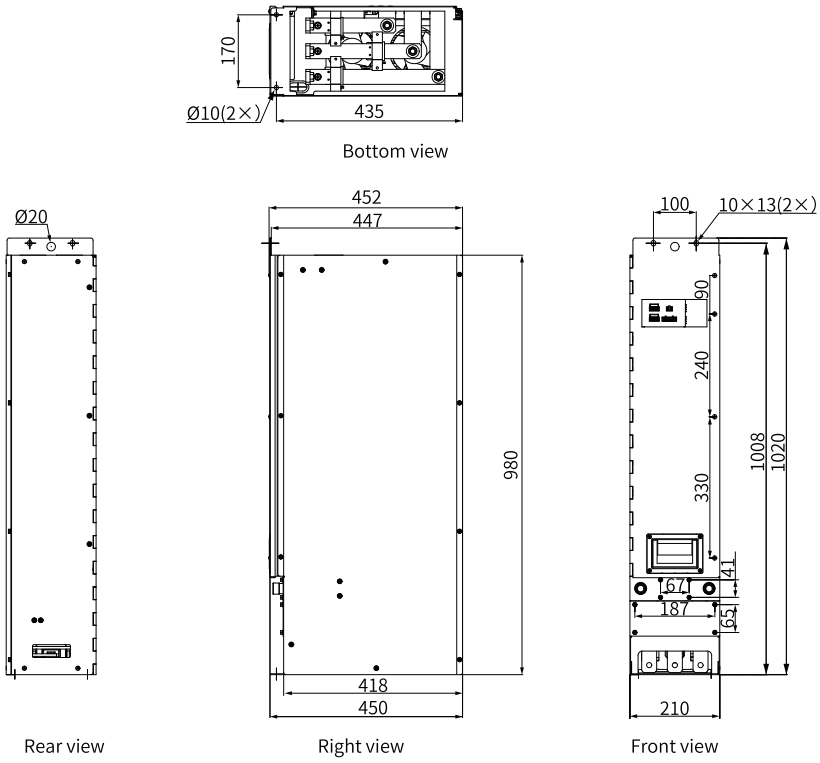


Figure 3-3 Outline dimensions of H8w module (mm)

3.1.2 Dimensions of Electrical Terminals of the Module

H6w module

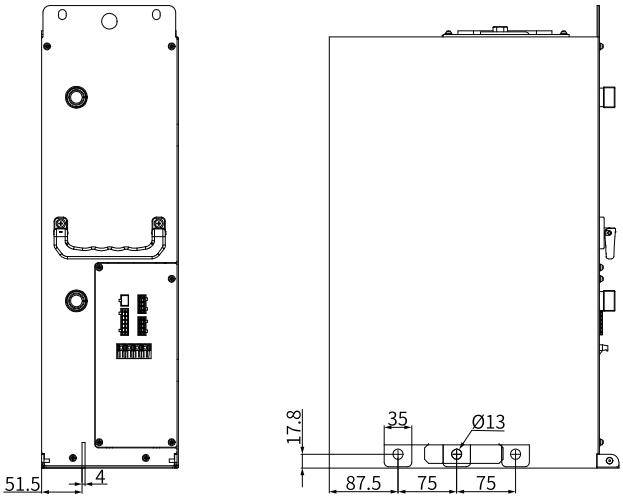
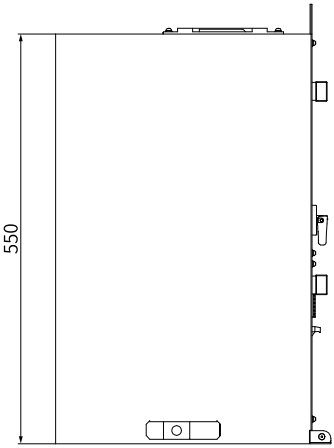
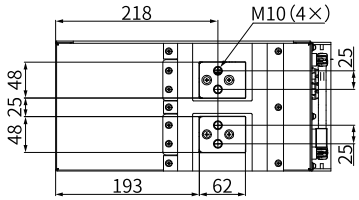


Figure 3-4 AC terminal dimensions of the H6w module (mm)



Side view



Top view

Figure 3-5 DC terminal dimensions of the H6w module (mm)

H7w module

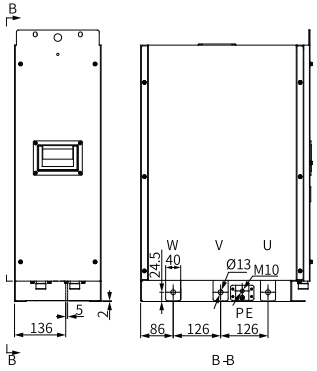


Figure 3-6 AC terminal dimensions of the H7w module (mm)

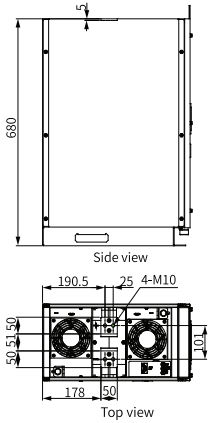


Figure 3-7 DC terminal dimensions of the H7w module (mm)

H8w module

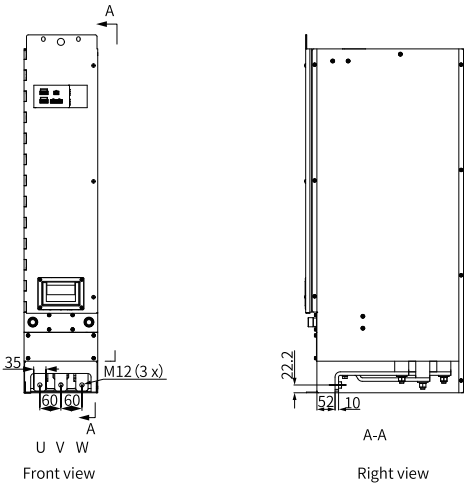


Figure 3-8 AC terminal dimensions of the H8w module (mm)

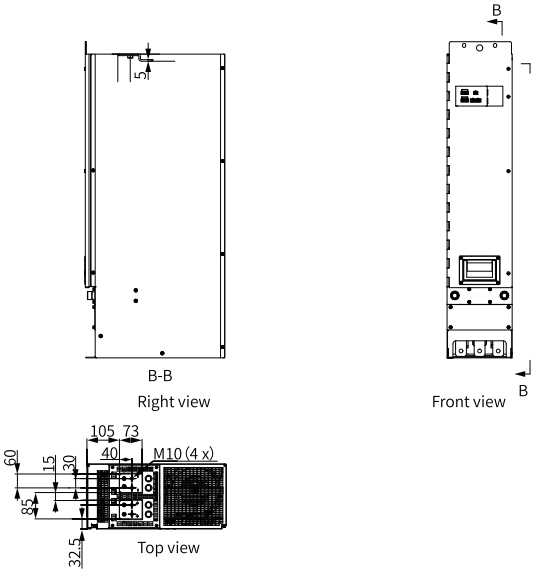


Figure 3-9 DC terminal dimensions of the H8w module (mm)

3.1.3 Dimensions of the Water Circuit Fitting of the Module

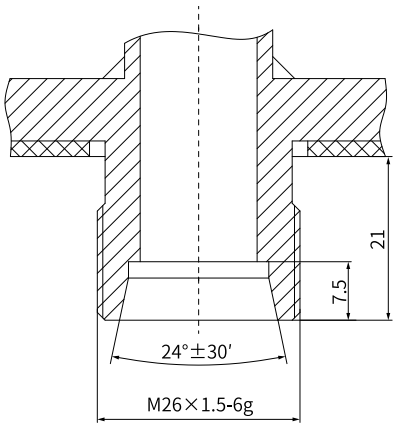


Figure 3-10 Dimensions of water inlet/outlet fitting of H6w/H7w module (mm)

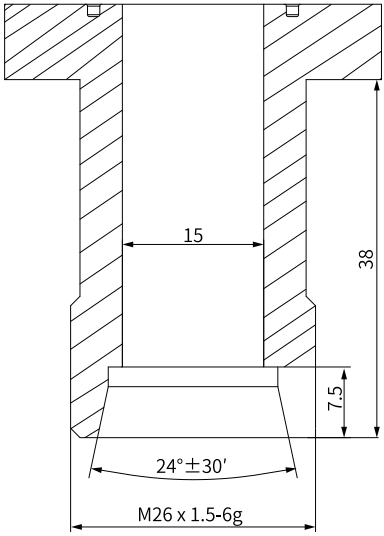


Figure 3-11 Dimensions of the water inlet/outlet fitting of H8w module (mm)

Note

The fitting has M26x1.5 metric external thread, with 24-degree internal taper.

3.1.4 Dimensions of 395 A Filter Module

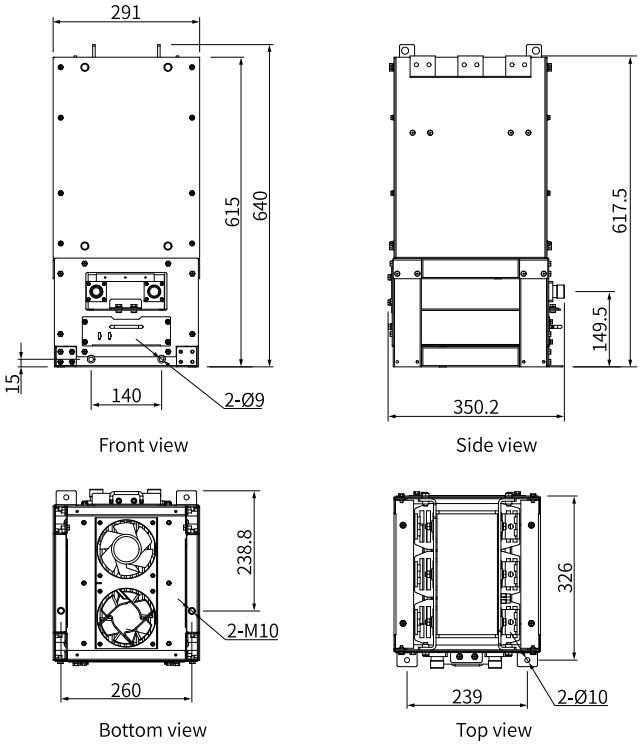


Figure 3-12 Dimensions of the 395 A reactor module (mm)

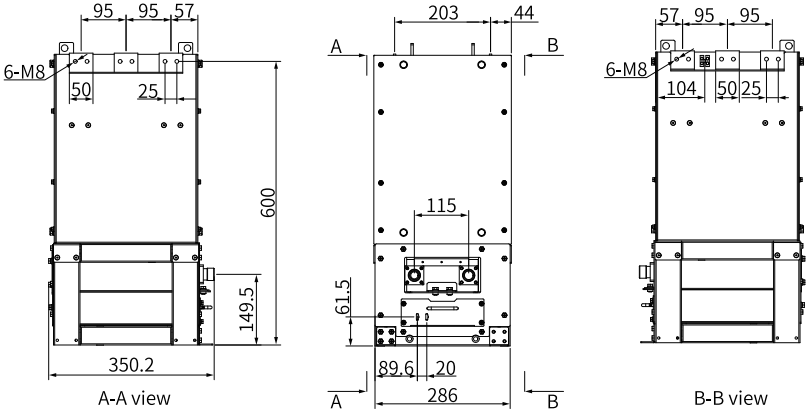


Figure 3-13 Electrical terminal dimensions of the 395 A reactor module (mm)

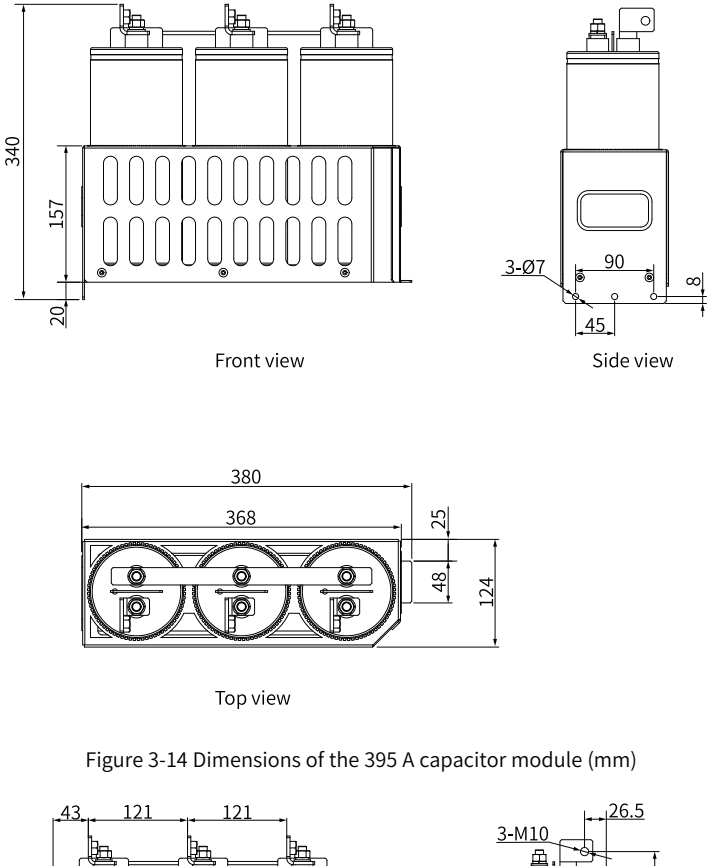


Figure 3-14 Dimensions of the 395 A capacitor module (mm)

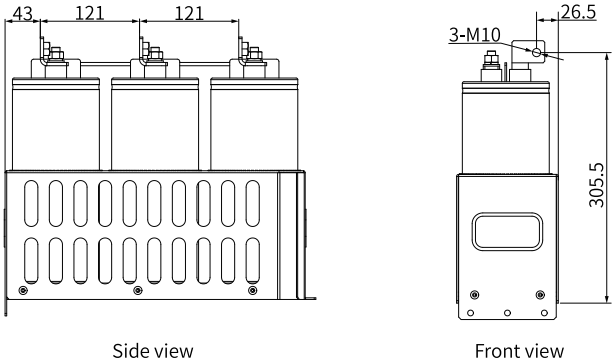


Figure 3-15 Electrical terminal dimensions of the 395 A capacitor module (mm)

3.1.5 Dimensions of 650 A Filter Module

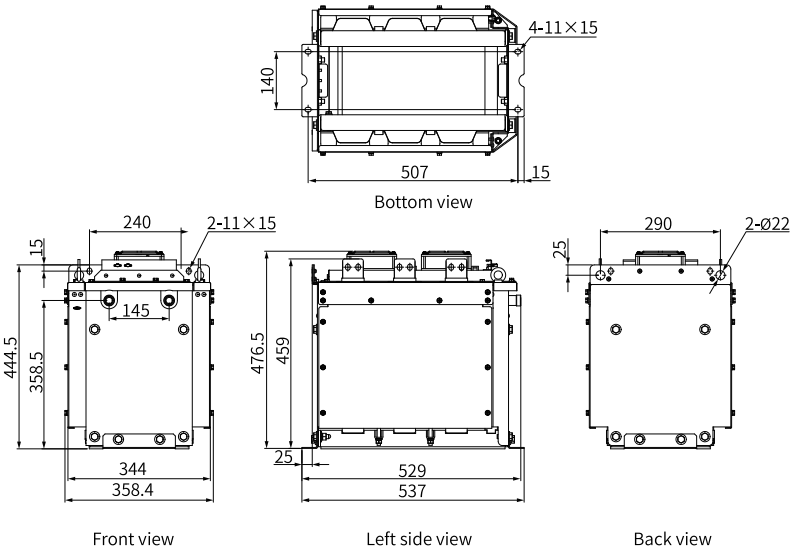


Figure 3-16 Dimensions of the 650 A reactor module (mm)

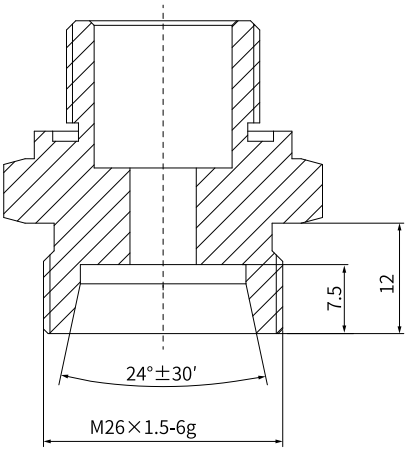


Figure 3-17 Dimensions of water inlet/outlet fitting of 650 A reactor module in mm (M26x1.5 metric external thread, 24-degree internal taper)

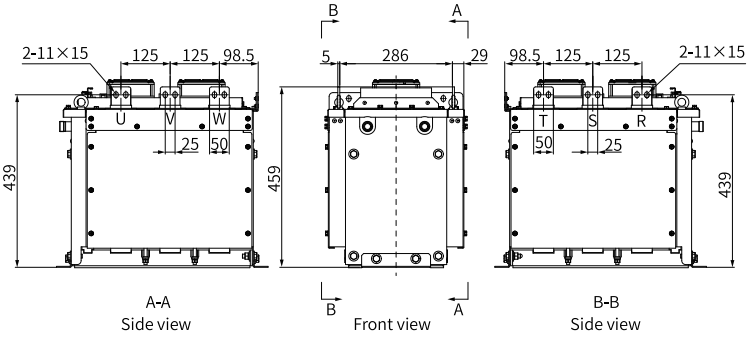


Figure 3-18 Electrical terminal dimensions of the 650 A reactor module (mm)

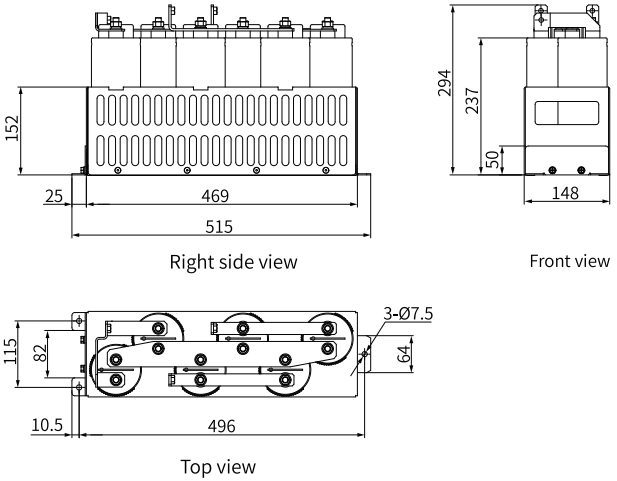


Figure 3-19 Outline dimensions of the 650 A capacitor module (mm)

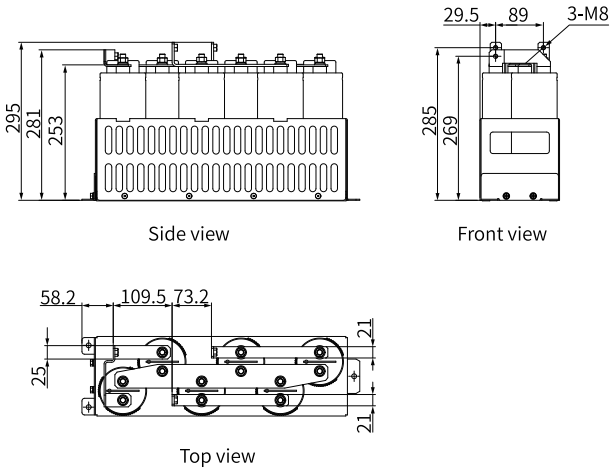


Figure 3-20 Electrical terminal dimensions of the 650 A capacitor module (mm)

3.1.6 Dimensions of 820 A Filter Module

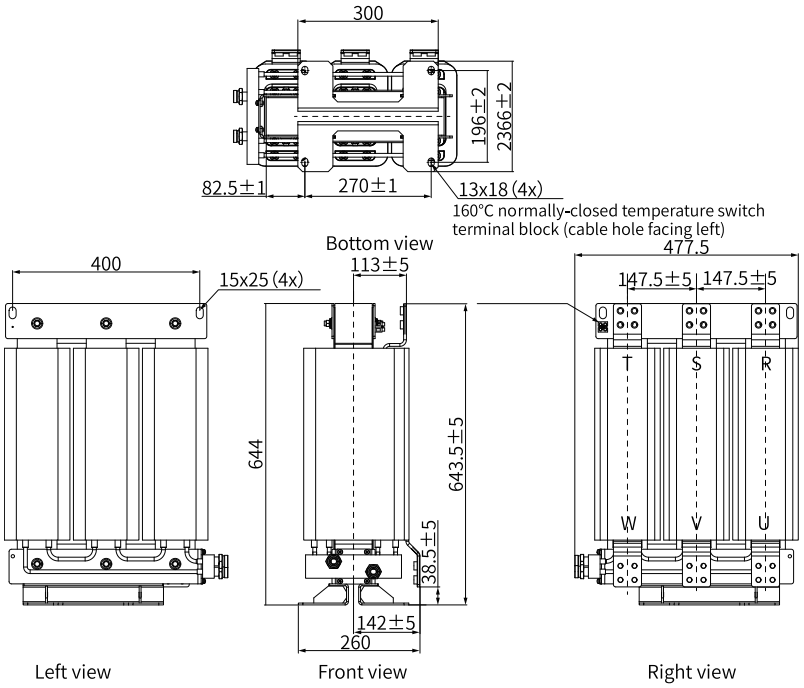


Figure 3-21 Dimensions of the 820 A reactor module (mm)

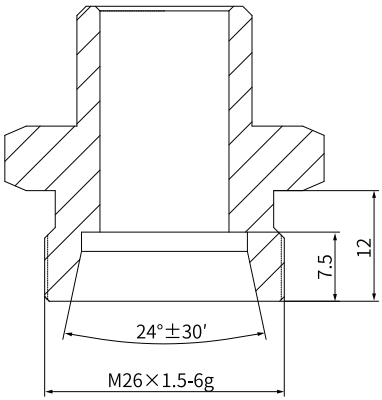


Figure 3-22 Dimensions of water inlet/outlet fitting of 820 A reactor module in mm (M26x1.5 metric external thread, 24-degree internal taper)

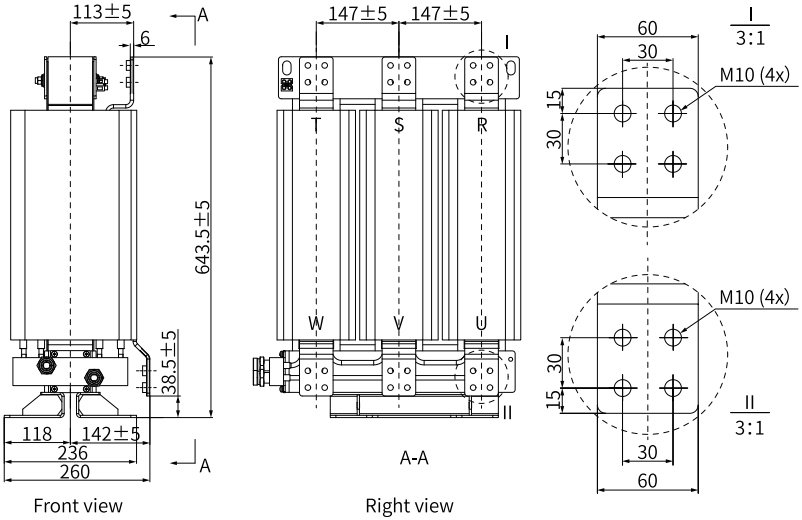


Figure 3-23 Electrical terminal dimensions of the 820 A reactor module (mm)

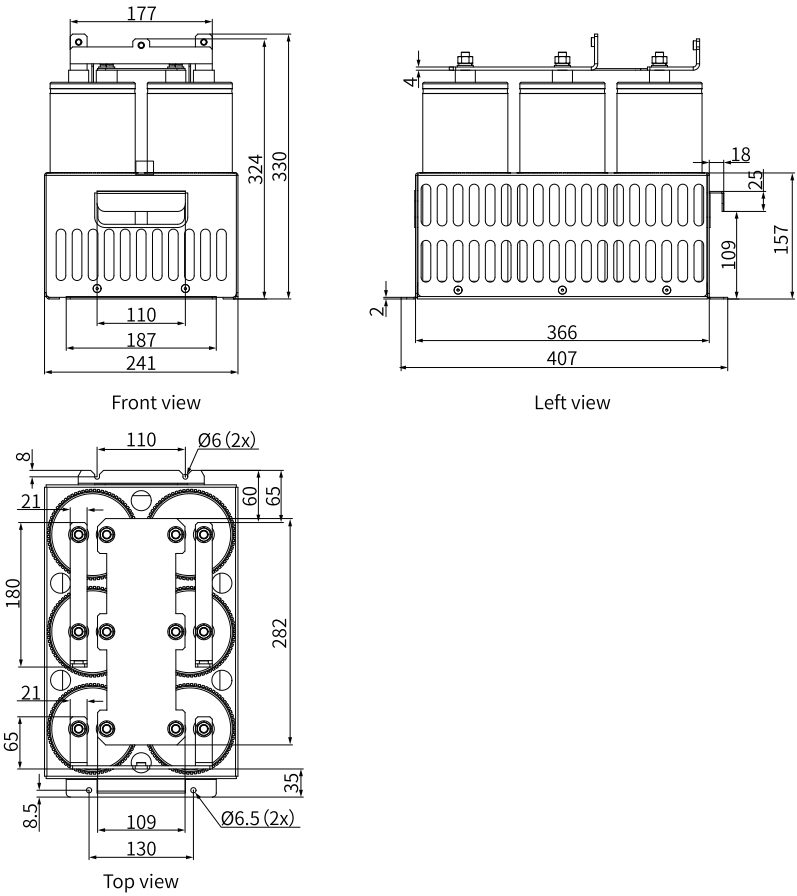


Figure 3-24 Outline dimensions of the 820 A capacitor module (mm)

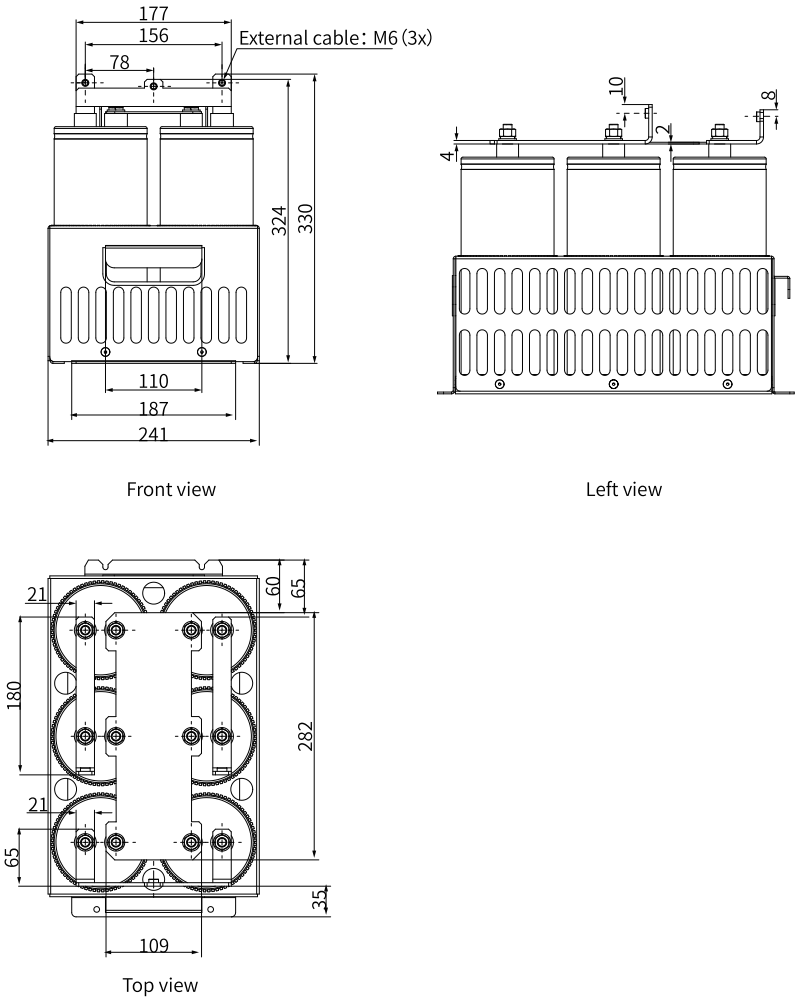


Figure 3-25 Electrical terminal dimensions of the 820 A capacitor module (mm)

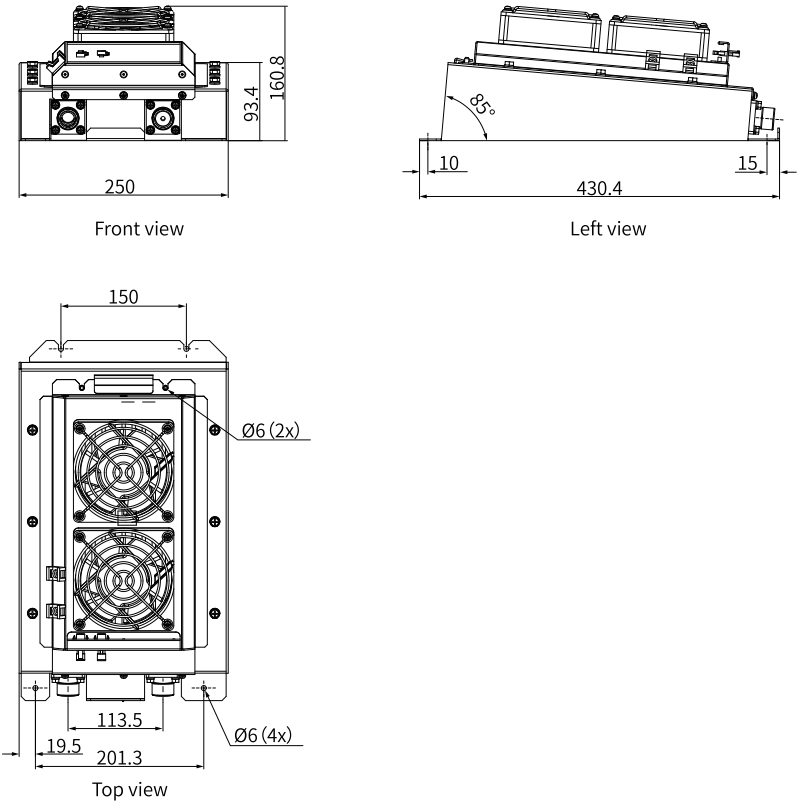


Figure 3-26 Dimensions of the 820 A water-to-air heat exchanger and fan module (mm)

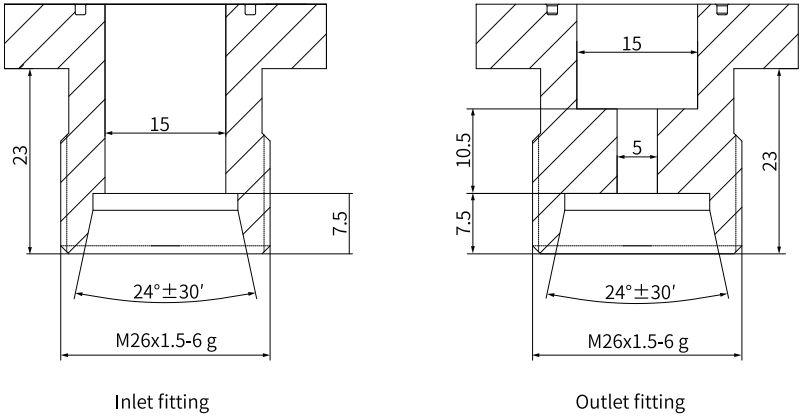


Figure 3-27 Dimensions of 820 A water-to-air heat exchanger and water inlet/outlet fitting of the fan module in mm (M26 x 1.5 metric external thread, 24-degree internal taper)

3.1.7 Dimensions of 1558 A Filter Module

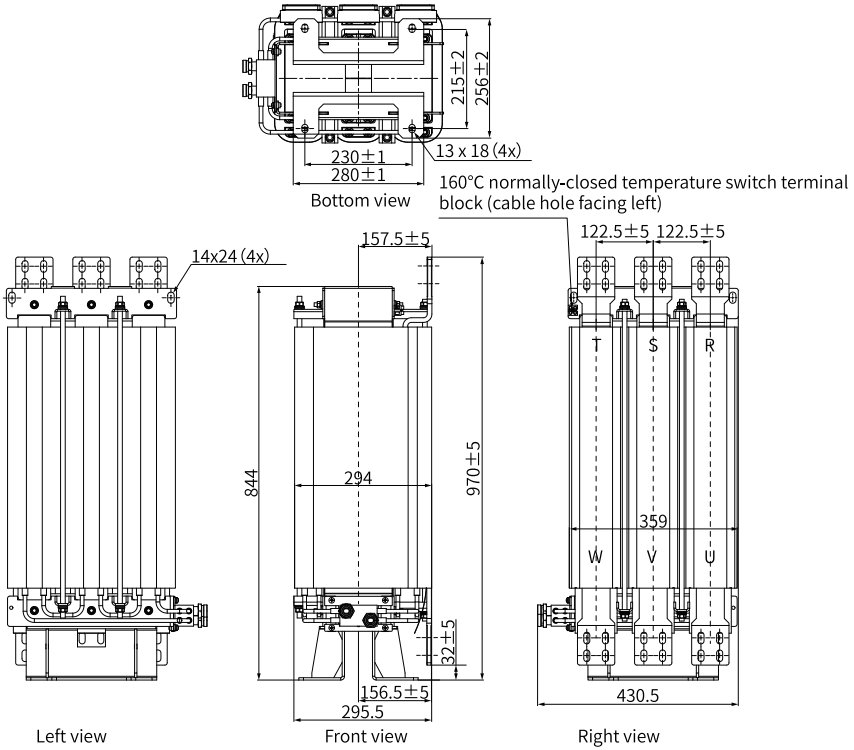


Figure 3-28 Dimensions of the 1558 A reactor module (mm)

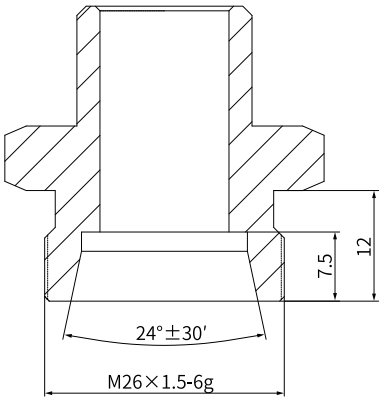


Figure 3-29 Water inlet/outlet fitting of 1558 A reactor module in mm (M26x1.5 metric external thread, 24-degree internal taper)

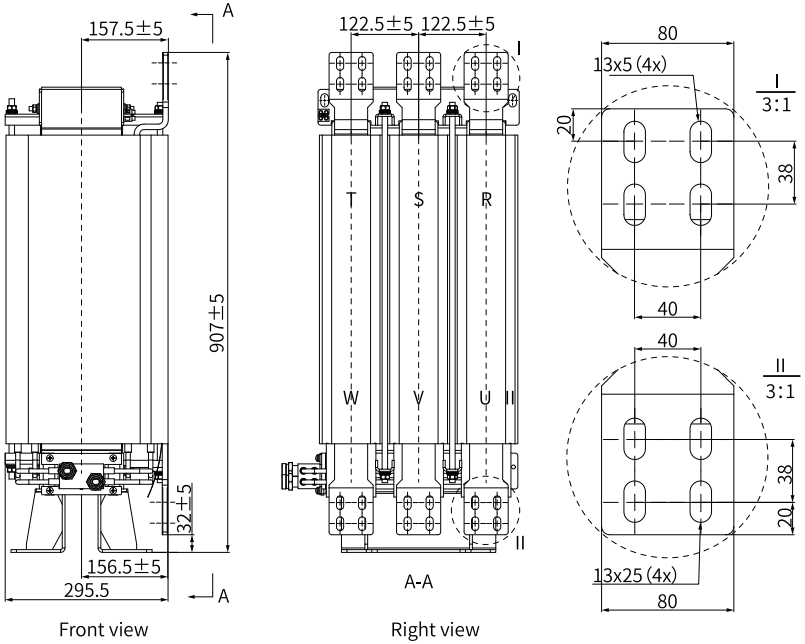


Figure 3-30 Electrical terminal dimensions of the 1558 A reactor module (mm)

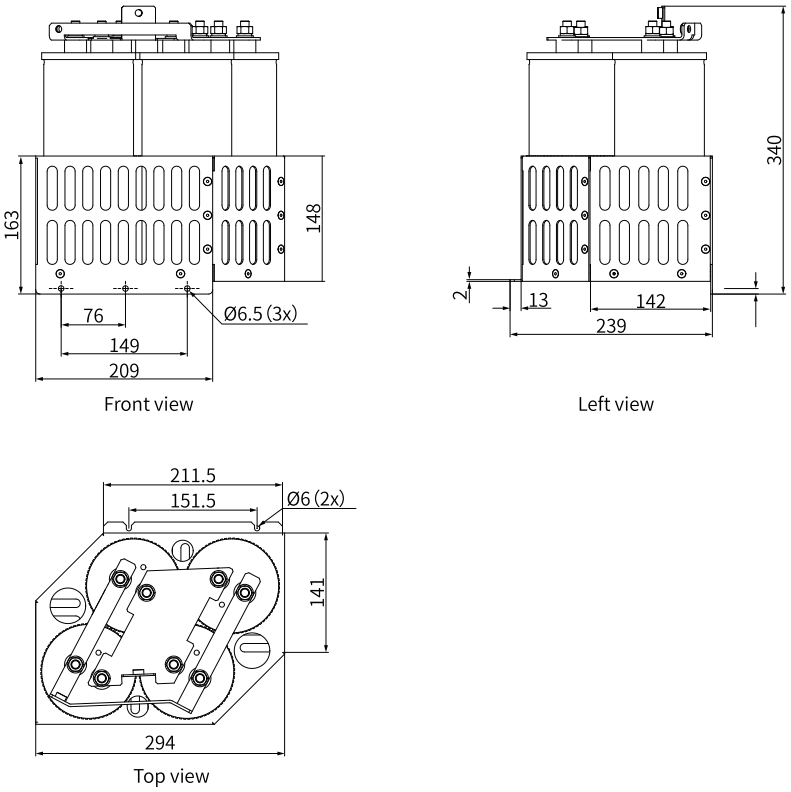


Figure 3-31 Dimensions of the 1558 A capacitor module (mm)

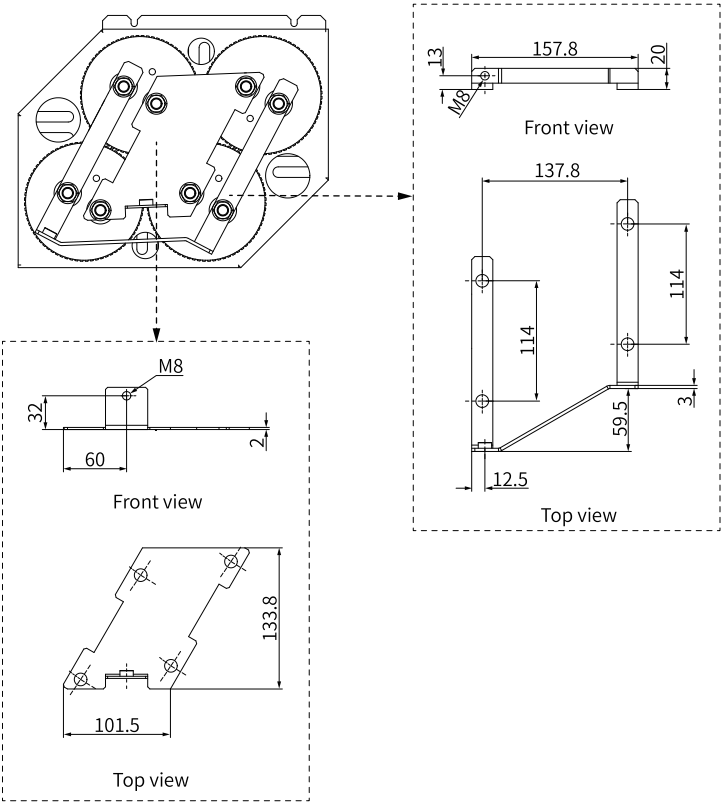


Figure 3-32 Electrical terminal dimensions of the 1558 A capacitor module (mm)

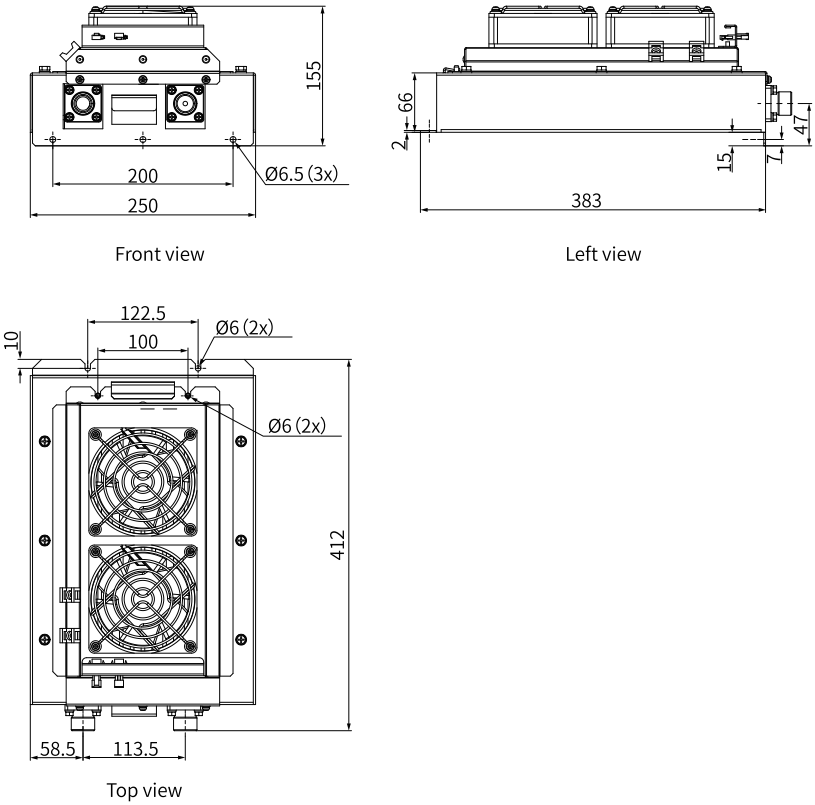


Figure 3-33 Dimensions of the 1558 A water-to-air heat exchanger and fan module (mm)

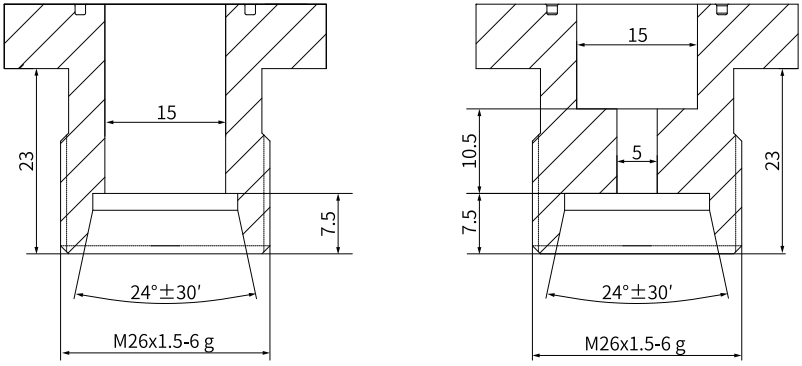


Figure 3-34 Dimensions of 1558 A water-to-air heat exchanger and water inlet/outlet fitting of the fan module in mm (M26 x 1.5 metric external thread, 24-degree internal taper)

3.2 Installation Space

H6w module

Reserve sufficient mounting space and clearance for the H6w module, as shown below.

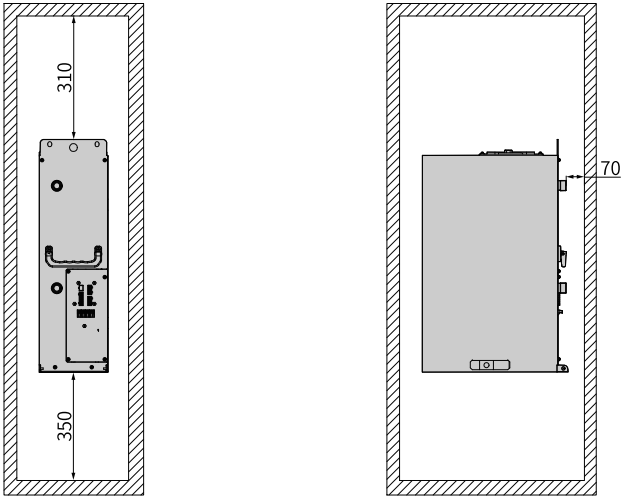


Figure 3-35 Clearance for the H6w module (in mm)

Note

The dimensions above represent the minimum space (mm) required.

H7w module

Reserve sufficient mounting space and clearance for the H7w module, as shown below.

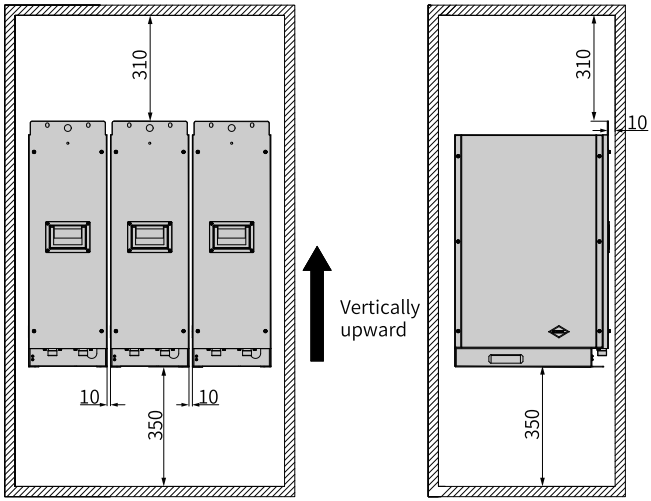


Figure 3-36 Clearance for the H7w module (in mm)

Note

The dimensions above represent the minimum space (mm) required.

H8w module

Reserve sufficient mounting space and clearance for the H8w module, as shown below.

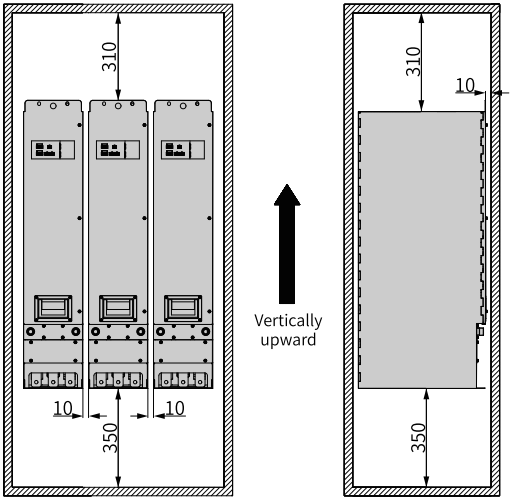


Figure 3-37 Clearance for the H8w module (in mm)

Note

The dimensions above represent the minimum space (mm) required.

3.3 Cabinet Design Instructions

3.3.1 Cabinet Design Precautions

- The cabinet frame must be sturdy enough to carry the weight of the components, control circuit and other devices installed in the cabinet.
- The cabinet must protect the active rectifier module and meet the dust-proof and humidity requirements.
- To facilitate installation and maintenance, it is recommended to leave enough space around the equipment to allow adequate cooling air flow, necessary clearance, and space required for holding cables and cable supports. Do not install the control board near the main circuit or high-temperature parts.
- Make sure any cross-over components or frames on which components are mounted are properly grounded and the connecting surfaces are not painted.
- Ensure that the module is grounded properly through the fixing points on the mounting baseplate.
- 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. When placing the heater, follow the instructions provided by the manufacturer.

- Take care when installing coolant pipes. Ensure the pipe machineries are installed correctly without leakage.

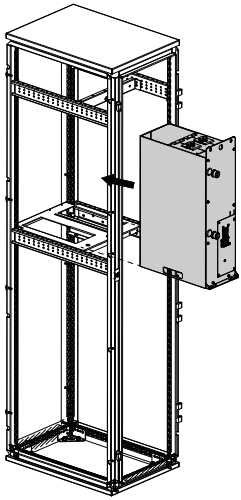
3.3.2 EMC Requirements of the Cabinet

- The fewer and smaller the holes in the cabinet, the better the anti-interference and anti-attenuation performance can be. The maximum diameter of a hole on the galvanic metal contact surface in the cabinet is 100 mm. Pay special attention to the size of the grid holes at the cooling air inlet and outlet.
- The best electrical connection between the steel panels is achieved by soldering them together as no holes are needed. If soldering is not possible, do not paint the gap between panels. In this case, install special conductive EMC bars to realize 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.
- Make sure that a high-frequency grounding system has been established in the cabinet. This is to prevent voltage difference, thus forming a structure that can shield against radiation. Use short and flat low-inductance copper braids to achieve a high-frequency grounding system. High-frequency single-point grounding cannot be used due to the long distance in the cabinet.
- The conductive EMC shield gasket is not enough to achieve protective grounding. To ensure electrical safety of the parts, a low-frequency grounding system is required. Follow local regulations when designing protective grounding.

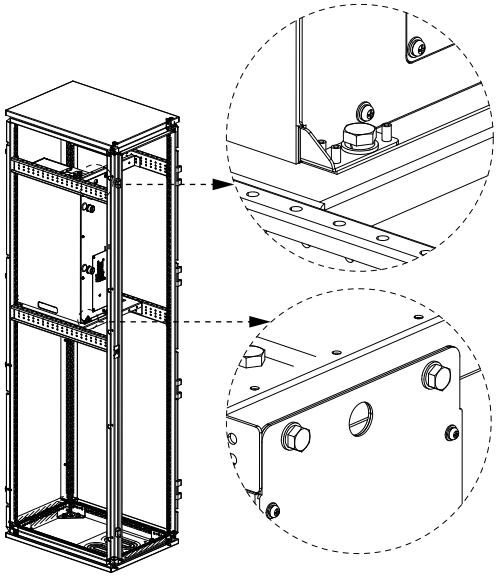
3.3.3 Installation Method

Installing the H6w module

1. Push the module into the cabinet along the mounting limit slot.

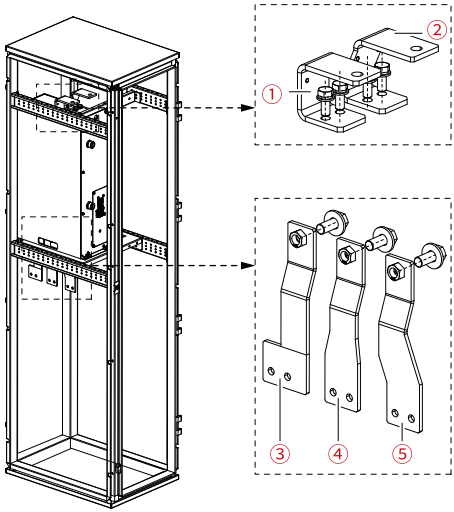


2. After pushing the module in place, use a 13 mm socket wrench (use an extension bar if necessary) to tighten the four M8x20 bolts on top and bottom of the module with a tightening torque of 12 N·m, as shown in the following figure.

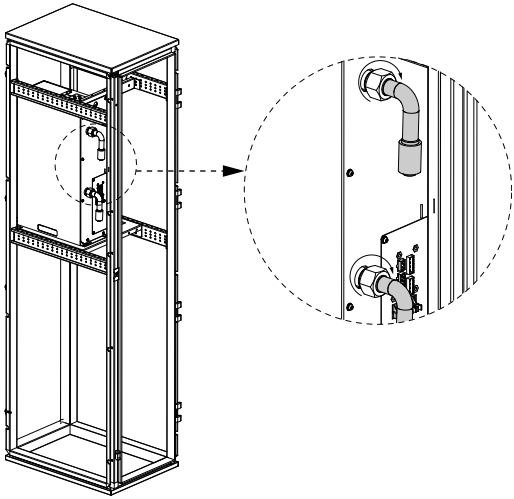


3. Use a 16 mm socket wrench (use an extension rod if necessary) to tighten the four M10x20 bolts with a tightening torque of 20 N·m to connect the two copper busbars ① and ② to the positive/negative copper busbars of the module. Use a 18 mm socket wrench (use an extension rod if necessary) to tighten the three M12x30 bolts with a

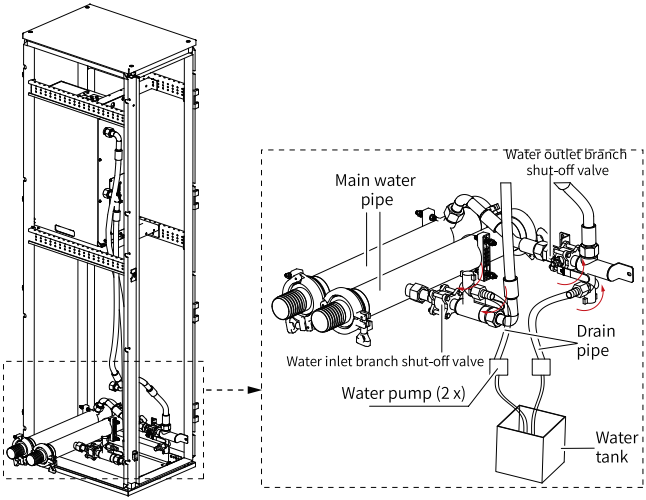
tightening torque of 35 N·m to connect the three copper busbars ③, ④, and ⑤ to the three-phase AC copper busbar at the bottom of the module.



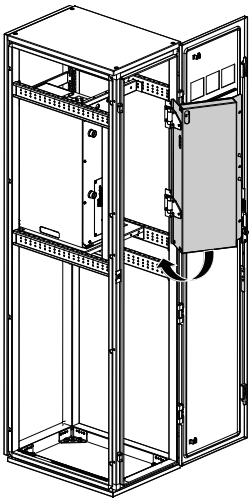
4. Lock the crimping pipes of the water inlet and outlet pipes to the water inlet and outlet fittings of the module with a 32 mm open-end wrench at a tightening torque of 35 N·m, as shown by the arrow direction in the figure. The water inlet/outlet fitting has M26x1.5 metric thread and 24-degree internal taper.



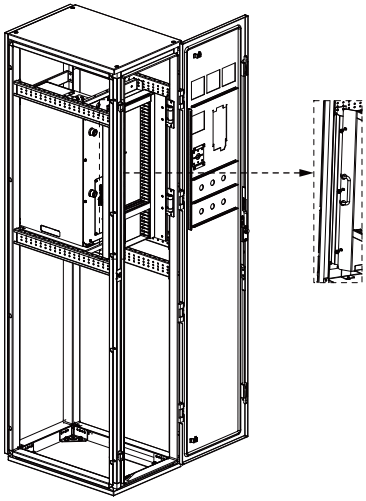
5. Close the two drain valves in the arrow direction shown in the figure, and then open the water inlet and outlet branch shut-off valves to ensure that the water circuit in the cabinet is connected to the water circuit of the main water pipe.



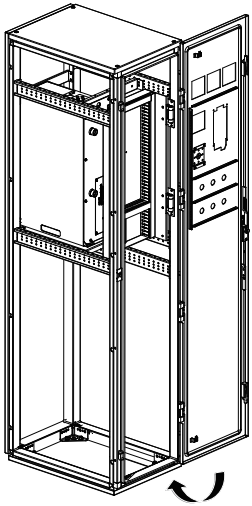
6. Hold the handle on the right side of the mounting panel and close it leftward, as shown in the following figure.



7. Install the M6 fixing nut of the mounting panel and open the panel.

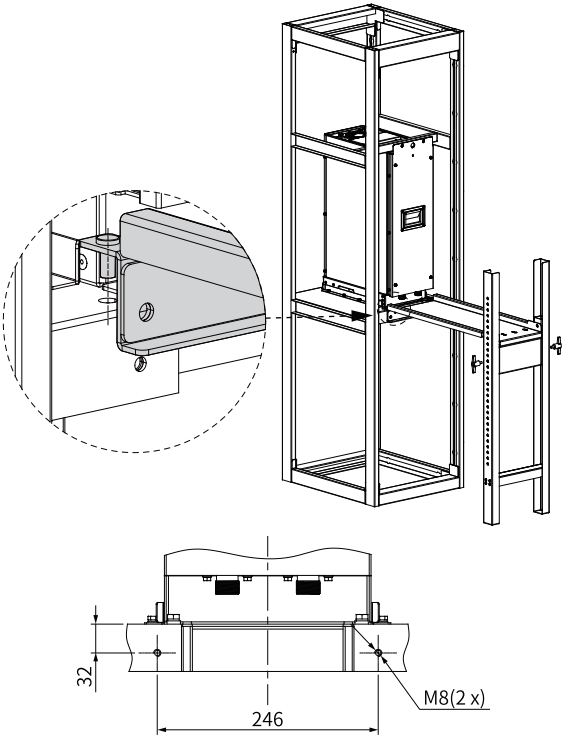


8. Close the cabinet door.

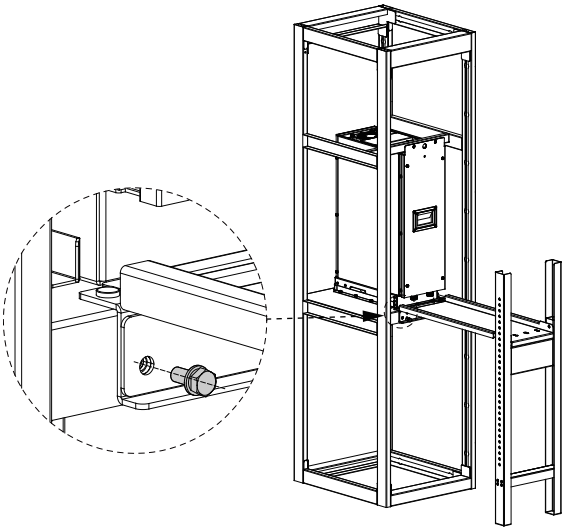


Installing the H7w module

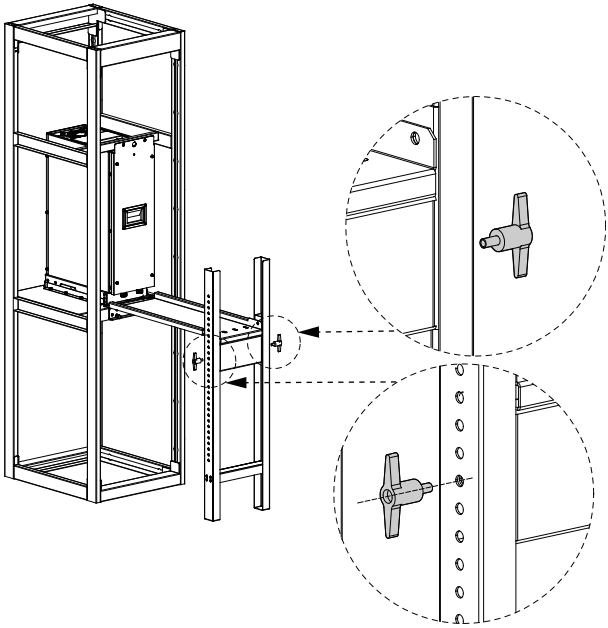
1. Install the maintenance stand for the module.
   a. Insert the maintenance stand limit pins into the positioning hole, as shown below.



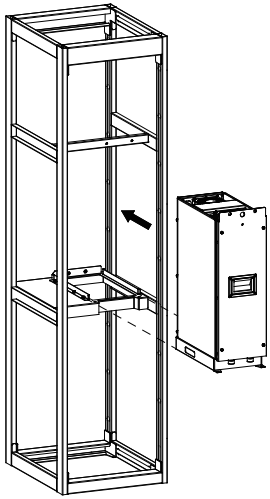
b. Fix the bracket with two M8 screws.



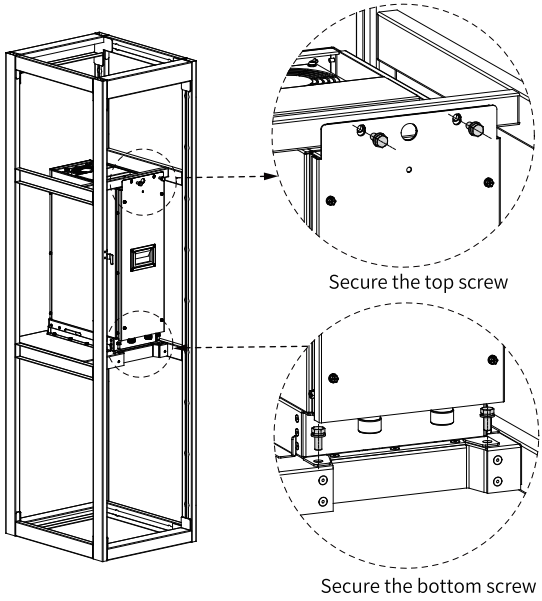
c. Adjust the foot height and fix it to the proper hole with thumb screws.



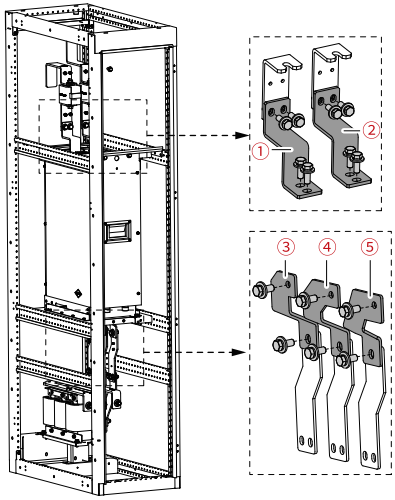
2. Push the module into the cabinet along the mounting limit slot.



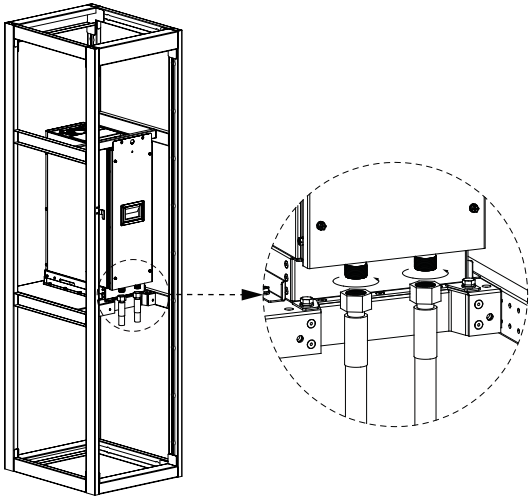
3. After pushing the module in place, use a 13 mm socket wrench (use an extension bar if necessary) to tighten the four M8x20 bolts on top and bottom of the module clockwise with a tightening torque of 12 N·m, as shown in the following figure.



4. Use a 16 mm socket wrench (use an extension rod if necessary) to tighten the eight M10x30 bolts with a tightening torque of 20 N·m to connect the two copper busbars ① and ② to the positive/negative copper busbars of the module. Use a 18 mm socket wrench (use an extension rod if necessary) to tighten the six M12x30 bolts with a tightening torque of 35 N·m to connect the three copper busbars ③, ④, and ⑤ to the three-phase AC copper busbar at the bottom of the module.



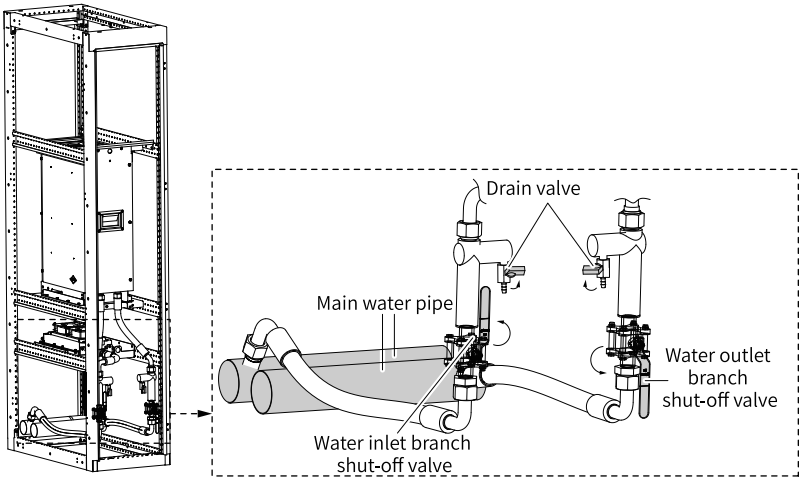
5. Lock the crimping pipes of the water inlet and outlet pipes to the water inlet and outlet fittings of the module with a 32 mm open-end wrench at a tightening torque of 35 N·m, as shown by the arrow direction in the figure. The water inlet/outlet fitting has M26x1.5 metric thread and 24-degree internal taper.



6. Close the two drain valves in the arrow direction shown in the figure, and then open the water inlet and outlet branch shut-off valves to ensure that the water circuit in the cabinet is connected to the water circuit of the main pipe.

Note

If the shut-off valve and drain valve handles are parallel to the water pipe, the shut-off valve and drain valve are opened. If they are vertical to the water pipe, they are closed. The following figure shows the handle status after valve commissioning is done.



Note

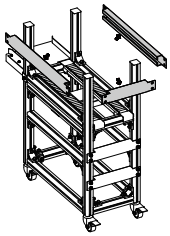
For water-cooled system, check the water first upon overtemperature.

Installing the H8w module

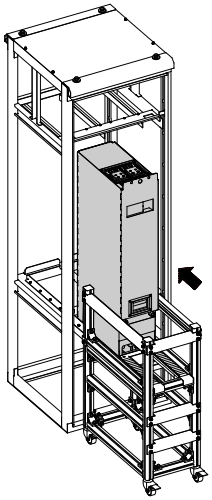
1. Place the new module on the trolley.

Note

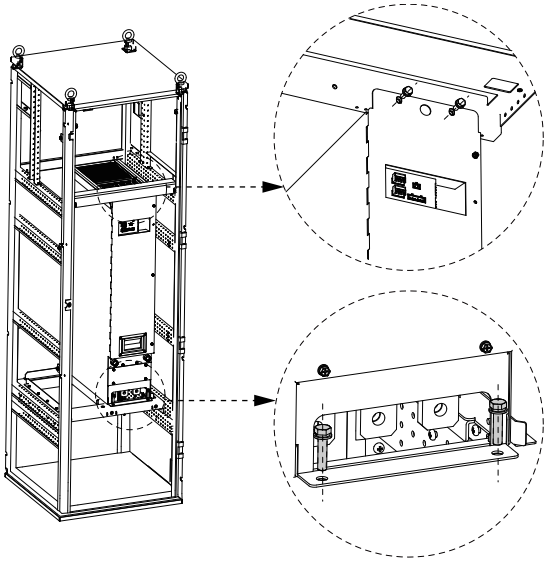
When moving the module from the trolley, you can remove the baffles around the trolley.



2. Lock the brake on the trolley wheel.
3. Push the module on the trolley into the cabinet along the limit slot.

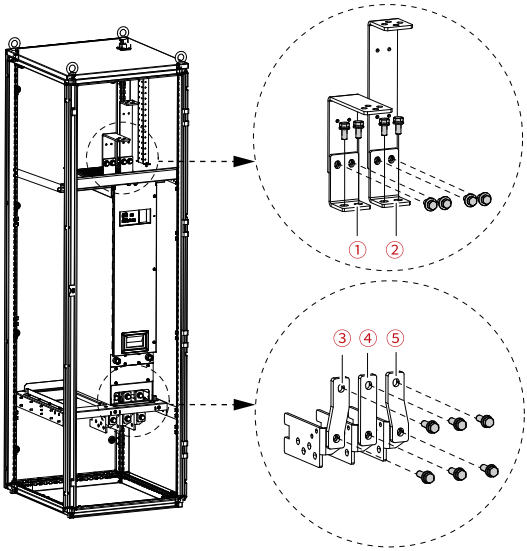


4. After pushing the module in place, use a 13 mm socket wrench (use an extension bar if necessary) to tighten the four M8x20 bolts on top and bottom of the module clockwise with a tightening torque of 12 N·m. Secure the module in the cabinet, as shown in the following figure.

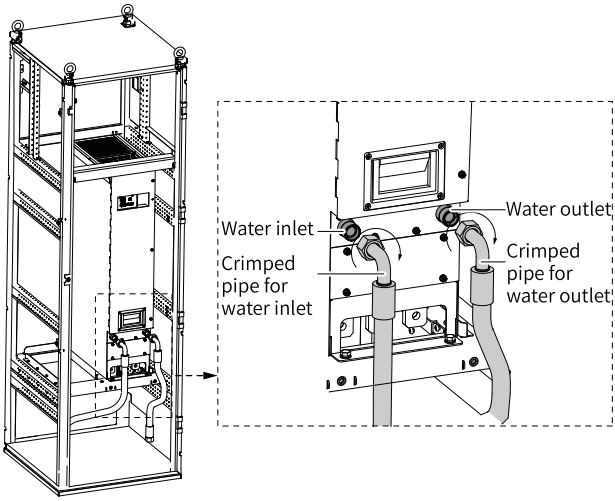


5. Use a 16 mm socket wrench (use an extension rod if necessary) to tighten the eight M10x25 bolts with a tightening torque of 20 N·m to connect the two copper busbars ① and ② to the positive/negative copper busbars of the module. Use a 18 mm socket wrench (use an extension rod if necessary) to tighten the six M12x40 bolts with a

tightening torque of 35 N·m to connect the three copper busbars ③, ④, and ⑤ to the three-phase AC copper busbar at the bottom of the module.



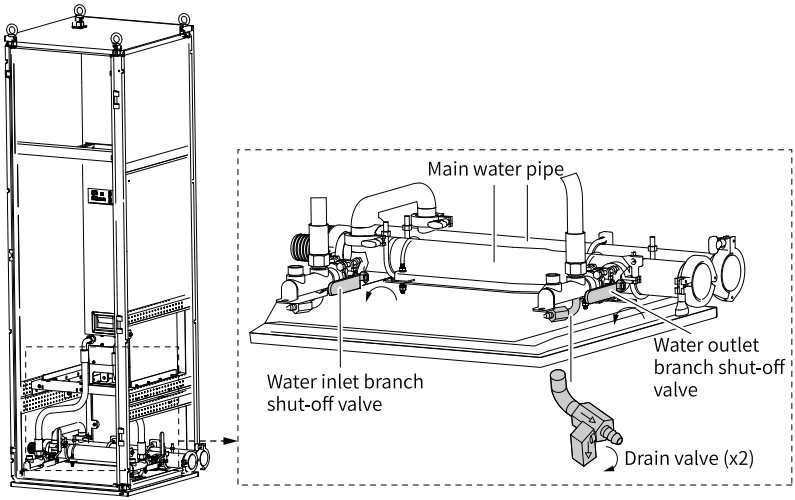
6. After the main circuit of the module is connected, lock the crimping pipes of the inlet and outlet pipes to the water inlet and outlet fittings of the module with a 32 mm open-end wrench at a tightening torque of 35 N·m, as shown in the arrow direction. The water inlet/outlet fitting has M26x1.5 metric thread and 24-degree internal taper.



7. Close the two drain valves in the arrow direction shown in the figure, and then open the water inlet/outlet branch shut-off valves. Ensure that the water circuit in the cabinet is connected to the water circuit of the main water pipe.

Note

If the switch valve and drain valve handles are parallel to the pipe, the switch valve and drain valve are open. If they are vertical to the pipe, they are closed. The following figure shows the handle status after valve commissioning is done.



Note

For water-cooled system, check the water first upon overtemperature.

3.3.4 Recommended Cabinet Layout

Active rectifier

The following figure shows the recommended installation of the H6w active rectifier module (395 A).

- The DC bus and DC fuse locate in the upper part of the cabinet.
- The AC incoming cables and AC fuses locate in the lower part of the cabinet.
- The control panel, which can be switched on/off, locates in the middle front part of the cabinet.
- The active rectifier module and capacitor module locate behind the control panel.
- The filter reactor module locates in the lower part of the active rectifier module.

- A water-to-air heat exchanger is integrated into the reactor module, which ensures that the air that enters the active rectifier module has been cooled by the heat exchanger. The fan blows the air from the top to bottom.
- The cabinet main water pipe locates at the bottom near the back of the cabinet.
- The water inlet and outlet branches locate on the left and right sides of the lower part of the cabinet.

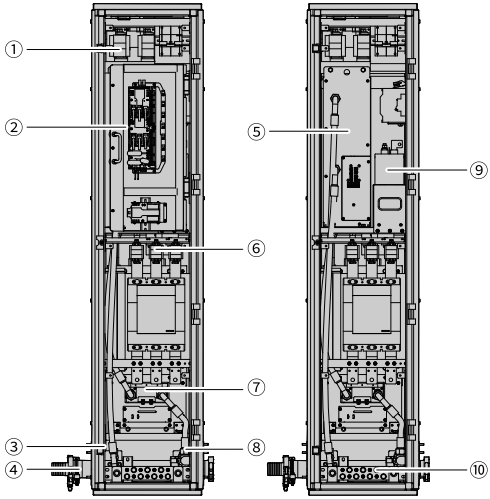


Figure 3-38 Components of the H6w active rectifier (395 A)

No.	Description
①	DC fuse
②	Swing door
③	Inlet valve
④	Main water pipe
⑤	Rectifier module
⑥	AC fuse
⑦	Reactor module (water-to-air heat exchanger and fan included)
⑧	Outlet valve
⑨	Capacitor module
⑩	PE busbar

Note

In the layout of the active rectifier cabinet, the left image shows a closed swing door, and the right image shows an open swing door.

The following figure shows the recommended installation of the H7w active rectifier module.

- The AC bus, DC bus, AC fuse, and DC fuse locate in the upper part of the cabinet.
- The control panel, which can be switched on/off, locates in the middle front part of the cabinet.
- The active rectifier module and capacitor module locate behind the control panel.
- The filter reactor module locates in the lower part of the active rectifier module.
- A water-to-air heat exchanger is integrated into the reactor module, which ensures that the air that enters the active rectifier module has been cooled by the heat exchanger.
- The cabinet main water pipe locates at the bottom near the back of the cabinet.
- The inlet and outlet branches locate in the lower left part of the cabinet.

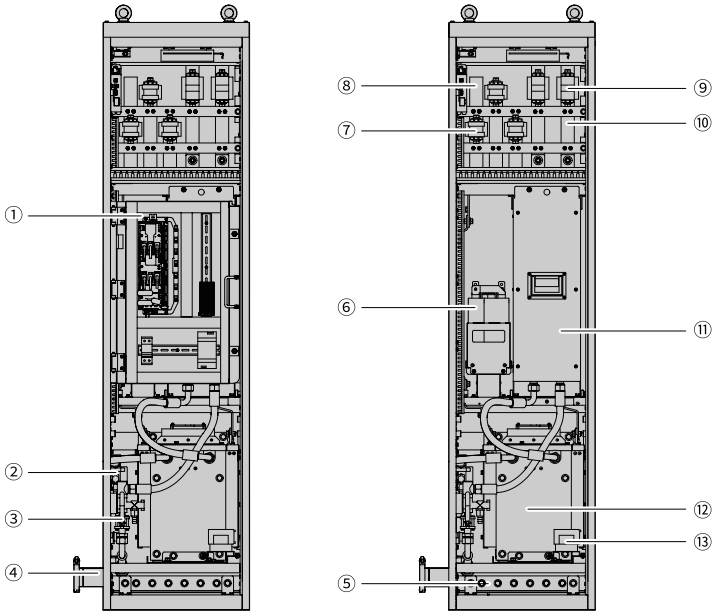


Figure 3-39 Components of the H7w active rectifier module

No.	Description
①	Swing door
②	Inlet valve
③	Outlet valve
④	Main pipe
⑤	PE busbar
⑥	Capacitor module
⑦	AC fuse
⑧	AC copper busbar

No.	Description
⑨	DC fuse
⑩	DC copper busbar
⑪	Rectifier module
⑫	Reactor module (water-to-air heat exchanger and fan included)
⑬	Heater

Note

In the layout of the active rectifier cabinet, the left image shows a closed swing door, and the right image shows an open swing door.

The following figure shows the recommended installation of the H8w active rectifier module (820 A).

- There are two cabinets installed side by side. The AC bus and AC fuse locate in the upper part of the left cabinet. The DC bus and DC fuse locate in the upper part of the right cabinet.
- The AC copper busbar, fuse, water-to-air heat exchanger, capacitor module, and reactor locate from top to bottom inside the left cabinet .
- The DC copper busbar, fuse, rectifier module, AC input copper busbar, and water inlet and water outlet shut-off valves locate from top to bottom inside the right cabinet.
- The control panel, which can be switched on/off, locates in the middle front part of the right cabinet.
- The active rectifier module locates behind the control panel.
- There is a baffle plate between the two cabinets. The air ducts of the left and right cabinets are independent of each other, without disturbing each other.
- The main water pipe locates at the bottom near the back of the cabinet.
- The water inlet branch locates in the lower left part of the right cabinet. The water outlet branch locates in the lower right part of the right cabinet.

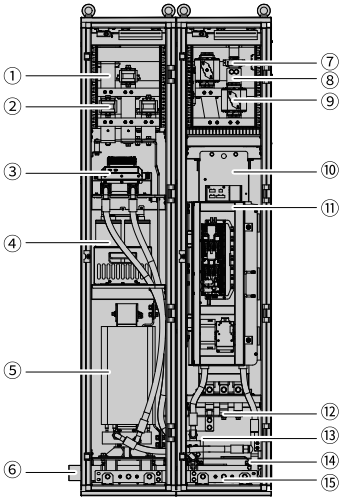


Figure 3-40 Components of the H8w active rectifier module (820 A)

No.	Description
①	AC copper busbar
②	AC fuse
③	820 A water-to-air heat exchanger and fan module
④	820 A capacitor module
⑤	820 A reactor
⑥	Main pipe
⑦	Hall current sensor
⑧	DC copper busbar
⑨	DC fuse
⑩	Rectifier module
⑪	Swing door
⑫	AC input copper busbar
⑬	Inlet valve
⑭	Outlet valve
⑮	PE busbar

The following figure shows the recommended installation of the H8w active rectifier module (1558 A).

- There are two cabinets installed side by side. The AC bus and AC fuse locate in the upper part of the left cabinet. The DC bus and DC fuse locate in the upper part of the right cabinet.

- The AC copper busbar and the fuse locate at the top inside the left cabinet. The reactor locates in the rear part of the left cabinet. The three sets of capacitor modules and water-to-air heat exchanger locate from top to bottom in the front part of the left cabinet.
- The DC copper busbar, fuse, rectifier module, AC input copper busbar, and water inlet and outlet shut-off valves locate from top to bottom in the right cabinet.
- The control panel, which can be switched on/off, locates in the middle front part of the right cabinet.
- The active rectifier module locates behind the control panel.
- There is a baffle plate between the two cabinets. The air ducts of the left and right cabinets are independent of each other, without disturbing each other.
- The main water pipe locates at the bottom near the back of the cabinet.
- The water inlet branch locates in the lower middle part of the right cabinet. The water outlet branch locates in the lower right part of the right cabinet.

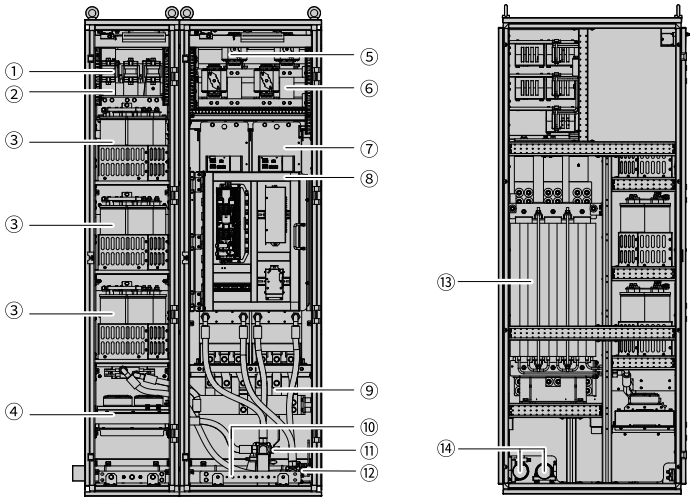


Figure 3-41 Components of the H8w active rectifier module (1558 A)

No.	Description
①	AC fuse
②	AC copper busbar
③	1558 A capacitor module
④	1558 A water-to-air heat exchanger and fan module
⑤	DC fuse
⑥	DC copper busbar
⑦	Rectifier module
⑧	Swing door
⑨	AC input copper busbar

No.	Description
⑩	PE busbar
⑪	Inlet valve
⑫	Outlet valve
⑬	1558 A reactor
⑭	Main pipe

Note

In the cabinet layout of the H8w active rectifier module (1558 A), the left image shows the front view, and the right image shows the left side view.

Inverter

The following figure shows the recommended installation of the H6w inverter module.

- The DC bus and DC fuse locate in the upper part of the cabinet.
- The control panel, which can be switched on/off, locates in the middle front part of the cabinet.
- The middle-lower part of the cabinet is the user wiring area.
- The inverter module locates behind the control panel.
- The cabinet main water pipe locates at the bottom near the back of the cabinet.
- The water inlet and outlet branches locate on the left and right sides of the lower part of the cabinet.

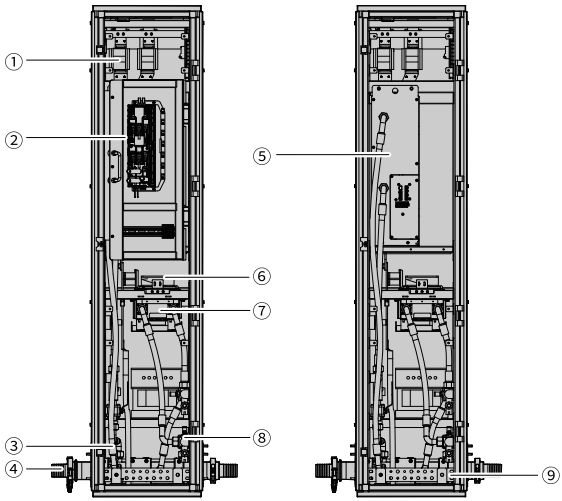


Figure 3-42 Components of the H6w inverter module

No.	Description
①	DC fuse
②	Swing door
③	Inlet valve
④	Main water pipe
⑤	Inverter module
⑥	AC fuse
⑦	Water-to-air heat exchanger module
⑧	Outlet valve
⑨	PE busbar

The following figure shows two H7w inverter modules arranged in parallel inside the cabinet.

- The DC bus and DC fuse locate in the upper part of the cabinet.
- The control panel, which can be switched on/off, locates in the middle front part of the cabinet.
- The inverter module locates behind the control panel.
- The outlet reactor locates near the back at the lower part of the cabinet. The copper busbar in the front part of the reactor is routed out from the reactor for wiring on the user side.
- A water-to-air heat exchanger and a sealed air duct locate between the reactor and the inverter module to ensure that the air that enters the inverter module has been cooled by the heat exchanger.
- The main pipe locates at the bottom near the back of the cabinet.
- The inlet and outlet branch pipes locate on the left and right sides of the lower part of the cabinet.

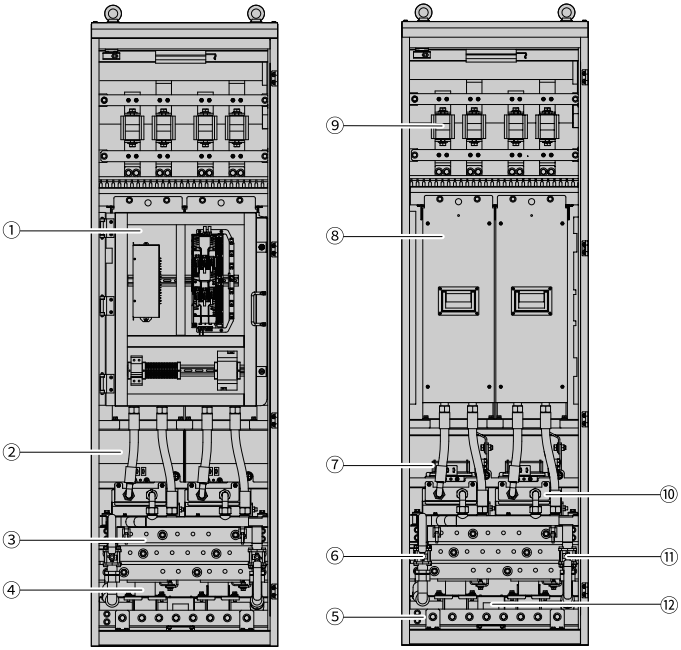


Figure 3-43 Components of the H7w inverter module

No.	Description
①	Inverter module swing door
②	Air inlet duct
③	Outcoming copper busbar
④	Reactor
⑤	PE busbar
⑥	Inlet valve
⑦	Fan of the water-to-air heat exchanger
⑧	Inverter module
⑨	DC fuse
⑩	Water-to-air heat exchanger
⑪	Outlet valve
⑫	Heater

The following figure shows two H8w inverter modules arranged in parallel inside the cabinet.

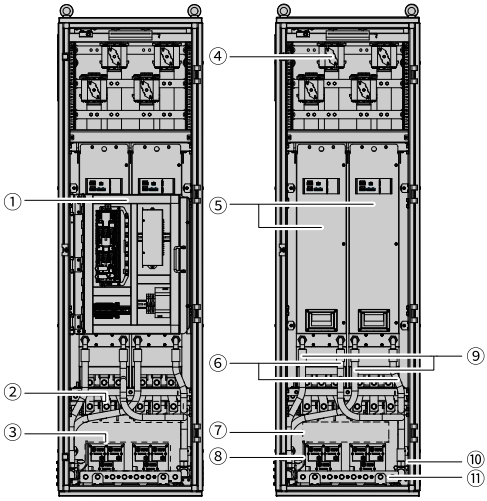


Figure 3-44 Components of the H8w inverter module

No.	Description
①	Inverter cabinet swing door
②	Outcoming copper busbar
③	dv/dt filter
④	DC fuse
⑤	Inverter module
⑥	Water outlet pipe of the inverter module
⑦	Air inlet duct of the inverter module
⑧	Water inlet shut-off valve
⑨	Water inlet pipe of the inverter module
⑩	Water outlet shut-off valve
⑪	PE busbar

Note

In the layout of the inverter module, the left image shows a closed swing door, and the right image shows an open swing door.

4 Internal Water-cooled Circuit

4.1 Recommended Water-cooled System Design

Each cabinet has an inlet pipe, an inlet valve, an outlet pipe, and a 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 an active rectifier module and an inverter module.

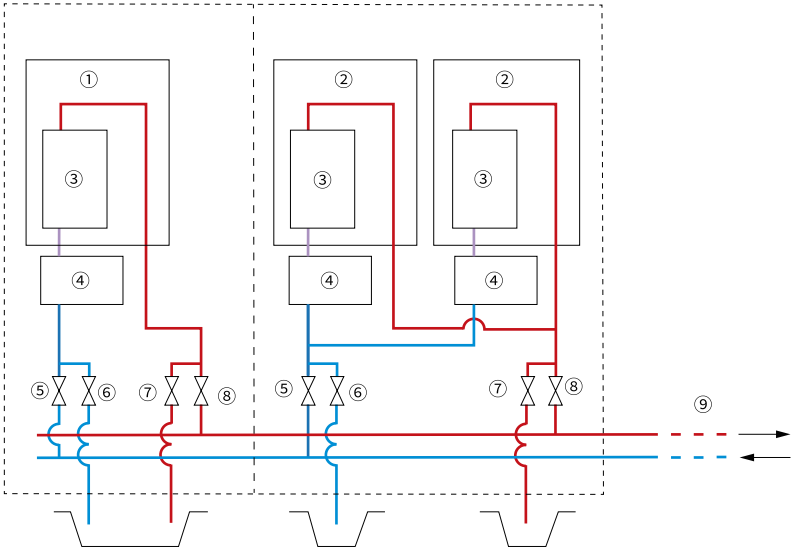


Figure 4-1 Internal water-cooled system of H6w and H7w modules

Table 4–1 Description of the internal water-cooled system of H6w and H7w modules

No.	Description
①	Active rectifier module
②	Inverter module
③	Heatsink
④	Water-to-air heat exchanger
⑤	Inlet valve
⑥	Inlet-side drain valve
⑦	Outlet-side drain valve
⑧	Outlet valve
⑨	Coolant main pipe

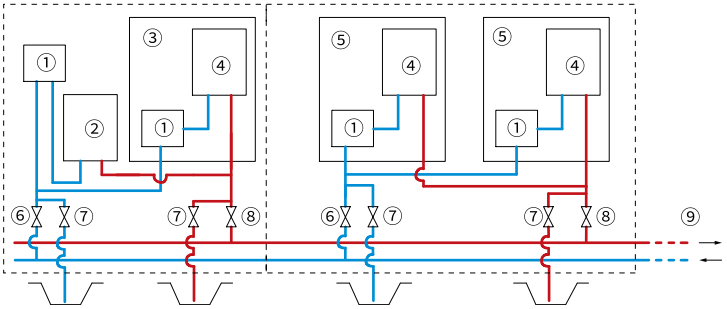


Figure 4-2 Internal water-cooled system of the H8w module

Table 4–2 Description of the internal water-cooled system of H8w module

No.	Description
①	Water-to-air heat exchanger
②	Water-cooled reactor
③	Active rectifier module
④	Water-cooled plate
⑤	Inverter module
⑥	Water inlet shut-off valve
⑦	Drain valve
⑧	Water outlet shut-off valve
⑨	Main pipe of the coolant

Note

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

4.2 Uniform Flow Distribution of Water Circuit

Reason for uniform flow distribution

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 the uniform flow can be achieved when the modules are used in parallel cabinets.

Method for adjusting water circuit flow resistance

For design of the water-cooled system, see *"4.1 Recommended Water-cooled System Design" on page 139*.

Caution

The water-to-air heat exchanger provided by Inovance has been designed properly to meet the needs for uniform flow distribution 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 flow-equalizing fitting with a small hole diameter at the water inlet/outlet of the heat exchanger or module. The following table shows the hole diameter of the flow-equalizing fitting of H6w and H7w modules.

Module	Diameter of the round hole in the water inlet/outlet fitting
H6w module	6
H7w module	5.7

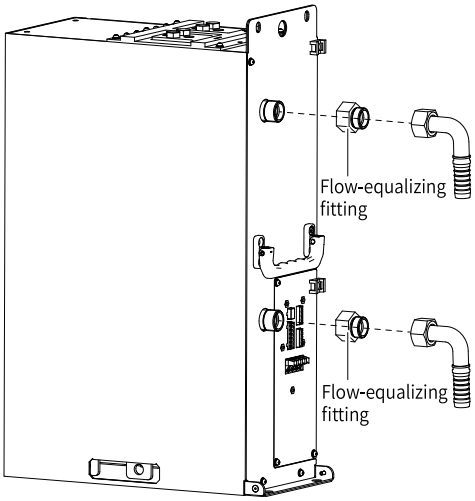


Figure 4-3 Diagram of the flow-equalizing fitting of H6w module

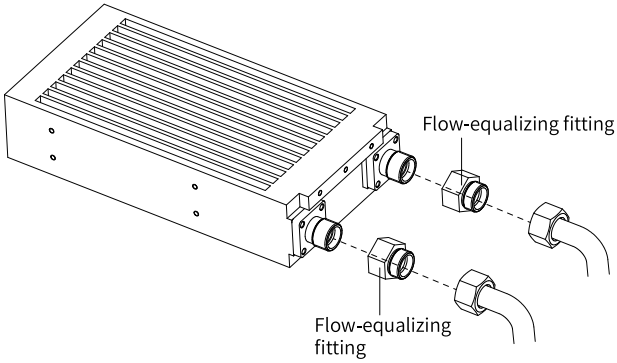


Figure 4-4 Diagram of the flow-equalizing fitting of H6w water-to-air heat exchanger

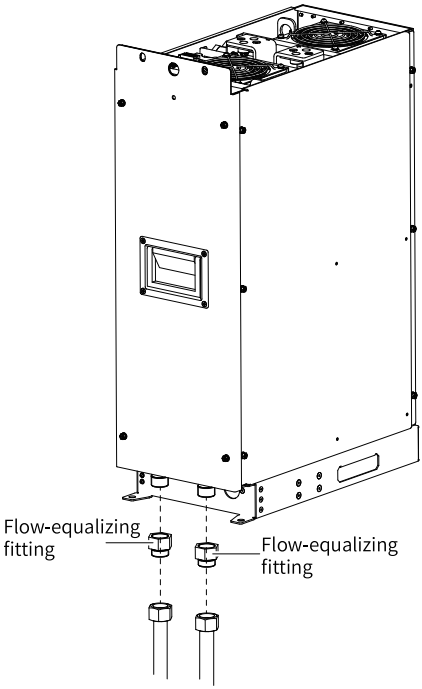


Figure 4-5 Diagram of the flow-equalizing fitting of H7w module

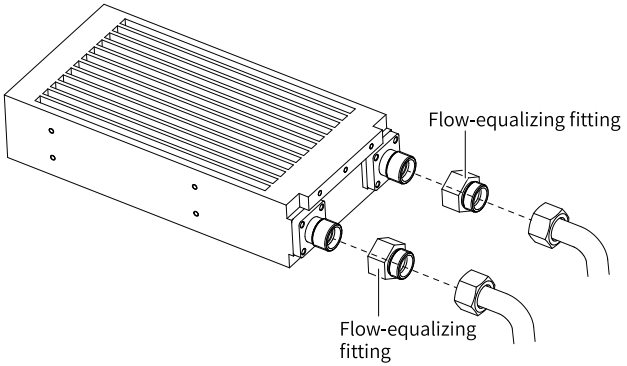


Figure 4-6 Diagram of the flow-equalizing fitting of H7w water-to-air heat exchanger

4.3 Technical Data of the Cooling Circuit

4.3.1 Installation Requirements

Reserve at least a distance of 310 mm and 350 mm above and below the H7w/H8w module respectively to ensure effective air ventilation.

- When the H6w module is used, do not reserve any ventilation space at the top or bottom. If there are other heating components (such as reactors) 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.
- The H8w module is integrated with a water-to-air heat exchanger and additional heat exchangers are not needed.

Install the drain valve at the lowest point in the cabinet system. See the following figure for related configurations.

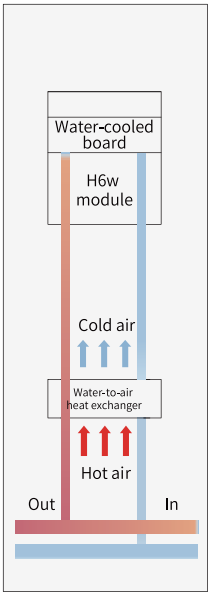


Figure 4-7 Cooling circuit in the H6w module cabinet

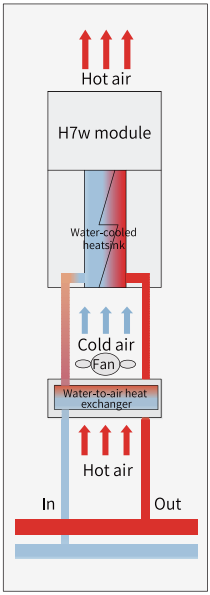


Figure 4-8 Cooling circuit in the H7w module cabinet

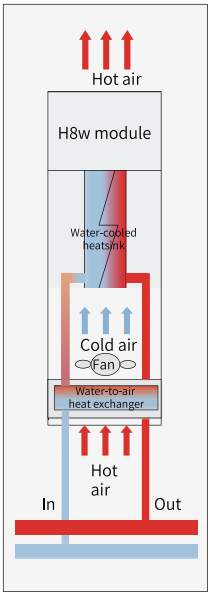


Figure 4-9 Cooling circuit in the H8w module cabinet

Table 4–3 Technical data of internal water-cooled circuit

Module model	Air inlet temperature of the module (°C)	Air volume of the module (CFM)	Flow of the module (L/min)			Water inlet temperature of the module (°C)	Water inlet pressure of the module (bar)
			100% Water	Water/ Ethylene glycol ratio 80:20	Water/ Ethylene glycol 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							

Note

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

4.3.2 Coolant Temperature Control

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

- 20% ethylene glycol solution can be used for storage temperatures not lower than -10°C.
- 40% ethylene glycol solution can be used for storage temperatures not lower than -25°C.
- Regardless of the freezing point of the coolant, the module is not allowed to run at the temperatures lower than 0°C (32°F).
- If the coolant temperature is within the range of 0°C to 5°C, it is recommended to add ethylene glycol solution to prevent freezing.

Note

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

4.3.3 Temperature Limit

Anti-freezing: The freezing point of the coolant is determined by the concentration of heat transfer fluid in the mixture.

The higher the concentration of heat transfer fluid, the higher the concentration of the coolant, and the higher the pressure loss in the system can be. For details, see *"4.3.4 Pressure Limit" on page 147*.

Input 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 a component with a maximum ambient temperature of 55°C (131°F) is installed with the drive module, the output current of the drive module must be derated by 6% for every additional 1°C (1.8°F).
  - If no such component is installed with the drive module, the output current of the drive module must be derated by 2% for every additional 1°C (1.8°F).

Condensation is not allowed. The minimum coolant temperature to avoid condensation (at an atmospheric pressure of 1 bar) is shown below, which is used as a function for the relative humidity (RH) and the ambient temperature.

Table 4–4 Minimum coolant temperature

Ambient temperature (°C)	Minimum coolant temperature (°C)				
	Relative humidity = 95%	Relative Humidity = 80%	Relative Humidity = 65%	Relative Humidity = 50%	Relative Humidity = 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.

4.3.4 Pressure Limit

- Flow resistance at rated flow (between main input/output lines): 200 kPa (16 L/min) for purified water; 300 kPa (18 L/min) for 20% ethylene glycol water solution (volume concentration); 400 kPa (21 L/min) for 40% ethylene glycol water solution (mass concentration)
- Rated water pressure: 600 kPa
- Short-term withstand capacity of maximum water supply pressure: 900 kPa

Note

Take the rated differential pressure into account when determining the size of the liquid cooling circuit.

4.3.5 Coolant Flow Limit

The maximum coolant flow of all drive devices is 1.3 x rated value. For the rated coolant flow, see *"Table 4–3 " on page 145*.

4.3.6 Cooling Circuit Material

The internal cooling circuit and the external cooling circuit must use the same materials, as described 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 housing) are used on the site, a cooling unit with a heat exchanger must be used to separate the system.

4.4 Filling and Venting the Internal Cooling Circuit

Both the drive and coolant must be at the room temperature before filling.

Caution

- Make sure that the maximum permissible operating pressure is not exceeded. Keep the pressure within a proper range by draining surplus coolant when necessary.
- Venting of the cooling circuit is a critical step, which must be done 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 venting of the circuit must be done through the external vent valve that installed at the highest point of the cabinet system. The valve should 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.

Follow the following procedure when filling and venting 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 direct it into a proper container.
3. Open the inlet valve of a cabinet and the drain valve on the outlet side. Keep the outlet valve and the drain valve on the inlet side closed.
4. Attach a hose to the drain valve on the outlet side and direct it into a proper container.
5. Fill the cooling circuit with coolant.
6. 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.
7. Close the inlet valve.
8. Repeat steps 2 to 6 for all cabinets.
9. Open the water inlet and outlet valves of all cabinets. Vent all the air in the system through the vent valve of the cabinet system.
10. Close the vent valve of the cabinet system.
11. Open the vent valve of the pump to vent all the air.
12. Re-check the pressure and fill the coolant if necessary.
13. Start the coolant pump. Vent all the air in the system through the vent valve of the cabinet.
14. Wait for one to two minutes, and then stop the coolant pump or block the coolant flow with a valve.
15. Re-check the pressure and fill the coolant if necessary.
16. Repeat steps 13 to 15 a few times until all the air in the cooling circuit is vented. Check whether a humming sound is generated or observe whether the pipe vibrates to find out if there is still air left in the circuit.

4.5 Draining Internal Cooling Circuits

You can drain the module through the drain valve.



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. Direct the hose into a suitable container. Make sure the ends of the hose are not immersed in the coolant at any position so that air can displace the coolant in the system.
2. Open the drain valve and wait until all coolant has been drained.
3. If the drive is to be stored in temperatures below 0 °C, do as follows.
   a. Dry the cooling circuit with natural ventilation.
   b. Fill the cooling circuit with 20% or 40% ethylene glycol solution.
   c. Drain the cooling circuit again.

5 Options

5.1 List of Options

Table 5–1 List of active rectifier options

No.	Part name	Remark
1	Function expansion module (See *"5.3 Function Expansion Module" on page 154*	Applicable to H6w, H7w, and H8w modules.
2	Pre-charge resistor (See *"5.7 Pre-charge Resistor of the Active Rectifier" on page 157*	
3	Optical fiber cable set (See *"5.8 Optical Fiber Cable Set of Active Rectifier " on page 158*	
4	Module disassembly tooling (See *"5.4 Tooling" on page 155*	
5	Fan fault detection module (See *"5.6 Fan Fault Detection Module" on page 156*	
6	Wall-mounted bracket (See *"5.5 Wall-mounted Bracket" on page 156*	Applicable to H6w modules.

Table 5–2 List of inverter module options

No.	Part name	Remark
1	Function expansion module (See *"5.3 Function Expansion Module" on page 154*	Applicable to H6w, H7w, and H8w modules.
2	Current-sharing reactor (See *"5.9 Current-sharing Reactor of the Inverter Module" on page 158*	Only applicable to the H7w module. The current-sharing reactor is integrated into the H8w module.
3	Water-to-air heat exchanger (See *"5.10 Water-to-Air Heat Exchanger of the Module" on page 160*	Only applicable to H6w and H7w modules. The water-to-air heat exchanger is integrated into the H8w module.
4	dv/dt filter (See *"5.11 Inverter Module Filter" on page 163*	Applicable to H6w, H7w, and H8w modules.
5	Module disassembly tooling (See *"5.4 Tooling" on page 155*	Applicable to H7w and H8w modules.
6	Wall-mounted bracket (See *"5.5 Wall-mounted Bracket" on page 156*	Applicable to H6w modules.

5.2 Fuse

Active rectifier

Table 5–3 Selection of fuses (AC side)

Module model	Fuse model (BUSSMANN)	Fuse model (SINOFUSE)	Quantity
MD880LC-40M-0299-5	170M6408 (500 A/690 V)	RS306-1-S1P-500A690V	3
MD880LC-40M-0395-5	170M6411 (700 A/690 V)	RS306-1-S1P-700A690V	3
MD880LC-40M-0530-5	170M6413 (900 A/690 V)	RS306-3-S1P-900A690V	3
MD880LC-40M-0650-5	170M6415 (1100 A/690 V)	RS306-3-S1P-1100A690V	3
MD880LC-40M-0820-5	170M6416 (1250 A/690 V)	RS306-3-S1P-1250A690V	3
MD880LC-40M-1558-5	170M6417 (1400 A/690 V)	RS306-3-S1P-1400A 690V	6
MD880LC-40M-0530-7	170M6413 (900 A/690 V)	RS306-3-S1P-900A690V	3
MD880LC-40M-0650-7	170M6415 (1100 A/690 V)	RS306-3-S1P-1100A690V	3
MD880LC-40M-0820-7	170M6416 (1250 A/690 V)	RS306-3-S1P-1250A690V	3
MD880LC-40M-1558-7	170M6417 (1400 A/690 V)	RS306-3-S1P-1400A 690V	6

Table 5–4 Selection of fuses (DC side)

Module model	Fuse model (BUSSMANN)	Fuse model (SINOFUSE)	Quantity
MD880LC-40M-0299-5	170M6541 (450 A/1250 V)	RS306-3-S5P-450A1250V-D	2
MD880LC-40M-0395-5	170M6544 (630 A/1250 V)	RS306-3-S5P-630A1250V-D	2
MD880LC-40M-0530-5	170M6548 (1000 A/1250 V)	RS306-3-S5P-900A1250V-D	2
MD880LC-40M-0650-5	170M6549 (1100 A/1250 V)	RS306-3-S5P-1100A1250V-D	2
MD880LC-40M-0820-5	170M7597 (1500 A/1250 V)	RSZ307-5-W7P-1500A1200V	2
MD880LC-40M-1558-5	170M7597 (1500 A/1250 V)	RSZ307-5-W7P-1500A1200V	4
MD880LC-40M-0530-7	170M6548 (1000 A/1250 V)	RS306-3-S5P-900A1250V-D	2
MD880LC-40M-0650-7	170M6549 (1100 A/1250 V)	RS306-3-S5P-1100A1250V-D	2
MD880LC-40M-0820-7	170M7597 (1500 A/1250 V)	RSZ307-5-W7P-1500A1200V	2
MD880LC-40M-1558-7	170M7597 (1500 A/1250 V)	RSZ307-5-W7P-1500A1200V	4

Inverter module

Table 5–5 Selection of fuses for the inverter module

Module model	Fuse model (BUSSMANN)	Fuse Model (SINOFUSE)	Quantity
MD880LC-50M-0149-5	170M6538 (315 A/1250 V)	RS306-3-S5P-315A1250V-D	2
MD880LC-50M-0183-5	170M6539 (350 A/1250 V)	RS306-3-S5P-350A1250V-D	2
MD880LC-50M-0245-5	170M6541 (450 A/1250 V)	RS306-3-S5P-450A1250V-D	2
MD880LC-50M-0299-5	170M6543 (550 A/1250 V)	RS306-3-S5P-550A1250V-D	2
MD880LC-50M-0349-5	170M6544 (630 A/1250 V)	RS306-3-S5P-630A1250V-D	2
MD880LC-50M-0395-5	170M6545 (700 A/1250 V)	RS306-3-S5P-700A1250V-D	2

Module model	Fuse model (BUSSMANN)	Fuse Model (SINOFUSE)	Quantity
MD880LC-50M-0530-5	170M6497 (900 A/1250 V)	RS306-3-S5P-900A1250V-D	2
MD880LC-50M-0650-5	170M6498 (1100 A/1250 V)	RS306-3-S5P-1100A1250V-D	2
MD880LC-50M-0900-5	170M7597 (1500 A/1250 V)	RSZ307-5-W7P-1500A1200V	2
MD880LC-50M-0530-7	170M6497 (900 A/1250 V)	RS306-3-S5P-900A1250V-D	2
MD880LC-50M-0650-7	170M6498 (1100 A/1250 V)	RS306-3-S5P-1100A1250V-D	2
MD880LC-50M-0900-7	170M7597 (1500 A/1250 V)	RSZ307-5-W7P-1500A1200V	2

Table 5–6 Selection of fuse switches for the inverter module

Module model	Recommended DC fuse switch model			Recommended built-in fuse model		
	Model: SOCOMEC	Spec.	Qty	Model (SINOFUSE)	Spec.	Quantity
MD880LC-50M-0149-5	Switch: 38S12080 Handle: 14333111 Extension rod: 14031240	800 A 1250 VDC	1	RS306-3-S5P-315A1250V-D	315 A	2
MD880LC-50M-0183-5	Switch: 38S12080 Handle: 14333111 Extension rod: 14031240	800 A 1250 VDC	1	RS306-3-S5P-350A1250V-D	350 A	2
MD880LC-50M-0245-5	Switch: 38S12080 Handle: 14333111 Extension rod: 14031240	800 A 1250 VDC	1	RS306-3-S5P-450A1250V-D	450 A	2
MD880LC-50M-0299-5	Switch: 38S12080 Handle: 14333111 Extension rod: 14031240	800 A 1250 VDC	1	RS306-3-S5P-550A1250V-D	550 A	2
MD880LC-50M-0349-5	Switch: 38S12080 Handle: 14333111 Extension rod: 14031240	800 A 1250 VDC	1	RS306-3-S5P-630A1250V-D	630 A	2
MD880LC-50M-0395-5	Switch: 38S12080 Handle: 14333111 Extension rod: 14031240	800 A 1250 VDC	1	RS306-3-S5P-700A1250V-D	700 A	2
MD880LC-50M-0530-5	Switch: 38S12080 Handle: 14333111 Extension rod: 14031240	800 A 1250 VDC	1	RS306-3-C4Z-900A-1000V	900 A	2
MD880LC-50M-0650-5	Switch: 38S12080 Handle: 14333111 Extension rod: 14031240	800 A 1250 VDC	1	RS306-2-C4Z-1100A-1000V	1100 A	2

Module model	Recommended DC fuse switch model			Recommended built-in fuse model		
	Model: SOCOMEC	Spec.	Qty	Model (SINOFUSE)	Spec.	Quantity
MD880LC-50M-0900-5	Switch: 38S14160 Handle: 14333111 Extension rod: 14031240	1600 A 1250 VDC	1	RS306-2-C4Z-900A-1000V	900 A	2
MD880LC-50M-0530-7	Switch: 38S12080 Handle: 14333111 Extension rod: 14031240	800 A 1250 VDC	1	RS306-3-C4Z-900A-1000V	900 A	2
MD880LC-50M-0650-7	Switch: 38S12080 Handle: 14333111 Extension rod: 14031240	800 A 1250 VDC	1	RS306-2-C4Z-1100A-1000V	1100 A	2
MD880LC-50M-0900-7	Switch: 38S14160 Handle: 14333111 Extension rod: 14031240	1600 A 1250 VDC	1	RS306-2-C4Z-900A-1000V	900 A	2

5.3 Function Expansion Module

See the following table for specific description of the expansion modules, and see the user guide of each module for details.

Table 5–7 Function modules used together with the HCU

No.	Name	Model	Function	Connection method with HCU	Dimension (mm)
1	Encoder detection module	HPG-10	HTL incremental differential, single-ended, OC or OE encoder detection, frequency-division output	Slot	105 x 73 x 24
		HPG-40	Resolver signal detection module	Slot	105 x 73 x 24
		HPG-50	TTL incremental OC or differential encoder detection, frequency-division output	Slot	105 x 73 x 24
2	I/O module	HIO-10	Two AIs Two AOs Two DIOs One relay output	Slot	105 x 73 x 24
3	PROFIBUS-DP module	HDP-10	PROFIBUS-DP bus adaption	Slot	75 x 73 x 24
4	CAN bus module	HCAN-10	CANopen bus adaptation	Slot	75 x 73 x 24
		HCAN-30	CAN 2.0 bus adaption	Slot	75 x 73 x 24
5	Modbus-RTU module	HMBA-10	Modbus-RTU bus adaption	Slot	75 x 73 x 24
6	EtherCAT module	HETC-10	EtherCAT bus adaption	Slot	75 x 73 x 24
7	Ethernet module	HETN-10	Ethernet commissioning module	Slot	75 x 73 x 24

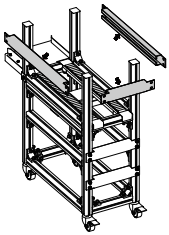
No.	Name	Model	Function	Connection method with HCU	Dimension (mm)
8	PROFINET I/O module	HPFN-10	Adapted to PROFINET I/O industrial Ethernet	Slot	75 x 73 x 24
		HPFN-20	Adapted to PROFINET IRT industrial Ethernet	Slot	75 x 73 x 24
9	Modbus TCP module	HMBT-10	Modbus TCP industrial Ethernet adaption	Slot	75 x 73 x 24
10	Parallel control module	HPCU-60	Supports two to six parallel modules.	Optical fiber	232 x 86 x 40
		HPCU-40	Supports 2 to 4 parallel modules.	Optical fiber	232 x 86 x 40
11	Function expansion module	HESD-10	One expansion slot	Optical fiber	105 x 75 x 70
12	Synchronous voltage detection module	HSVM-10	Three-phase AC input voltage detection	Optical fiber	150 x 100 x 30
		HSVM-20	DC voltage detection module (supports one voltage channel and two current channels)	Optical fiber	150 x 100 x 30
13	Optical fiber expansion module	HOFM-10	One pair of optical fibers	Slot	75 x 73 x 24
		HOFM-30	Three pairs of optical fibers	Slot	75 x 73 x 24
14	Smart operating panel	SOP-20-880	HMI operating panel	Network cable	73 x 125 x 25
15	Optical fiber routing control module	HOFR-50	Supports data exchange among two to five HCU control modules	Optical fiber	232 x 86 x 40
16	Pulse-by-pulse current limit module	HCBC-A0	Pulse-by-pulse current limit control for parallel power modules	Optical fiber	232 x 86 x 40

Note

- The HOFM-30 can be installed only in SLOT1 or SLOT2.
- The HDP-10 is recommended to be installed in SLOT3.

5.4 Tooling

The following figure shows the tooling for installing and dismantling the H8w module.

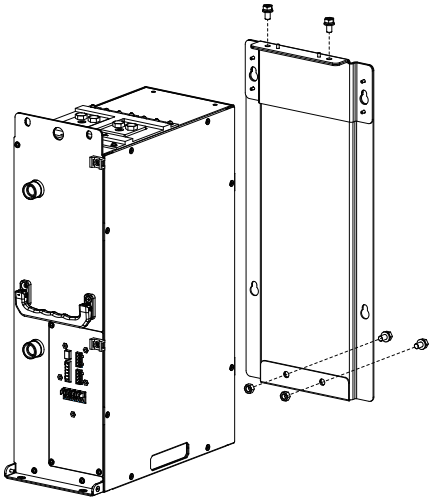


5.5 Wall-mounted Bracket

To install the H6w module on the wall, use four screws to secure the H6w module to the wall-mounted bracket, and then install the bracket assembly to the wall or cabinet.

Note

Engineering drive options - Wall-mounted bracket for water-cooled H6w, model: MD880LC-BGZ J-H6W



5.6 Fan Fault Detection Module

The HFAN-10 fan fault detection module is used to detect the operating state of the fan, including the fan feedback signal detection and digital output function.

Features:

- Supports detection on the operating state of the fan with voltage signal feedback through FAN_DI1 to FAN_DI6.
- Supports DO1 and DO2.
- DIL is reserved as a regular DI input, which does not support fan state detection.
- Powered by the HCU control module without the need for an external power supply.

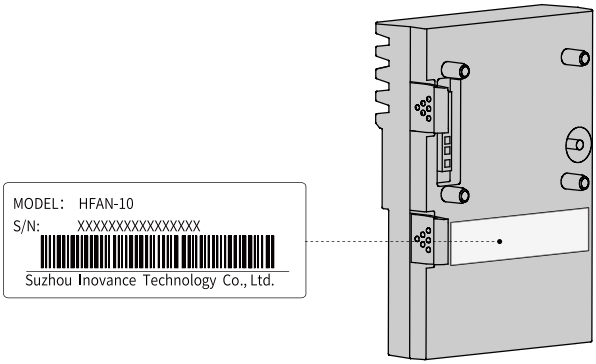


Figure 5-1 Nameplate and model

HFAN-10
① ②

①	**Product series** HFAN: Fan fault detection module	③	**Product type** 10: Fan fault detection module with voltage signal feedback

For details about the fan fault detection module, see *HFAN-10 Fan Fault Detection Module User Guide*.

5.7 Pre-charge Resistor of the Active Rectifier

Model	Name	Remark
MD880LC-SR-7	AC pre-charge resistor	This model contains three 5 Ω resistors with the cable set.

For details on selection of the pre-charge resistor, see *"Table 2–1 H6w pre-charge circuit configuration" on page 64* and *"Table 2–3 H8w pre-charge circuit configuration" on page 65*

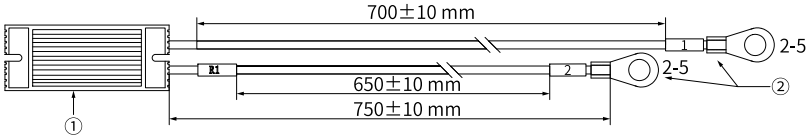


Figure 5-2 Pre-charge resistor

Table 5–8 Description of the pre-charge resistor

No.	Name	Description	Model
①	Wire-wound resistor	300 W - 5 Ω - ±215 mm x 60 mm x 30 mm - Trapezoidal aluminum housing	RXLG-300W-5RJ
②	Insulation terminal	Round (bare) - 27 A - AWG16 to 14AWG - 16.8 mm in length - Applicable to M5 (RoHS)	OT terminal with the screw hole size of M5

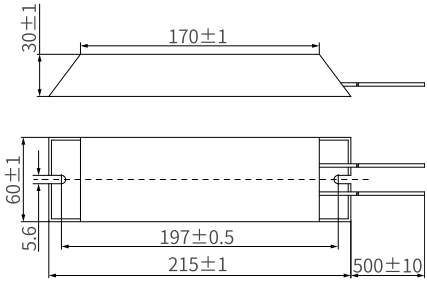


Figure 5-3 Dimensions of the pre-charge resistor (mm)

5.8 Optical Fiber Cable Set of Active Rectifier

Model	Name	Remarks
MD880–Fiber-1.5m	Optical fiber cable set	Model naming rules: MD880–Fiber-1.5m • MD880: Product series • Fiber: Optical fiber • 1.5 m: The optical fiber cable length is 1.5 m.
MD880–Fiber-3m		
MD880–Fiber-5m		
MD880–Fiber-7m		
MD880–Fiber-10m		
MD880–Fiber-15m		
MD880–Fiber-20m		

5.9 Current-sharing Reactor of the Inverter Module

Whether to install an AC current-sharing reactor at the output side of the inverter module depends on actual situations.

For inverter modules connected in parallel, install an AC current-sharing reactor close to the inverter module.

When the output cable is excessively long, install a current-sharing reactor. If the cable is 150 m or longer, install an AC current-sharing reactor close to the inverter module.

Table 5–9 Current-sharing reactor selection

Module model	Inductance	Reactor model	Insulation class	Cooling method	Rated loss at 20°C	Weight
MD880LC-50M-0149-5	20 μH	MD880-H8-L6	H	Forced air cooling	600 W	22 kg
MD880LC-50M-0183-5						
MD880LC-50M-0245-5						
MD880LC-50M-0299-5						
MD880LC-50M-0349-5						
MD880LC-50M-0395-5						
MD880LC- 50M-0530-5	8 μH	MD880-OCL-008U-0900-7	H	Forced air cooling	300 W	22 kg
MD880LC- 50M-0650-5	8 μH	MD880-OCL-008U-0900-7	H	Forced air cooling	450 W	22 kg
MD880LC- 50M-0900-5	Built-in					
MD880LC- 50M-0530-7	8 μH	MD880-OCL-008U-0900-7	H	Forced air cooling	300 W	22 kg
MD880LC- 50M-0650-7	8 μH	MD880-OCL-008U-0900-7	H	Forced air cooling	450 W	22 kg
MD880LC- 50M-0900-7	Built-in					

When using the preceding current-sharing reactor, install a water-to-air heat exchanger and a fan in the cabinet to cool down the reactor. For selection of the water-to-air heat exchanger, see *"5.10 Water-to-Air Heat Exchanger of the Module" on page 160*. For cabinet layout, see *"3.3.4 Recommended Cabinet Layout" on page 129*

MD880-OCL-008U has a temperature switch (normally-closed contact that opens for temperatures above 160°C) for overtemperature detection. It is strongly recommended to connect the temperature switch to the input DI of HCU or other controllers for overtemperature detection.

For HCU temperature detection method, see *"2.2.2 Description of Control Circuit Terminals" on page 72*.

Note

The key dimension difference between MD880-H8-L6 and MD880-OCL-008U models is that the thickness of the I/O copper busbar of MD880-H8-L6 models is 1 mm higher than that of MD880-OCL-008U models.

Dimensions of MD880-OCL-008U are as follows:

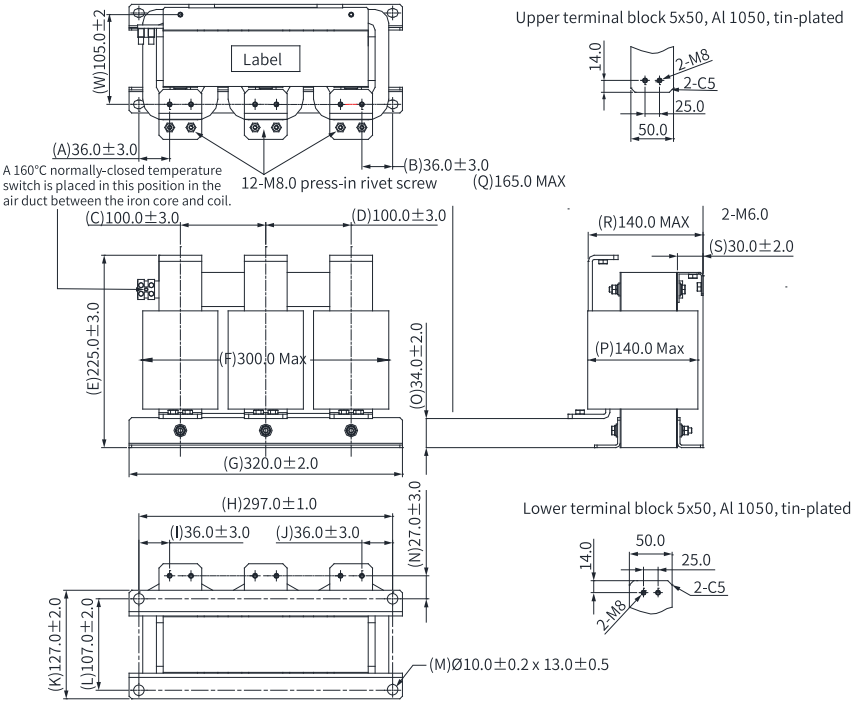


Figure 5-4 Dimensions of MD880-OCL-008U (mm)

5.10 Water-to-Air Heat Exchanger of the Module

- When the H6w module is selected, an external heat exchanger is not required for heat dissipation of H6w module. If there are other heating devices (such as reactors) in the cabinet, you can install a water-to-air heat exchanger to take away the heat generated by these devices. The heat-exchange power must be greater than the sum of the power consumption of other heating components in the cabinet.
- When H7w and H8w modules are selected, ensure that the bottom air inlet temperature of the module does not exceed 50°C. To achieve this, install a water-to-air heat exchanger at the bottom. The heat-exchange power must be greater than the sum of the power consumption of the module and other heating components in the cabinet.

See the following table for recommended options of the water-to-air heat exchanger.

Module model	Water-to-air heat exchanger model	Heat exchange power	Rated flow	Weight
MD880LC-40M-0295-5 [1]	MD880LC-WAHE-3.2 kW	3.2 kW	16 L	2.5 kg
MD880LC-40M-0395-5 [1]	MD880LC-WAHE-3.2 kW	3.2 kW	16 L	2.5 kg

Module model	Water-to-air heat exchanger model	Heat exchange power	Rated flow	Weight
MD880LC-40M-0820-7	Built-in			
MD880LC-40M-1558-7	Built-in			
MD880LC-50M-0149-5	Without output reactor, heat exchanger not required			
MD880LC-50M-0183-5	Without output reactor, heat exchanger not required			
MD880LC-50M-0245-5	Without output reactor, heat exchanger not required			
MD880LC-50M-0299-5	Without output reactor, heat exchanger not required			
MD880LC-50M-0349-5	Without output reactor, heat exchanger not required			
MD880LC-50M-0395-5	Without output reactor, heat exchanger not required			
MD880LC-50M-0530-5	MD880LC-WAHE-1.5 kW	1.5 kW	16 L	3 kg
MD880LC-50M-0650-5	MD880LC-WAHE-1.5 kW	1.5 kW	16 L	3 kg
MD880LC-50M-0900-5	Built-in			
MD880LC-50M-0530-7	MD880LC-WAHE-1.5 kW	1.5 kW	16 L	3 kg
MD880LC-50M-0650-7	MD880LC-WAHE-1.5 kW	1.5 kW	16 L	3 kg
MD880LC-50M-0900-7	Built-in			

Note

[1]: The heat exchanger has been integrated into the filter module. For dimensions, see *"Figure 3–12 Dimensions of the 395 A reactor module (mm)" on page 99*.

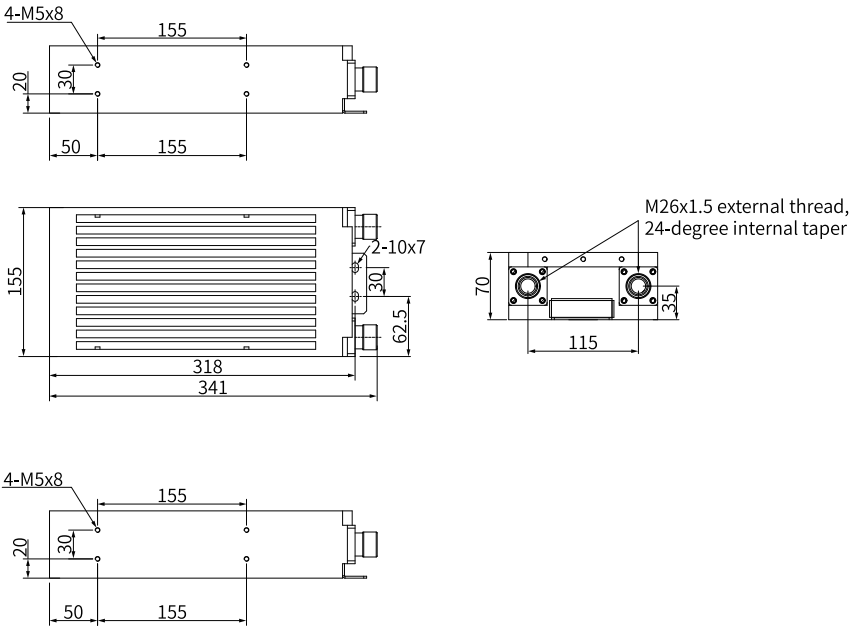


Figure 5-5 Dimensions of options of the heat exchanger of H6w rectifier cabinet (mm)

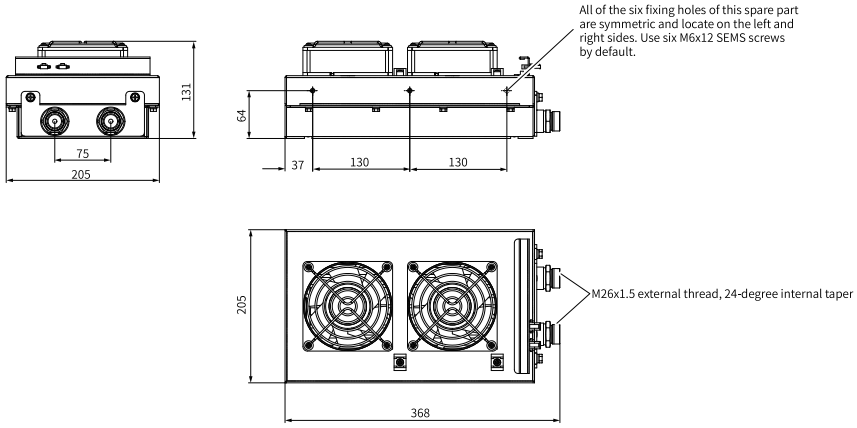


Figure 5-6 Dimensions of options of water-to-air heat exchanger of MD880LC-50M-0530-5/7 and MD880LC-50M-0650-5/7 (mm)

5.11 Inverter Module Filter

With a dv/dt filter installed on the output side of the drive, the excessive dv/dt and the reflected voltage caused by long cable can be reduced. This protects the motor winding, lowers the motor axis current, and prolongs the service life of the motor.

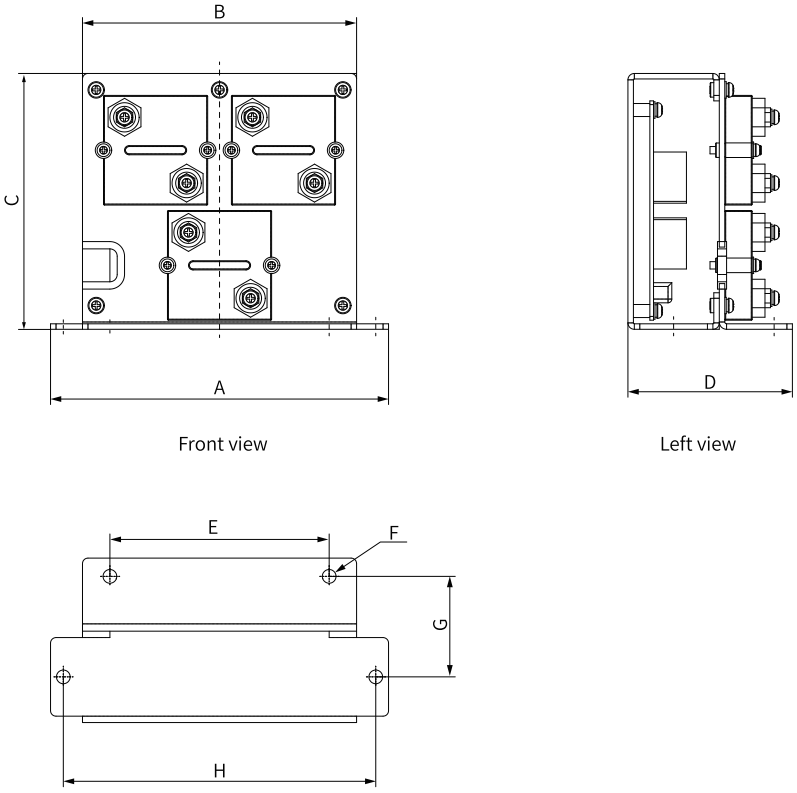
The module of the dv/dt filter is MD880LC-Filter-16.5-33-dv-dt.

Product specifications

When a 50 m non-shielded cable with a cross-sectional area of 120 mm^2 is used and a dv/dt filter is installed at the output end of the drive, the dv/dt value at the motor end can be limited to 1600 V/us.

- Maximum output frequency supported: 100 Hz
- Maximum switching frequency supported: 4 kHz

Dimensions



Front view

Left view

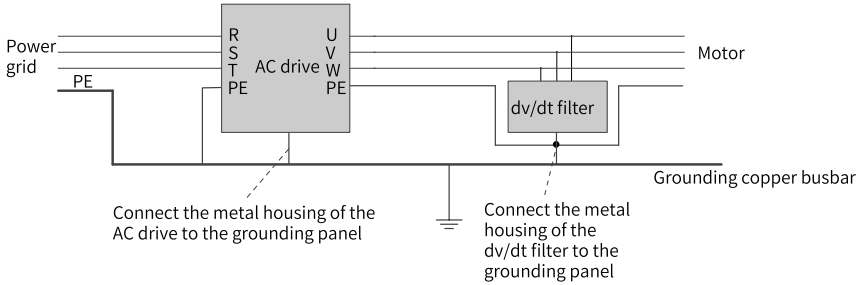
Bottom view

Figure 5-7 Dimensions of the dv/dt filter

Table 5–10 Dimensions of the dv/dt filter (mm)

Model	A	B	C	D	E	F	G	H
MD880LC-Filter-16.5-33-dv-dt	185	150	140	90	120	4-ϕ7.5	55	171

Installation



6 Certification and Standards Requirements

6.1 Compliance List

Certification	Directive		Standard
CE Certification	EMC Directive	2014/30/EU	EN IEC 61800-3:2018
	LVD	2014/35/EU	EN 61800-5–1
	RoHS Directive	2011/65/EU	EN IEC 63000

Note

The product meets the requirements of the latest version of instructions and standards of the CE certification.

6.2 CE Cerfication

6.2.1 Precautions for Compliance with European Standards

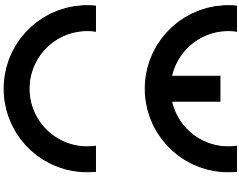


Figure 6-1 CE mark

- The CE mark indicates compliance with the Low Voltage Directive (LVD), Electromagnetic Compatibility (EMC), and Restriction of Hazardous Substances (RoHS) directives for commercial trades (production, import, and sales) in Europe.
- The CE mark is mandatory for engaging in commercial business (production, importation, and distribution) in Europe.
- The product complies with the LVD, EMC, and RoHS directives and is labeled with the CE mark.
- The machinery and devices equipped with this product must also meet CE requirements when sold in Europe.
- The integrator who integrates this drive into other products and attaches the CE mark to the final assembly has the responsibility of ensuring compliance with CE certification.

6.2.2 Requirements for Compliance with EMC

This product is applicable to the first environment and second environment and complies with EMC directive 2014/30/EU and standard EN IEC 61800-3.



If used in the first environment, the AC drive may generate radio interference. Besides the CE compliance described in this chapter, take measures to avoid interference if required.

As required by EMC directives and standards, install an EMC filter on the input side and shielded cables on the output side. Ensure that the filter is grounded properly and the shield of the output cable is grounded 360 degrees.



The manufacturer of the system with the product installed must ensure that the system meets the requirements of the European EMC Directive, and ensure that the system meets the requirements of the standard EN IEC 61800-3 according to the application environment of the system.

Introduction to EMC standards

Electromagnetic compatibility (EMC) describes the ability of electronic and electrical devices or systems to work properly in the electromagnetic environment and not to generate electromagnetic interference that influences other local devices or systems. EMC includes the following requirements:

- The electromagnetic interference generated by a device during normal operation must be restricted within a certain limit.
- The device must have sufficient immunity to electromagnetic interference in the environment and can work properly in the environment with electromagnetic interference, which is described as electromagnetic sensitivity.

EN IEC 61800-3 defines the following two environments:

- First environment: It includes domestic premises. It also includes establishments directly connected without intermediate transformer to a low-voltage power supply network which supplies buildings used for domestic purposes.
- Second environment: Environment that includes all establishments other than those directly connected to a low-voltage power supply network which supplies buildings used for domestic purposes

Devices are divided into the following four categories based on the intended application environment.

- Category C1 equipment: Power drive system (PDS) with the rated voltage lower than 1000 V, which is intended for use in the first environment
- Category C2 equipment: PDS of rated voltage less than 1000 V, which is hardwired and, when used in the First Environment, is intended to be installed and commissioned only by a professional.
- Category C3 equipment: PDS of rated voltage less than 1000 V, intended for use in the Second Environment only and not the First Environment.
- Category C4 equipment: PDS of rated voltage greater than or equal to 1000 V, or rated current greater than or equal to 400 A, or intended for use in complex systems in the Second Environment.

6.2.3 Requirements for Compliance with Low Voltage Directive

The product has been tested in accordance with EN61800-5-1 and complies with the Low Voltage Directive. Observe the following requirements to enable machines and devices integrated with this drive to comply with the Low Voltage Directive.

Installation location

Install the product in a place with overvoltage category III and pollution degree 2 or lower as specified by IEC 60664-1.

Installation environment

For installation environment requirements, see section "Installation Environment" in *MD880LC Series AC Drive (Multi-drive System) Installation and Maintenance Guide*.

Installation protection requirements

- The drive must be installed in a fireproof cabinet with doors that provide effective electrical and mechanical protection. The installation must conform to local and regional laws and regulations and relevant IEC standards.
- Drives (IP20) intended to be installed inside the cabinet must be installed in a structure that prevents intrusion of unwanted objects from the top and the front.

Requirements for protective devices

To comply with EN 61800-5-1 standards, install a fuse/circuit breaker on the input side of the drive to prevent accidents caused by short circuit in the internal circuit. See *"5.2 Fuse" on page 152* for recommended fuse/circuit breaker models.

7 Ordering Instructions

Example of active rectifier model selection

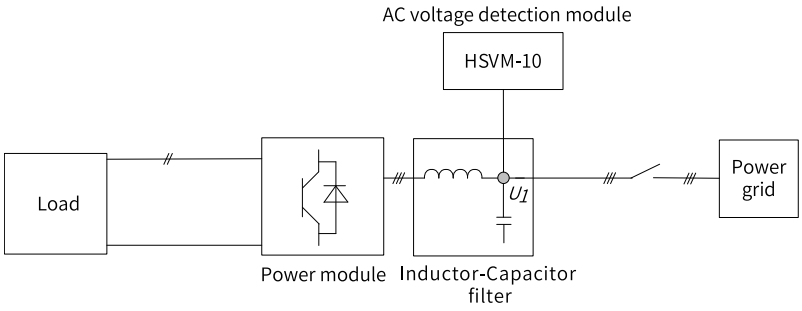


Figure 7-1 Active rectifier system topology

When two 530 A/690 V active rectifiers are connected in parallel, the derating coefficient is 0.95 and the derated rated current without overload is 1007 A. The following table shows the model list.

Model MD880LC-40...	Structure	Part No.	Quantity	Name
1007-7	(ALC+H7w) x 2	1. MD880LC-40M-0530-7	2	Active rectifier module
		2. MD880LC-40F-0650-7	2	Active rectifier filter module
		3. HCU-40	1	Active rectifier control module
		4. HPCU-40	1	Parallel control module
		5. HSVM-10	1	AC voltage detection module
		6. MD880LC-SR-7	3	AC pre-charge resistor (mandatory)
		7. HOFM-10	1	Optical fiber expansion module
		8. HFAN-10	1	Fan fault detection module

Example of power conversion system selection

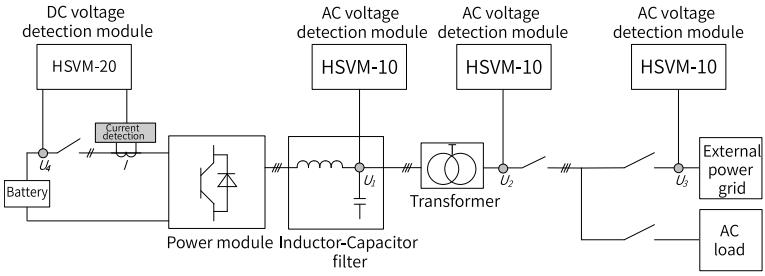


Figure 7-2 Topology of the integrated charger-inverter system

Take the 530 A/690 V power conversion system as an example. When two 530 A/690 V power conversion systems are connected in parallel, the derating coefficient is 0.95, and the derated rated current without overload is 1007 A. The topology is shown in the preceding figure, and the model list is shown in the following table. Three AC voltage detection modules are required for on-grid sampling. The sampling positions are the filter capacitor, load side, and point of interconnection. Two AC voltage detection modules are required for off-grid sampling. The sampling positions are the filter capacitor and load side. The number of AC voltage detection modules depends on the actual application requirements.

Model MD880LC-40...	Structure	Part No.	Quantity	Name
1007-7	(ALC+H7w) x 2	1. MD880LC-40M-0530-7	2	Active rectifier module
		2. MD880LC-40F-0650-7	2	Active rectifier filter module
		3. HCU-40+Power conversion system	1	Power conversion system control module
		4. HPCU-40	1	Parallel control module
		5. HSVM-10	3 ON-grid application	AC voltage detection module
			2 OFF-grid application	
		6. MD880LC-SR-7	3	AC pre-charge resistor (mandatory)
		7. HOFM-30	1	Optical fiber expansion module
		8. HFAN-10	1	Fan fault detection module

Example of inverter module model selection

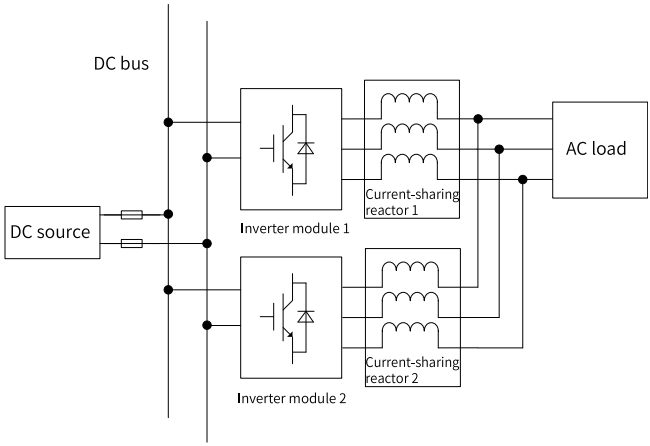


Figure 7-3 Topology of two paralleled inverter modules

When two 530 A/690 V inverters are connected in parallel, the derating coefficient is 0.95, and the derated current without overload is 1007 A. The system topology is shown in the following figure, and the order list is shown in the following table. The inverter modules 1 and 2 require two current-sharing reactors, one HPCU-40 (parallel expansion module) and one HCU-50 to allow parallel operation.

Model MD880LC-50...	Structure	Part No.	Quantity	Name
1007-7	H7w x 2	1. MD880LC-50M-0530-7	2	Inverter module
		2. MD880-OCL-008U-0900-7	2	Current-sharing reactor
		3. HCU-50S	1	Inverter control module
		4. HPCU-40	1	Parallel expansion module
		5. MD880LC-WAHE-1.5 kW	2	Water-to-air heat exchanger

The following table describes the product models and order list of the MD880 series high-performance water-cooled active rectifier and power conversion system.

Model MD880LC-40...	Structure	Part No.	Quantity	Name
0299-5	ALC+H6w	1. MD880LC-40M-0299-5	1	Active rectifier module
		2. MD880LC-40F-0395-5	1	Filter module
		3. HCU-40[1]/HCU-40+Power conversion system[2]	1	Active rectifier control module/Power conversion system control module
		4. HSVM-10 [3]	1	AC voltage detection module
		5. MD880LC-SR-7	1	AC pre-charge resistor (mandatory)
		6. HOFM-10[4]/HOFM-30 [5]	1	Optical fiber expansion module
		7. HFAN-10[6]	1	Fan fault detection module
0395-5	ALC+H6w	1. MD880LC-40M-0395-5	1	Active rectifier module
		2. MD880LC-40F-0395-5	1	Filter module
		3. HCU-40/HCU-40+Power conversion system	1	Active rectifier control module/Power conversion system control module
		4. HSVM-10	1	AC voltage detection module
		5. MD880LC-SR-7	1	AC pre-charge resistor (mandatory)
		6. HOFM-10/HOFM-30	1	Optical fiber expansion module
		7. HFAN-10	1	Fan fault detection module
0530-5	ALC+H7w	1. MD880LC-40M-0530-5	1	Active rectifier module
		2. MD880LC-40F-0650-7	1	Filter module
		3. HCU-40[1]/HCU-40+Power conversion system [2]	1	Active rectifier control module/Power conversion system control module
		4. HSVM-10 [3]	1	AC voltage detection module
		5. MD880LC-SR-7	2	AC pre-charge resistor (mandatory)
		6. HOFM-10 [4]/HOFM-30 [5]	1	Optical fiber expansion module
		7. HFAN-10 [6]	1	Fan fault detection module

Model MD880LC-40...	Structure	Part No.	Quantity	Name
0650-5	ALC+H7w	1. MD880LC-40M-0650-5	1	Active rectifier module
		2. MD880LC-40F-0650-7	1	Active rectifier filter module
		3. HCU-40/HCU-40+Power conversion system	1	Active rectifier control module/Power conversion system control module
		4. HSVM-10	1	AC voltage detection module
		5. MD880LC-SR-7	2	AC pre-charge resistor (mandatory)
		6. HOFM-10/HOFM-30	1	Optical fiber expansion module
		7. HFAN-10	1	Fan fault detection module
0820-5	ALC+H8w	1. MD880LC-40M-0820-5	1	Active rectifier module
		2. MD880LC-40F-0820-7	1	Filter module
		3. HCU-40/HCU-40+Power conversion system	1	Active rectifier control module Power conversion system control module
		4. HSVM-10	1	AC voltage detection module
		5. MD880LC-SR-7	3	AC pre-charge resistor (mandatory)
		6. HOFM-10/HOFM-30	1	Optical fiber expansion module
		7. HFAN-10	1	Fan fault detection module

Model MD880LC-40...	Structure	Part No.	Quantity	Name
1007-5	(ALC+H7w) x 2	1. MD880LC-40M-0530-5	2	Active rectifier module
		2. MD880LC-40F-0650-7	2	Active rectifier filter module
		3. HCU-40/HCU-40+Power conversion system	1	Active rectifier control module/Power conversion system control module
		4. HPCU-40	1	Parallel control module
		5. HSVM-10	1	AC voltage detection module
		6. MD880LC-SR-7	3	AC pre-charge resistor (mandatory)
		7. HOFM-10/HOFM-30	1	Optical fiber expansion module
		8. HFAN-10	1	Fan fault detection module
1235-5	(ALC+H7w) x 2	1. MD880LC-40M-0650-5	2	Active rectifier module
		2. MD880LC-40F-0650-7	2	Active rectifier filter module
		3. HCU-40/HCU-40+Power conversion system	1	Active rectifier control module/Power conversion system control module
		4. HPCU-40	1	Parallel control module
		5. HSVM-10	1	AC voltage detection module
		6. MD880LC-SR-7	3	AC pre-charge resistor (mandatory)
		7. HOFM-10/HOFM-30	1	Optical fiber expansion module
		8. HFAN-10	1	Fan fault detection module

Model MD880LC-40...	Structure	Part No.	Quantity	Name
1510-5	(ALC+H7w) x 3	1. MD880LC-40M-0530-5	3	Active rectifier module
		2. MD880LC-40F-0650-7	3	Active rectifier filter module
		3. HCU-40/HCU-40+Power conversion system	1	Active rectifier control module/Power conversion system control module
		4. HPCU-40	1	Parallel control module
		5. HSVM-10	1	AC voltage detection module
		6. MD880LC-SR-7	5	AC pre-charge resistor (mandatory)
		7. HOFM-10/HOFM-30	1	Optical fiber expansion module
		8. HFAN-10	1	Fan fault detection module
1558-5	ALC + 2 x H8w	1. MD880LC-40M-0820-5	2	Active rectifier module
		2. MD880LC-40F-1558-7	1	Active rectifier filter module
		3. HCU-40/HCU-40+Power conversion system	1	Active rectifier control module Power conversion system control module
		4. HSVM-40	1	Parallel control module
		5. HSVM-10	1	AC voltage detection module
		5. MD880LC-SR-7	5	AC pre-charge resistor (mandatory)
		6. HOFM-10/HOFM-30	1	Optical fiber expansion module
		7. HFAN-10	1	Fan fault detection module

Model MD880LC-40...	Structure	Part No.	Quantity	Name
1852-5	(ALC+H7 w) x 3	1. MD880LC-40M-0650-5	3	Active rectifier module
		2. MD880LC-40F-0650-7	3	Active rectifier filter module
		3. HCU-40/HCU-40+Power conversion system	1	Active rectifier control module/Power conversion system control module
		4. HPCU-40	1	Parallel control module
		5. HSVM-10	1	AC voltage detection module
		6. MD880LC-SR-7	5	AC pre-charge resistor (mandatory)
		7. HOFM-10/HOFM-30	1	Optical fiber expansion module
		8. HFAN-10	1	Fan fault detection module
2014-5	(ALC+H7 w) x 4	1. MD880LC-40M-0530-5	4	Active rectifier module
		2. MD880LC-40F-0650-7	4	Active rectifier filter module
		3. HCU-40/HCU-40+Power conversion system	1	Active rectifier control module/Power conversion system control module
		4. HPCU-40	1	Parallel control module
		5. HSVM-10	1	AC voltage detection module
		6. MD880LC-SR-7	6	AC pre-charge resistor (mandatory)
		7. HOFM-10/HOFM-30	1	Optical fiber expansion module
		8. HFAN-10	2	Fan fault detection module

Model MD880LC-40...	Structure	Part No.	Quantity	Name
2337-5	(ALC+H8w) x 3	1. MD880LC-40M-0820-5	3	Active rectifier module
		2. MD880LC-40F-0820-7	3	Active rectifier filter module
		3. HCU-40/HCU-40+Power conversion system	1	Active rectifier control module/Power conversion system control module
		4. HPCU-40	1	Parallel control module
		5. HSVM-10	1	AC voltage detection module
		6. MD880LC-SR-7	8	AC pre-charge resistor (mandatory)
		7. HOFM-10/HOFM-30	1	Optical fiber expansion module
		8. HFAN-10	1	Fan fault detection module
2470-5	(ALC+H7w) x 4	1. MD880LC-40M-0650-5	4	Active rectifier module
		2. MD880LC-40F-0650-7	4	Active rectifier filter module
		3. HCU-40/HCU-40+Power conversion system	1	Active rectifier control module/Power conversion system control module
		4. HPCU-40	1	Parallel control module
		5. HSVM-10	1	AC voltage detection module
		6. MD880LC-SR-7	6	AC pre-charge resistor (mandatory)
		7. HOFM-10/HOFM-30	1	Optical fiber expansion module
		8. HFAN-10	2	Fan fault detection module

Model MD880LC-40...	Structure	Part No.	Quantity	Name
2517-5	(ALC+H7 w) x 5	1. MD880LC-40M-0530-5	5	Active rectifier module
		2. MD880LC-40F-0650-7	5	Active rectifier filter module
		3. HCU-40/HCU-40+Power conversion system	1	Active rectifier control module/Power conversion system control module
		4. HPCU-60	1	Parallel control module
		5. HSVM-10	1	AC voltage detection module
		6. MD880LC-SR-7	8	AC pre-charge resistor (mandatory)
		7. HOFM-10/HOFM-30	1	Optical fiber expansion module
		8. HFAN-10	2	Fan fault detection module
3021-5	(ALC+H7 w) x 6	1. MD880LC-40M-0530-5	6	Active rectifier module
		2. MD880LC-40F-0650-7	6	Active rectifier filter module
		3. HCU-40/HCU-40+Power conversion system	1	Active rectifier control module/Power conversion system control module
		4. HPCU-60	1	Parallel control module
		5. HSVM-10	1	AC voltage detection module
		6. MD880LC-SR-7	9	AC pre-charge resistor (mandatory)
		7. HOFM-10/HOFM-30	1	Optical fiber expansion module
		8. HFAN-10	2	Fan fault detection module

Model MD880LC-40...	Structure	Part No.	Quantity	Name
3087-5	(ALC+H7w) x 5	1. MD880LC-40M-0650-5	5	Active rectifier module
		2. MD880LC-40F-0650-7	5	Active rectifier filter module
		3. HCU-40/HCU-40+Power conversion system	1	Active rectifier control module/Power conversion system control module
		4. HPCU-60	1	Parallel control module
		5. HSVM-10	1	AC voltage detection module
		6. MD880LC-SR-7	8	AC pre-charge resistor (mandatory)
		7. HOFM-10/HOFM-30	1	Optical fiber expansion module
		8. HFAN-10	2	Fan fault detection module
3116-5	(ALC+2 x H8w) x 2	1. MD880LC-40M-0820-5	4	Active rectifier module
		2. MD880LC-40F-1558-7	2	Active rectifier filter module
		3. HCU-40/HCU-40+Power conversion system	1	Active rectifier control module/Power conversion system control module
		4. HPCU-40	1	Parallel control module
		5. HSVM-10	1	AC voltage detection module
		6. MD880LC-SR-7	9	AC pre-charge resistor (mandatory)
		7. HOFM-10/ HOFM-30	1	Optical fiber expansion module
		8. HFAN-10	1	Fan fault detection module

Model MD880LC-40...	Structure	Part No.	Quantity	Name
3705-5	(ALC+H7w) x 6	1. MD880LC-40M-0650-5	6	Active rectifier module
		2. MD880LC-40F-0650-7	6	Active rectifier filter module
		3. HCU-40/HCU-40+Power conversion system	1	Active rectifier control module/Power conversion system control module
		4. HPCU-60	1	Parallel control module
		5. HSVM-10	1	AC voltage detection module
		6. MD880LC-SR-7	9	AC pre-charge resistor (mandatory)
		7. HOFM-10/HOFM-30	1	Optical fiber expansion module
		8. HFAN-10	2	Fan fault detection module
0530-7	ALC+H7w	1. MD880LC-40M-0530-7	1	Active rectifier module
		2. MD880LC-40F-0650-7	1	Filter module
		3. HCU-40 [1]/HCU-40 + Power conversion system [2]	1	Active rectifier control module/Power conversion system control module
		4. HSVM-10 [3]	1	AC voltage detection module
		5. MD880LC-SR-7	2	AC pre-charge resistor (mandatory)
		6. HOFM-10 [4]/HOFM-30 [5]	1	Optical fiber expansion module
		7. HFAN-10 [6]	1	Fan fault detection module

Model MD880LC-40...	Structure	Part No.	Quantity	Name
0650-7	ALC+H7w	1. MD880LC-40M-0650-7	1	Active rectifier module
		2. MD880LC-40F-0650-7	1	Active rectifier filter module
		3. HCU-40/HCU-40+Power conversion system	1	Active rectifier control module/Power conversion system control module
		4. HSVM-10	1	AC voltage detection module
		5. MD880LC-SR-7	2	AC pre-charge resistor (mandatory)
		6. HOFM-10/HOFM-30	1	Optical fiber expansion module
		7. HFAN-10	1	Fan fault detection module
0820-7	ALC+H8w	1. MD880LC-40M-0820-7	1	Active rectifier module
		2. MD880LC-40F-0820-7	1	Filter module
		3. HCU-40/HCU-40+Power conversion system	1	Active rectifier control module Power conversion system control module
		4. HSVM-10	1	AC voltage detection module
		5. MD880LC-SR-7	3	AC pre-charge resistor (mandatory)
		6. HOFM-10/HOFM-30	1	Optical fiber expansion module
		7. HFAN-10	1	Fan fault detection module

Model MD880LC-40...	Structure	Part No.	Quantity	Name
1007-7	(ALC+H7 w) x 2	1. MD880LC-40M-0530-7	2	Active rectifier module
		2. MD880LC-40F-0650-7	2	Active rectifier filter module
		3. HCU-40/HCU-40+Power conversion system	1	Active rectifier control module/Power conversion system control module
		4. HPCU-40	1	Parallel control module
		5. HSVM-10	1	AC voltage detection module
		6. MD880LC-SR-7	3	AC pre-charge resistor (mandatory)
		7. HOFM-10/HOFM-30	1	Optical fiber expansion module
		8. HFAN-10	1	Fan fault detection module
1235-7	(ALC+H7 w) x 2	1. MD880LC-40M-0650-7	2	Active rectifier module
		2. MD880LC-40F-0650-7	2	Active rectifier filter module
		3. HCU-40/HCU-40+Power conversion system	1	Active rectifier control module/Power conversion system control module
		4. HPCU-40	1	Parallel control module
		5. HSVM-10	1	AC voltage detection module
		6. MD880LC-SR-7	3	AC pre-charge resistor (mandatory)
		7. HOFM-10/HOFM-30	1	Optical fiber expansion module
		8. HFAN-10	1	Fan fault detection module

Model MD880LC-40...	Structure	Part No.	Quantity	Name
1510-7	(ALC+H7w) x 3	1. MD880LC-40M-0530-7	3	Active rectifier module
		2. MD880LC-40F-0650-7	3	Active rectifier filter module
		3. HCU-40/HCU-40+Power conversion system	1	Active rectifier control module/Power conversion system control module
		4. HPCU-40	1	Parallel control module
		5. HSVM-10	1	AC voltage detection module
		6. MD880LC-SR-7	5	AC pre-charge resistor (mandatory)
		7. HOFM-10/HOFM-30	1	Optical fiber expansion module
		8. HFAN-10	1	Fan fault detection module
1558-7	ALC + 2 x H8w	1. MD880LC-40M-0820-7	2	Active rectifier module
		2. MD880LC-40F-1558-7	1	Active rectifier filter module
		3. HCU-40/HCU-40+Power conversion system	1	Active rectifier control module Power conversion system control module
		4. HSVM‐40	1	Parallel control module
		5. HSVM-10	1	AC voltage detection module
		5. MD880LC-SR-7	5	AC pre-charge resistor (mandatory)
		6. HOFM-10/HOFM-30	1	Optical fiber expansion module
		7. HFAN-10	1	Fan fault detection module

Model MD880LC-40...	Structure	Part No.	Quantity	Name
1852-7	(ALC+H7 w) x 3	1. MD880LC-40M-0650-7	3	Active rectifier module
		2. MD880LC-40F-0650-7	3	Active rectifier filter module
		3. HCU-40/HCU-40+Power conversion system	1	Active rectifier control module/Power conversion system control module
		4. HPCU-40	1	Parallel control module
		5. HSVM-10	1	AC voltage detection module
		6. MD880LC-SR-7	5	AC pre-charge resistor (mandatory)
		7. HOFM-10/HOFM-30	1	Optical fiber expansion module
		8. HFAN-10	1	Fan fault detection module
2014-7	(ALC+H7 w) x 4	1. MD880LC-40M-0530-7	4	Active rectifier module
		2. MD880LC-40F-0650-7	4	Active rectifier filter module
		3. HCU-40/HCU-40+Power conversion system	1	Active rectifier control module/Power conversion system control module
		4. HPCU-40	1	Parallel control module
		5. HSVM-10	1	AC voltage detection module
		6. MD880LC-SR-7	6	AC pre-charge resistor (mandatory)
		7. HOFM-10/HOFM-30	1	Optical fiber expansion module
		8. HFAN-10	2	Fan fault detection module

Model MD880LC-40...	Structure	Part No.	Quantity	Name
2337-7	(ALC+H8w) x 3	1. MD880LC-40M-0820-7	3	Active rectifier module
		2. MD880LC-40F-0820-7	3	Active rectifier filter module
		3. HCU-40/HCU-40+Power conversion system	1	Active rectifier control module/Power conversion system control module
		4. HPCU-40	1	Parallel control module
		5. HSVM-10	1	AC voltage detection module
		6. MD880LC-SR-7	8	AC pre-charge resistor (mandatory)
		7. HOFM-10/HOFM-30	1	Optical fiber expansion module
		8. HFAN-10	1	Fan fault detection module
2470-7	(ALC+H7w) x 4	1. MD880LC-40M-0650-7	4	Active rectifier module
		2. MD880LC-40F-0650-7	4	Active rectifier filter module
		3. HCU-40/HCU-40+Power conversion system	1	Active rectifier control module/Power conversion system control module
		4. HPCU-40	1	Parallel control module
		5. HSVM-10	1	AC voltage detection module
		6. MD880LC-SR-7	6	AC pre-charge resistor (mandatory)
		7. HOFM-10/HOFM-30	1	Optical fiber expansion module
		8. HFAN-10	2	Fan fault detection module

Model MD880LC-40...	Structure	Part No.	Quantity	Name
2517-7	(ALC+H7 w) x 5	1. MD880LC-40M-0530-7	5	Active rectifier module
		2. MD880LC-40F-0650-7	5	Active rectifier filter module
		3. HCU-40/HCU-40+Power conversion system	1	Active rectifier control module/Power conversion system control module
		4. HPCU-60	1	Parallel control module
		5. HSVM-10	1	AC voltage detection module
		6. MD880LC-SR-7	8	AC pre-charge resistor (mandatory)
		7. HOFM-10/HOFM-30	1	Optical fiber expansion module
		8. HFAN-10	2	Fan fault detection module
3021-7	(ALC+H7 w) x 6	1. MD880LC-40M-0530-7	6	Active rectifier module
		2. MD880LC-40F-0650-7	6	Active rectifier filter module
		3. HCU-40/HCU-40+Power conversion system	1	Active rectifier control module/Power conversion system control module
		4. HPCU-60	1	Parallel control module
		5. HSVM-10	1	AC voltage detection module
		6. MD880LC-SR-7	9	AC pre-charge resistor (mandatory)
		7. HOFM-10/HOFM-30	1	Optical fiber expansion module
		8. HFAN-10	2	Fan fault detection module

Model MD880LC-40...	Structure	Part No.	Quantity	Name
3087-7	(ALC+H7w) x 5	1. MD880LC-40M-0650-7	5	Active rectifier module
		2. MD880LC-40F-0650-7	5	Active rectifier filter module
		3. HCU-40/HCU-40+Power conversion system	1	Active rectifier control module/Power conversion system control module
		4. HPCU-60	1	Parallel control module
		5. HSVM-10	1	AC voltage detection module
		6. MD880LC-SR-7	8	AC pre-charge resistor (mandatory)
		7. HOFM-10/HOFM-30	1	Optical fiber expansion module
		8. HFAN-10	2	Fan fault detection module
3116-7	(ALC+2 x H8w) x 2	1. MD880LC-40M-0820-7	4	Active rectifier module
		2. MD880LC-40F-1558-7	2	Active rectifier filter module
		3. HCU-40/HCU-40+Power conversion system	1	Active rectifier control module/Power conversion system control module
		4. HPCU-40	1	Parallel control module
		5. HSVM-10	1	AC voltage detection module
		6. MD880LC-SR-7	9	AC pre-charge resistor (mandatory)
		7. HOFM-10/ HOFM-30	1	Optical fiber expansion module
		8. HFAN-10	1	Fan fault detection module

Model MD880LC-40...	Structure	Part No.	Quantity	Name
3705-7	(ALC+H7w) x 6	1. MD880LC-40M-0650-7	6	Active rectifier module
		2. MD880LC-40F-0650-7	6	Active rectifier filter module
		3. HCU-40/HCU-40+Power conversion system	1	Active rectifier control module/Power conversion system control module
		4. HPCU-60	1	Parallel control module
		5. HSVM-10	1	AC voltage detection module
		6. MD880LC-SR-7	9	AC pre-charge resistor (mandatory)
		7. HOFM-10/HOFM-30	1	Optical fiber expansion module
		8. HFAN-10	2	Fan fault detection module

Note

- [1] and [2]: The models of the active rectifier model and the power conversion system control module are different. The active rectifier is HCU-40 and the power conversion system is HCU-40+PCS.
- [3]: For the active rectifier, one HSVM-10 can meet the requirements in most cases. The number of the power conversion systems needed depends on the number of AC and DC voltage sampling points and application scenarios.
- [4]: The HOFM-10 supports expansion of one HSVM-10 through optical fiber.
- [5]: The HOFM-30 supports expansion of three HSVM-10/HSVM-20 through optical fiber. Generally, one HOFM-10 is needed for the active rectifier. HOFM-30 is recommended for application of the power conversion system.
- [6]: A fan fault detection module supports six detection channels and filter fan fault detection for systems with three paralleled modules. It is recommended to use the fan fault detection module together with an HESD-10 function expansion module and HOFM-30 module.

Active rectifier and power conversion system integrated product (H6w module)

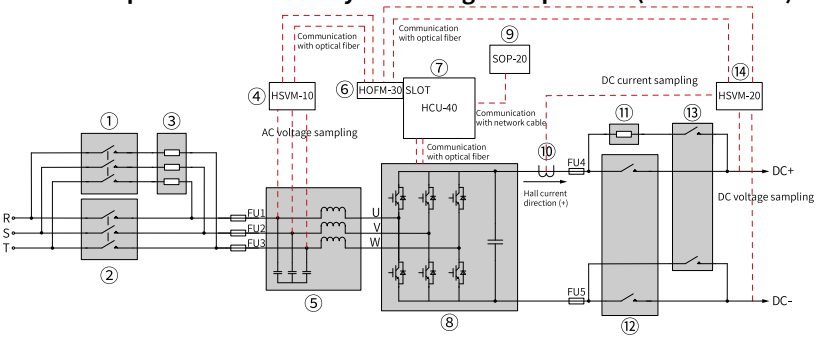


Figure 7-4 Topology of active rectifier and power conversion system integrated product (H6w module)

Table 7–1 Delivery list of power conversion system integrated product (H6w module)

No.	Name	Importance	Description
①	AC pre-charge contactor	Standard	Provides soft start circuit on the AC side.
②	Main contactor on the AC side	User-defined	You can configure the main contactor on the AC side based on actual operating conditions.
③	AC pre-charge resistor	Standard	Used to limit the inrush current on the AC side.
④	HSVM-10	Standard	Provides incoming voltage sampling on the AC side for the HCU-40 control module.
⑤	Power conversion system filter module	Standard	Used for current control on the AC side and filter out high frequency current harmonics on the AC side.
⑥	HOFM-30	Standard	Connect the HCU-40 control module through the slot to provide an optical fiber expansion interface.
⑦	HCU-40	Standard	Used to control the power conversion system power module through the optical fiber.
⑧	Power conversion system power module	Standard	Power conversion system power module
⑨	SOP-20-880	Standard	Used to connect to HCU-40 through a network cable to allow parameter setting, software programming, start/stop control, and communication relay.

No.	Name	Importance	Description
⑩	Hall components	Standard	Used to collect current on the DC side.
⑪	Pre-charge resistor for black start	Standard	Used to limit the pre-charge current upon black start on the DC side.
⑫	Main contactor on the DC side	User-defined	You can configure the main contactor on the DC side based on actual operating conditions.
⑬	Pre-charge contactor for black start	Standard	Provides pre-charge circuit upon black start on the DC side.
⑭	HSVM-20	Standard	Provides voltage and current sampling on the DC side for the HCU-40 control module.

Table 7–2 Delivery list of active rectifier integrated product (H6w module)

No.	Name	Importance	Description
①	AC pre-charge contactor	Standard	Provides soft start circuit on the AC side.
②	Main contactor on the AC side	User-defined	You can configure the main contactor on the AC side based on actual operating conditions.
③	AC pre-charge resistor	Standard	Used to limit the inrush current on the AC side.
④	HSVM-10	Standard	Provides incoming voltage sampling on the AC side for the HCU-40 control module.
⑤	Active rectifier filter module	Standard	Used for current control on the AC side and filter out high frequency current harmonics on the AC side.
⑥	HOFM-30	Standard	Connect the HCU-40 control module through the slot to provide an optical fiber expansion interface.
⑦	HCU-40	Standard	Used to control the power conversion system power module through the optical fiber.
⑧	Active rectifier power module	Standard	Active rectifier power module
⑨	SOP-20	Standard	Used to connect to HCU-40 through a network cable to allow parameter setting, software programming, start/stop control, and communication relay.
⑫	Main contactor on the DC side	User-defined	You can configure the main contactor on the DC side based on actual operating conditions.

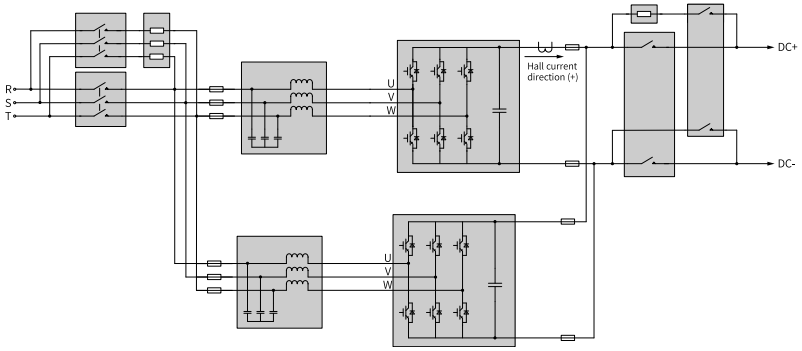


Figure 7-5 Topology of parallel operation of active rectifier products or power conversion system products (H6w module)

Note

In the parallel application, the position and quantity of the current sampling Hall on the DC side are consistent with that in the single module application, so there is no need to install additional current sampling Hall.

Inverter module

The following table describes the product models and order list of the MD880 series 690 VAC high-performance water-cooled inverter module.

Model MD880LC-50...	Structure	Part No.	Quantity	Name
0149-5	H6w	1. MD880LC-50M-0149-5	1	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
0183-5	H6w	1. MD880LC-50M-0183-5	1	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
0245-5	H6w	1. MD880LC-50M-0245-5	1	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
0299-5	H6w	1. MD880LC-50M-0299-5	1	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
0349-5	H6w	1. MD880LC-50M-0349-5	1	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller

Model MD880L C-50...	Structure	Part No.	Quantity	Name
0395-5	H6w	1. MD880LC-50M-0395-5	1	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
0466-5	2 x H6w	1. MD880LC-50M-0245-5	2	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-40	1	Parallel expansion module
0530-5	H7w	1. MD880LC-50M-0530-5	1	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
0568-5	2 x H6w	1. MD880LC-50M-0299-5	2	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-40	1	Parallel expansion module
0650-5	H7w	1. MD880LC-50M-0650-5	1	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
0663-5	2 x H6w	1. MD880LC-50M-0349-5	2	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-40	1	Parallel expansion module
0751-5	2 x H6w	1. MD880LC-50M-0395-5	2	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-40	1	Parallel expansion module
0852-5	3 x H6w	1. MD880LC-50M-0299-5	3	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-40	1	Parallel expansion module
0995-5	3 x H6w	1. MD880LC-50M-0349-5	3	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-40	1	Parallel expansion module
1126-5	3 x H6w	1. MD880LC-50M-0395-5	3	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-40	1	Parallel expansion module
0900-5	H8w	1. MD880LC-50M-0900-5	1	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller

Model MD880L C-50...	Structure	Part No.	Quantity	Name
1007-5	H7w x 2	1. MD880LC-50M-0530-5	2	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-40	1	Parallel expansion module
1235-5	H7w x 2	1. MD880LC-50M-0650-5	2	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-40	1	Parallel expansion module
1510-5	H7w x 3	1. MD880LC-50M-0530-5	3	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-40	1	Parallel expansion module
1710-5	H8w x 2	1. MD880LC-50M-0900-5	2	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-40	1	Parallel expansion module
1852-5	H7w x 3	1. MD880LC-50M-0650-5	3	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-40	1	Parallel expansion module
2014-5	H7w x 4	1. MD880LC-50M-0530-5	4	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-40	1	Parallel expansion module
2470-5	H7w x 4	1. MD880LC-50M-0650-5	4	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-40	1	Parallel expansion module
2517-5	H7w x 5	1. MD880LC-50M-0530-5	5	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-60	1	Parallel expansion module
2565-5	H8w x 3	1. MD880LC-50M-0900-5	3	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-40	1	Parallel expansion module
3021-5	H7w x 6	1. MD880LC-50M-0530-5	6	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-60	1	Parallel expansion module

Model MD880L C-50...	Structure	Part No.	Quantity	Name
3087-5	H7w x 5	1. MD880LC-50M-0650-5	5	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-60	1	Parallel expansion module
3420-5	H8w x 4	1. MD880LC-50M-0900-5	4	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-40	1	Parallel expansion module
3524-5	H7w x 7	1. MD880LC-50M-0530-5	7	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-A0	1	Parallel expansion module
3705-5	H7w x 6	1. MD880LC-50M-0650-5	6	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-60	1	Parallel expansion module
4028-5	H7w x 8	1. MD880LC-50M-0530-5	8	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-A0	1	Parallel expansion module
4275-5	H8w x 5	1. MD880LC-50M-0900-5	5	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-60	1	Parallel expansion module
4322-5	H7w x 7	1. MD880LC-50M-0650-5	7	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-A0	1	Parallel expansion module
4940-5	H7w x 8	1. MD880LC-50M-0650-5	8	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-A0	1	Parallel expansion module
0530-7	H7w	1. MD880LC-50M-0530-7	1	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
0650-7	H7w	1. MD880LC-50M-0650-7	1	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
0900-7	H8w	1. MD880LC-50M-0900-7	1	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller

Model MD880L C-50...	Structure	Part No.	Quantity	Name
1007-7	H7w x 2	1. MD880LC-50M-0530-7	2	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-40	1	Parallel expansion module
1235-7	H7w x 2	1. MD880LC-50M-0650-7	2	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-40	1	Parallel expansion module
1510-7	H7w x 3	1. MD880LC-50M-0530-7	3	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-40	1	Parallel expansion module
1710-7	H8w x 2	1. MD880LC-50M-0900-7	2	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-40	1	Parallel expansion module
1852-7	H7w x 3	1. MD880LC-50M-0650-7	3	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-40	1	Parallel expansion module
2014-7	H7w x 4	1. MD880LC-50M-0530-7	4	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-40	1	Parallel expansion module
2470-7	H7w x 4	1. MD880LC-50M-0650-7	4	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-40	1	Parallel expansion module
2517-7	H7w x 5	1. MD880LC-50M-0530-7	5	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-60	1	Parallel expansion module
2565-7	H8w x 3	1. MD880LC-50M-0900-7	3	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-40	1	Parallel expansion module
3021-7	H7w x 6	1. MD880LC-50M-0530-7	6	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-60	1	Parallel expansion module

Model MD880L C-50...	Structure	Part No.	Quantity	Name
3087-7	H7w x 5	1. MD880LC-50M-0650-7	5	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-60	1	Parallel expansion module
3420-7	H8w x 4	1. MD880LC-50M-0900-7	4	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-40	1	Parallel expansion module
3524-7	H7w x 7	1. MD880LC-50M-0530-7	7	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-A0	1	Parallel expansion module
3705-7	H7w x 6	1. MD880LC-50M-0650-7	6	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-60	1	Parallel expansion module
4028-7	H7w x 8	1. MD880LC-50M-0530-7	8	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-A0	1	Parallel expansion module
4275-7	H8w x 5	1. MD880LC-50M-0900-7	5	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-60	1	Parallel expansion module
4322-7	H7w x 7	1. MD880LC-50M-0650-7	7	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-A0	1	Parallel expansion module
4940-7	H7w x 8	1. MD880LC-50M-0650-7	8	Water-cooled inverter module
		2. HCU-50S	1	Inverter controller
		3. HPCU-A0	1	Parallel expansion module

8 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.

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